

**Subject:** The Nuclear Waste Management Organization has outlived its credibility.

Jim Baird  
Subductive Waste Disposal Method  
5152 Parton Drive  
Nanaimo, BC, Canada  
V9T 5S9  
1 250 758 4443  
Email [subductionservices@shaw.ca](mailto:subductionservices@shaw.ca)  
<http://members.shaw.ca/subductionservices>

9/22/2004

Elizabeth Dowdeswell, President  
Nuclear Waste Management Organization  
49 Jackes Avenue First Floor  
Toronto Ontario  
M4T 1E2

Email: [edowdeswell@nwmo.ca](mailto:edowdeswell@nwmo.ca)

Dear President Dowdeswell:

Thank you for your letter of August 30 in which you suggest areas in which my insight might be helpful to NWMO in further assessing the potential associated with the subductive waste disposal method, the advantages it has to offer in achieving the objectives for nuclear waste management and the timeline required for its development.

NWMO is only now getting around to considering the proliferation problem. The consensus emerging from last years CBC program "Fueling the Future" and virtually every other post 9/11 forum is; proliferation is the greatest risk associated with nuclear power. An international repository in Canada based on the subductive waste disposal method is the only safe and viable means to addressing the proliferation problem. It is also the safest and most technically sound approach to spent fuel. At the very outset of your study your assessment team eliminated this method from study on fallacious grounds. Before even considering the greatest problem associated with the nuclear fuel cycle and the subductive waste disposal methods' greatest strength. You were advised of this many months ago and have issued no retraction or have made no adjustment to your process since. By means of this letter I am calling on the government of Canada to disband the NWMO immediately as it is has demonstrated it has nothing new to offer with respect to Canadian's apprehension about nuclear waste. It is simply reinforcing the same fallacy the nuclear industry has foisted on the public from its inception; it is not a proliferation risk. I call upon the government of Canada to address the real problem now by allowing the real solution to immediately go forward, before it is too late.

You advise that your assessment team determined that, for disposal in subduction zones there is insufficient proof-of-concept to undertake an adequate assessment at the conceptual design level.

According to your paper Understanding the Choices, NWMO identified 14 technical methods for managing used nuclear fuel, and sorted them into three categories: methods requiring review as specified in the Nuclear Fuel Waste Act; methods receiving international attention; and methods of limited interest per the following table.

Methods Requiring Review	Methods Receiving International Attention	Methods of Limited Interest
Deep Geological Disposal in the Canadian Shield	Reprocessing, Partitioning and Transmutation	Direct Injection
Storage at Reactor Sites	Storage or Disposal at an International Repository	Rock Melting
Centralized Storage Above or Below Ground	Emplacement in Deep Boreholes	Sub-Seabed Disposal
		Disposal at Sea
		Disposal in Ice-Sheets
		Disposal in Subduction Zones
		Disposal in Space
		Dilution & Dispersion

The Methods of Limited Interest were excluded from consideration on the basis they either contravene international treaties (e.g., the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter); and/or insufficient proof-of-concept to undertake an adequate assessment at the conceptual design level.

The Assessment Team did not complete a formal assessment for these methods because in its opinion they would have scored very poorly. It eliminated Disposal in Subduction Zones, according to Table 4-1, on the basis of insufficient proof-of-concept.

Unfortunately it is impossible to prove anything to an interlocutor that is indisposed to even consider your thesis.

Disposal in Subduction Zones was screened out citing lack of confidence in predicting the fate of the used nuclear fuel as the main reason why little attention has been paid to disposal in subduction zones. Concerns have been expressed that the used fuel might return to the surface environment via volcanic eruptions. It has also been suggested that this method would be seen as a form of sea disposal and hence would be prohibited by international conventions. No national or international program is currently examining this option in any way.

As was pointed out to you in a letter of April 1, 2004, which was never posted on your website, nor in fact were 4 subsequent submissions, your assessment team's conclusions are factually incorrect.

## **Proof-of-concept**

The subductive waste disposal method would dispose of nuclear and toxic waste by placing the waste in repositories radiating from an access tunnel constructed into a subtending tectonic plate adjacent or as near as possible a subduction zone. The waste material descends then within the tectonic plate into the mantle of the Earth.

On the basis of the most current scientific evidence this method is the only viable means of disposal in which the fate of spent fuel can be confidently forecast.

Professor Frank W. Dickson, a research professor at the University of Nevada, has registered a scientifically based objection to the proposed U.S. repository at Yucca Mountain that has ramifications for all land based geologic nuclear waste disposal. Professor Dickson's concept is based on two principles. First equilibrium, considered a prerequisite for geologic disposal, is rarely found in Nature. Second excess energy, in the form of spent fuel, would upset any system that exists in such a rare state.

Professor Dickson theories have evolved from a lengthily study of granite which is a ubiquitous igneous mineral often formed in locations where the temperatures and pressures existing at the time of formation suggest the rock should not have melted.

In an August 14 op-ed article, "Yucca Mountain: Wait until we know", published in the Reno Gazette-Journal, <http://www.rgj.com/news/stories/html/2003/08/14/49340.php> Prof. Dickson stated, "I realized that placing our waste in one place underground would concentrate excess energy. Mobilized matter would move upward. Energy is transported more effectively in fluids rather than in solid rocks. Energy released in shallow sites above and below the water table creates convection cells. Hot springs and fumaroles result. Deeply buried waste would liquefy rocks. Liquid bodies with waste constituents would move upward in two ways. If light enough, they float as diapirs. Or, they move chemically in my recently conceived reaction cells, which dissolve rocks above and precipitate minerals below. Radioactive volcanoes would be emplaced on the surface."

Heat and water are the mechanisms driving Professor Dickson's reactions.

Hydrothermal convection is an efficient conductor of heat. As the temperature gradient decreases away from the crest of an oceanic ridge where hot mantle materials rise and create new oceanic crust the circulation of water decreases. Hydrothermal circulation of seawater through the oceanic crust is an important process for only about five million years after crust formation. Most of the metamorphic alteration of mid-ocean ridge basalts takes place in the first one or two million years, after which water is locked up in hydrated form in the crust. Oceanic crust older than two million years is therefore the only accessible geology in which hydrothermal convection and its potential to return radionuclides to the biosphere does not occur. Wastes deposited in the oceanic crust could not be mobilized until they reached a depth of approximately 100 kilometers in a subduction zone, which in the case of the Explorer Plate, off Vancouver Island, would take 10 million years – presuming a subduction rate of 2cm per year and a horizontal distance of 200 kilometers from the trench to the volcanic arc. By then the radiological

hazard of the waste as well as its excess energy would have dissipated. The subduction rate of the Explorer Plate, where this repository would be located, is one of the slowest in the world. The time between emplacement and any potential volcanic activity relative to the site is therefore maximized.

Subduction zones are also relatively the coolest places on the planet as the subducting oceanic crust moderates the surrounding rock.

Professor Dickson has stated of the subductive waste disposal method, **“it looks like the only alternative left to us.”**

He has also affirmed deep boreholes (currently receiving international attention) would be the worst possible isolation method.

The assessment teams' concern that used fuel might return to the surface via volcanic eruption is scientifically baseless. It has been demonstrated, experimentally, it is unlikely subducted oceanic crust contributes to destructive margin magmas. Such hydrated crusts must however dehydrate at a depth of 80-100 km (a horizontal distance of 200 km from the subduction zone) and release water into the overlaying wedge of lithospheric mantle. Since the melting temperature of mantle peridotite is lowered by the addition of water this causes melting of the overlaying mantle peridotite and andesitic volcanism. It is unlikely therefore that waste could be distributed in either airborne volcanic ash or volcanic flows as a result of being subducted in oceanic crust. If somehow melting of the oceanic crust were to occur however, this wouldn't transpire for at least 10 million years, until the waste was subducted to a minimum depth of 80 kilometers (200 kilometers horizontally). By then the radiological risk of the high-level radioactive waste would be minimal. Other toxic wastes disposed of by this method would be rendered harmless by the heat and pressure of the volcanic process.

The assessment panel's statement, “it has been suggested that this method would be seen as a form of sea disposal and hence would be prohibited by international conventions” in conjunction with the government of Canada's previous statements that it considers its commitments under the London Dumping Convention as precluding this solution, is sophistry at its worst.

A method either is or is not proscribed.

This one is not.

The status of sub-seabed disposal was ambiguous until 1996 when the Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, the London Dumping Convention, extended the definition of “dumping” to include “any deliberate disposal or storage of wastes or other matter in the sea-bed and the subsoil thereof.” Definition, 7. of Article 1 of the Protocol states: “Sea” means all marine waters other than the internal waters of States, as well as the seabed and the subsoil thereof; it does not include sub-seabed repositories accessed only from land.”

The legal opinion offered by James Waczewski, in the Journal of Transnational Law & Policy, entitled Legal, Political, and Scientific Response to Ocean Dumping and Sub-Seabed Disposal of Nuclear Waste states as follows:

*"While sub-seabed disposal of nuclear waste-filled canisters thrown from vessels apparently is regulated by the London Convention, and will certainly be regulated by the Protocol, sub-seabed disposal is not prohibited or regulated by the London Convention when accessed via land-based tunnels. Sweden has been practicing this method of sub-seabed disposal since 1988, when a repository for reactor wastes was opened sixty meters below the Baltic seabed. This project has been widely cited by politicians from other countries as a great example of solving the nuclear waste problem.*

*Because of Sweden's initiative, nuclear waste is already being deposited under the seabed. Other countries could follow Sweden's example and dispose of nuclear waste under the seabed via land-based tunnels. Special attention must be given to shore-accessed seabed burial of nuclear waste because current international coverage of this problem is extremely deficient. Neither the London Convention nor the Protocol regulates this activity because the waste is not dumped from the ocean, but from land. UNCLOS does not regulate this activity because it occurs outside the Area and within the national jurisdiction of Sweden"*

The assessment team's statement, "No national or international program is currently examining this option in any way" is also false. The Geological Survey of Japan is currently undertaking the JUDGE project which it recognizes as important from both a scientific and societal point of view. "The JUDGE project is aimed at understanding the earth's interior, last unexplored region of our planet earth, by conducting ultra-deep continental scientific drilling and multi-purpose scientific observation on subduction zones. This project provides us with fundamental knowledge that is indispensable for;

- (1) reducing the damage of geologic hazard such as earthquake,
- (2) exploration for new energy resources,
- (3) managing deep ground-water and mineral resources, and
- (4) geologic disposal of radioactive or toxic waste.

Besides, it will give incentive for innovation of new technology."

The British government has also gone back to square one to consider all disposal options and in this regard Steve Mansfield of the Committee on Radioactive Waste Management wrote July 12, 2004, "Your ideas on subduction, in particular, will aid that process and I am very grateful to you for finding the time to contact CoRWM."

Since accessible subduction zones are not available to most countries there is little reason for them to consider this option but that is hardly a rationale for Canada to eschew the most technically sound solution. Unless of course we are too timorous to actually get ahead of the curve by pursuing the safest, cheapest, most viable, home grown solution to the world's most intractable problem and to capitalize on the rare opportunity Nature has afforded us.

In its initial documentation, the assessment team sited irretrievability of the fuel after disposal in a subduction zone as an impediment where in fact this is precisely what is required in an era of vast arrays of bomb-grade materials and high-level waste laying poorly protect around the world waiting for some terrorist or rogue state to buy or steal.

The recently released MIT interdisciplinary study on "The Future of Nuclear Energy" concluded, "The reprocessing system now used in Europe, Japan, and Russia that involves separation and recycling of plutonium presents unwarranted proliferation risks. We conclude that, over at least the next 50 years, the best choice to meet these challenges is the open, once-through fuel cycle. We judge that there are adequate uranium resources available at reasonable cost to support this choice under a global growth scenario."

NWMO on the other hand considers Reprocessing, Partitioning and Transmutation as an option worthy of further consideration.

The subductive waste disposal method was of limited interest to the NWMO assessment team but the judgment of other experts in this field should be of interest to the government of Canada and other interested Canadians.

In a May 2, Tass, article "World has no feasible project yet to liquidate nuclear waste" Yevgeny Velikhov of the Kurchatov Institute, an acknowledged world expert in the nuclear power industry and fuel cycle development, an honored doctor of a number of Universities in France, USA, Great Britain, Germany, awarded the highest of the USSR and Russia's Orders and Prizes, a Szillard Prize winner of the American Physical society, and "Science and World " Prize winner of the World Federation of Scientists, Switzerland, noted, "out of 14 versions of liquidating nuclear waste in some countries, suggested by researchers now, only three can be examined dead serious and even in this case with a great share of doubt and in the most distant future".

Radioactive waste can be shipped to the sun by space freight ferries, to put into pits of the Antarctic ice cap and to place it into earth's crust at great depths so that it can melt in the plasma of the earth later."

The latter option is the subductive waste disposal method and notably the other two options Dr. Velikhov considers feasible were also of no interest to the NWMO team. It is also notable; all of Dr. Velikhov's viable options are intrinsically international ventures.

In correspondence last March, Dr. William S. Fyfe, one of Canada's top scientist, whose knowledge of the geology of ancient rocks and the movement of fluids in the Earth's crust has afforded key research into the possibility of safe geological disposal of high-level nuclear waste stated, "The best system that I know of is the one developed by Sweden, which involves disposal in a facility hollowed out under the Baltic Sea, accessible from land by tunnels. This has been in existence for some time."

A 1984 Nature article entitled "The geology of nuclear wastes disposal" authored by Professor Fyfe and other distinguished members of the International Council of Scientific

Unions concluded, "Disposal in subduction trenches and ocean sediments deserves more attention."

K. R. Rao declared in a December 25, 2001 Current Science article, Radioactive waste: The problem and its management, the subductive waste disposal method "is the state-of-the-art in nuclear waste disposal technology. It is the single viable means of disposing radioactive waste that ensures non return of the relegated material to the biosphere. At the same time, it affords inaccessibility to eliminated weapons material. The principle involved is the removal of the material from the biosphere faster than it can return. It is considered that 'the safest, the most sensible, the most economical, the most stable long-term, the most environmentally benign, the most utterly obvious places to get rid of nuclear waste, high-level waste or low-level waste is in the deep oceans that cover 70% of the planet".

Dr. Burton Richter, Noble laureate in Physics, addressing the nuclear waste problem at the July 15, 1999, World Experts Meeting on Accelerator Transmutation of Waste, stated, "It can be done if it is done right and the public is correct in their concern that it be done so. If we would dump all this stuff in subduction zones in the ocean, or if we would bury it half a kilometer deep in the deep sediments of the ocean floor, no one would ever have to worry about it."

The Ecoforum for Economics and the Environment has asserted "A solution to that problem -nuclear waste- is at hand. . . The solution is to use subduction zones, the areas where one continental plate has become pushed below another; here the encased waste would be taken slowly but surely into the depths of the earth where, eventually, it will become molten and blend into the liquid rock at the earth's core. If it ever reappears as surface rock that will be in millions of years' time, when its radiation will long have decayed and disappeared."

"Selected sites in the deep ocean trenches – subduction zones - are so good a site for nuclear waste disposal, and solve the problem so perfectly, that it became necessary to stop it happening. Skilled people were able to convince the politicians and the bureaucrats of the major nations of the world to draft and sign a treaty. A treaty making it all illegal. It was a confidence trick to end all confidence tricks." Allan J. Yeomans, Keyline Ag Consultants, Forbes, NSW Australia

Lord Oxburgh, the head of the House of Lords Science Committee and a world renowned geologist wrote two years ago, "I too have been interested in the possible use of subduction zones for the disposal of waste. . . I rather regret that this possibility has not been explored further."

Professor Tom Hilde, Department of Geology and Geophysics, Texas A&M University whose specialty is marine geology and geophysics, plate tectonics and marine magnetics has written "one of the goals should be learning how to properly and safely use Earth's "ultimate" recycling system – the subduction zones. That this will eventually be done seems to me to be obvious."

The assessment team determined that, for disposal in subduction zones, there is insufficient proof-of-concept to undertake an adequate assessment at the conceptual design level. This is patently untrue.

Sweden's disposal facility hollowed out under the Baltic Sea, accessible from land by means of a tunnel is operational proof of this concept.

The English Channel tunnel is operational proof of this concept.

The Japanese Seikan tunnel is operational proof of this concept.

South African and Canadian mines operating at depths comparable to that of a repository constructed in accordance with this method are proof of this concept. Canada has some of the finest mining engineers and technology in the world. We were tunneling through mountains a hundred years ago.

Nature's recycling method is an analogy we disregard at our peril.

Although the world has focused on land-based disposal, it is doubtful whether restricting repositories to land-based sites really prevent sea pollution. If radionuclides from a land-based repository leached out to the surface, they would quickly be transported to the sea by surface water. What is essential is to isolate radionuclides from the biosphere as reliably as possible. If sub-seabed disposal results in more reliable isolation, sub-seabed disposal is a better safeguard against sea pollution.

The United Nation Convention on the Law of the Sea delineates that a coastal state is granted sovereign rights to utilize all resources in water and under the seabed within its exclusive economic zone (EEZ), which can extend from the coast line up to 200 nautical miles (about 370 km) offshore. The proposed repository would be constructed in bedrock 2 kilometers beneath the seabed within the EEZ. Waste packages would be transported through a submarine tunnel connecting land with the sub-seabed repository. Sea pollution by means of an accident during disposal would be improbable because wastes would never go through sea water during the work. Although the repository would lie beneath the ocean floor, the knowledge accumulated from geologic disposal research can be made use of because the proposed method is a variation of geologic disposal. Long-term monitoring is also possible by maintaining the access tunnel for some time after constructing barriers to the repositories.

## **Timeline**

This method has been available for implementation for the past fifteen years. The only impediment has been what William Thorsell characterized in his July 26, 2004 Toronto Globe and Mail op ed article, Burn, baby, burn; Why we're back to nuclear power, the "endless public hearings, where its (nuclear waste's) essentially political nature ensures harmless inaction."



With the slightest political leadership the global problems of loose weapons material and spent nuclear fuel would have been resolved.

The current analogy in terms of length of tunnel is the English Channel project which was first agreed upon in 1986 and opened for commercial use 1994. As it was a first of its kind the lead for this venture likely would be reduced by this prior experience.

### **Advantages of the subductive waste disposal method in achieving the objectives set for the management approach over the other methods assessed.**

In its report, the assessment team lays out a set of objectives for the assessment of spent fuel management. You asked that I add my views concerning how the subductive waste disposal method could be expected to perform on this set of objectives or criteria as compared with the other methods which are assessed.

That assessment follows:

#### **Framework**

##### **Citizen Values**

- Safety From Harm
  - The greatest threat to Canadians is likely the spent fuel and loose nuclear weapons material of other countries which would best be eliminated by an international repository constructed in accordance with this method.
  - The U.S. Congressional Research Service has identified space and placement deep beneath the ocean floor as the only locations where nuclear weapons materials can be rendered irretrievable.
  - In its 1995 Screening Process to Determine Reasonable Alternatives for Long-Term Storage and Disposition of Weapons-Usable Fissile Materials the U.S. Department of Energy determined that only 3 of the 23 options considered rated high for Environmental Safety and Health criteria. Sub Seabed disposal and deep borehole emplacement, both of which are elements of the subductive waste disposal method, were 2 the other was taking no action at all. It follows that such a method is also the safest way to eliminate spent fuel.
- Responsibility

- The proliferation of weapons of mass destruction and their means of delivery in conjunction with the spread of international terrorism is considered by some the pre-eminent threat to mankind. Others consider climate change to be that threat. The subductive waste disposal method is the only solution that addresses both for the price of one. The cost of disposing of 100 tons of Russian and American plutonium, less than half of the 260 tons of weapons plutonium that has been produced worldwide for weapons, not including separate plutonium from commercial operations, has been estimated at over \$6 billion using other techniques. James Lovelock whose Gaia theory inspired the Green movement declared in an August 2001, "Telegraph," article, We need nuclear power, says the man who inspired the Greens, "Nuclear is the only practical energy source that we could apply in time to offset the threat from accumulating greenhouse gases." In terms of the waste problem associated with nuclear, he stated, "There seems no sensible reason why nuclear waste should not be disposed of in the deep subducting regions of the ocean where tectonic forces draw all deposits down into the magma."
- Adaptability
  - Proprietary improvements to this method have been developed to expedite the disposal of nuclear weapons material as well as to facilitate the disposal of spent fuel. Lack of support from either the nuclear power industry or government for these improvements let alone the original process has prevented these solutions from being patented or from being implemented.
  - The subductive waste disposal method is the only approach that has evolved over the past thirty years. The technology of placing waste in a hole in the ground has remained static over that time span.
- Stewardship
  - The opportunity to pool resources in an international repository, as I have proposed for the past fifteen years, reduces the cost of construction and certification of a nuclear waste repository.
  - Such a facility affords economies of scale.
  - This would be a true geological disposal solution that would not require expensive engineered barriers. The analogy is the 95 miles of tunnel for the English Channel "Chunnel" constructed at a cost of \$15 billion as opposed to the plus \$30 billion cost for 50 miles of access and repository at the US Yucca Mountain site. The Chunnel was expected to cost \$6.2 billion but finished at \$15 billion because

engineers were working with completely new technology. No one had dug tunnels that deep or that long before and cost overruns, in large part, were due to financing costs. This project would benefit from both record low interest costs and existing tunneling expertise.

- As was demonstrated by 9/11 the cost of procrastination can be immense in terms of both loss of life and the economy. Graham Allison, Director of Harvard's Belfer Center for Science and International Affairs, who has recently published a book Nuclear Terrorism: The Ultimate Preventable Catastrophe, states a nuclear attack on an American city would make 9/11 seem like a toothache.
  - Former US Defense Secretary William Perry has predicted the odds of such an event occurring before this decade is out – the next six years – are greater than even. Nevertheless NWMO is content to spend another year on redundant studies.
  - Matthew Bunn, a senior researcher at Harvard, has said that although the chance of a nuclear attack is difficult to predict they are great enough to materially lower the life expectancy of anyone living or working in New York or Washington.
  - The threat to a Canadian city is likely not as great, though no one knows, but an attack on any major city would have grave economic ramifications for us all.
- Accountability and Transparency
    - When the Hare Report was submitted in 1977, on The Management of Canada's Nuclear Wastes, Dr. Hare and his colleagues advised that, before their recommendations were adopted as policy, they should be subject to wide public discussion and have broad public support. This discussion however never took place. When asked during the Seaborn commission whether it had, Dr. Hare said, I don't think it has. I'm not sure that it can. . . .But not to carry it out or not to attempt it is—and I will use an old-fashioned word —immoral in my judgment.”
    - As the conclusions of your assessment team exemplifies, the top-down, decide, announce, defend mentality persists, with a fig leaf of consultation - mandated to ensure a predetermined outcome - thrown in to dress up the charade. When the consultation process unexpectedly does not come up with the desired result, as was the case with the Seaborn commission, another study, yours, simply takes its place.
    - As a consequence of 30 years of history on this issue the Canadian Public Policy Research Network recently learned the Canadian public

no longer trusts government, industry or existing regulators with the job of disposing of nuclear waste.

- What is to be done with the spent fuel? Here I have a specific and emphatic recommendation-- the creation of competitive, commercial, mined geologic repositories to be certified by the IAEA for spent fuel and nuclear waste; the acceptable forms of spent fuel and nuclear waste would need also to be certified by IAEA. In the era of globalization, it is ridiculous to insist that Switzerland or Belgium or England each do the research and development and find within its limited territory a site for the geologic disposal of nuclear waste.” Richard L. Garwin, Philip D. Reed Senior Fellow for Science and Technology, Council on Foreign Relations, in an address entitled *Can the World Do Without Nuclear Power? Can the World Live With Nuclear Power?* to the Nuclear Control Institute, April 9, 2001. “Ultimately, disposal under the deep seabed may be the solution, with continued surveillance to avoid poaching to obtain long-decayed spent fuel for its plutonium content.” He added.
  - As the Seaborn commission recommended a body at arm's length and independent from the utilities that provide nuclear services, from the other vested interests or offshoots of those utilities, and from government itself, is the only acceptable structure for this enterprise.
  - This is the approach I have tried to advance for fifteen years.
  - Where the backend of the nuclear fuel cycle is the sixty year old neglected stepchild of the nuclear industry; it and the elimination of nuclear weapons materials have been the sole focus of the subductive waste disposal method for twenty years.
- Knowledge
    - Despite a steady stream of reports and public hearings about nuclear waste, most participants in the Maxwell study said they had heard little or nothing and were shocked to learn that no long-term plan was in place before Canada opted for electricity from nuclear power.
    - “How, they argued, can society manage these issues for centuries to come if nobody knows what is going on?”
    - It is my experience the media makes no effort to enlighten the public on this issue and will not comment on any proposal in which some vested interest other than the government's exists, regardless of the importance of the subject or the righteousness of the proposal.

- The reality is, the government has spread millions of dollars around on the public relations exercises of consultation and studies but zero for increasing knowledge on this matter outside of the methods they have mandated for review.
- Inclusion
  - The government of Canada has made every effort to exclude any dissenting opinion on this issue. It has employed a lay waste strategy of calculated and malignant neglect which has brought the state-of-the-art solution to this problem to within weeks of collapse. Notwithstanding the thirteen months it will take the NWMO to draft its recommendations and God only knows how long it will take for the government to then respond. As Mr. Thorsell noted however, to date this has been an open-ended proposition.

### **Ethical Principles**

- Respect for life
  - The subductive waste disposal method is the only viable solution that would be implemented beyond the biosphere. It would further preserve life by affording the means to eliminating nuclear weapons material and a solution to the Achilles heal of the nuclear power industry which some proclaim is the only viable solution to climate change.
- Respect for future generations
  - This solution would unburden future generations from its two greatest threats. Once a repository built in accordance with this method is closed there would be no impact on future for generations out to, and even then with minimal effect if at all, 10 million years.
- Respect for people and cultures
  - The ultimate disrespect for people and the cause of most of the world's current unrest is the debasement of individual effort and the illegitimate obstruction of people's ability to provide for their families on the basis of that effort. That is what has transpired to date with respect to the subductive waste disposal method.
  - The ultimate respect for humanity is paid by ameliorating the threats it faces. That is what has been squelched.
- Justice
  - There is a litany of injustice associated with nuclear waste which, unaddressed, bode ill of the future.

- Mine and every other Canadian's legal right under the Canadian charter of rights and freedoms to not to be deprived of security from the threat of nuclear annihilation and/or the consequences of global warming have been illegitimately impeded.
- The mandate of the Canadian Competition Act is to maintain and encourage competition in Canada in order to promote the efficiency and adaptability of the Canadian economy, in order to expand opportunities for Canadian participation in world markets and to ensure that small and medium-sized enterprises have an equitable opportunity to participate in the Canadian economy. The government of Canada and the nuclear power industry has violated the spirit of this Act as well as any number of its particulars. The Competition Bureau has failed to respond to a complaint in this regard, <http://members.shaw.ca/subductionservices/Conspiracy.html>, as has the Federal Court of Canada. As a consequence there is no healthy competition to provide nuclear waste disposal services in this country.
- Sub-seabed disposal of nuclear waste is widely regarded within the scientific community as an important and environmentally sound means of eliminating nuclear waste. The Nuclear Energy Agency of the Organization for Economic Co-operation and Development concluded a 1988 report titled, *Feasibility of Disposal of High-Level Radioactive Waste Into the Seabed*, by stating, "seabed disposal has the capability of meeting relevant safety criteria and should therefore be considered as a potentially viable option for the safe disposal of high-level and other long-live radioactive waste." Canada has agreed to be bound by international treaty obligations that reflect the international law principles of national treatment and most-favored-nation treatment, such as the World Trade Organization Agreement on Sanitary and Phytosanitary Measures. These "WTO" obligations require Canada to base its regulatory measures on sound science, and to ensure that they are no more trade-restrictive than necessary to achieve a legitimate regulatory goal. By ascribing to the 1996 Protocol to the London Dumping Convention, without consultation with either the public or effected parties, and contrary to the scientific evidence, Canada has violated its WTO obligation.
- The measures taken by the government of Canada and the nuclear power industry have deleteriously impacted my ability to use, enjoy or dispose of my intellectual property. They both directly and indirectly are tantamount to a creeping expropriation of my intellectual property. To date there has been no offer of compensation for this expropriation.
- The measures taken by the government of Canada and the nuclear power industry constitute an unreasonable restraint of trade.
- These measures have and will continue to result in considerable loss and harm including – but not limited to – the following:

- the loss of the market for high-level waste disposal services in Canada;
  - loss of revenues from the sale or licensing of my patents;
  - loss of return on capital investments made in developing this solution;
  - the loss of my patents either through expiration or financial inability to maintain the same;
  - loss of potential investment capital.
- Fairness
    - It is patently unfair to censor material provided to the NWMO.
    - It is unfair and disrespectful to humanity, the biosphere and future generations to play down any solution offered to address our most intractable problems, let alone one that has been characterized as the state-of-the-art solution and the only alternative left.
    - It is unfair to purposefully marginalize a solution that comes from out of the main stream.
    - It is irrational to reject a solution that minimizes cost, maximizes economic benefit and reduces the impact on everyone, minority, mainstream or the marginalized.

## **Specific Objectives**

### **Fairness**

- The G8 has committed to spending \$20 billion in Russia to fund disarmament projects in that country. Unfortunately no solution to the proliferation problem is to be found there. It does however exist in this country as Dr. Velikhov concurs.
- The rationale behind Dr. Velikhov's statement is a proposal for an International Nuclear Fuel Bank in Russia which would generate upwards of \$20 billion dollars over a period of 10 years to store, not eliminate, international waste. Nils Bøhmer physicist and International Program Director for the Norwegian Bellona Foundation has stated of this proposal. "Russia maybe the one country in the world which at present is the least suited to host an international repository. "First, Russia's handling of its own waste and spent nuclear fuel speaks for itself. Second, Russia has not developed the necessary democratic system and control mechanisms that are necessary to form the basis for an internationally accepted repository.

Russia also lacks the transparency in order to assure that the money paid for the fuel ends up in the right places.”

- Global governments have spent billions on geological disposal technology which is unsound to the exclusion of any alternatives.
- The government of Canada is now using my tax dollars to finance a boondoggle overseas while stonewalling a homegrown, state-of-the-art, solution to this problem.
- It is leaving a plus \$100 billion dollar market unexploited or worse, open to the exploitation of others using technology that will prove harmful.
- William Thorsell’s op-ed article claims inaction is harmless but September 11 evidences that is far from the case.

### **Public health and safety**

The Subductive Waste Disposal Method is the safest means of eliminating nuclear waste because:

- Radionuclides disposed of by this method will not mix with the water table,
- There is a dual failsafe element to this process that would mend any fissures that might develop over a repository. First, the natural sedimentation process of the ocean would fill-in such a fault as would the settling of turbidite sediments disturbed by localized earthquakes. Second the incessant creep of the oceanic crust in relation to the overriding plate would offset a fault in the oceanic crust from a corresponding crack in the overlaying plate to the extent where escaping radionuclides would be sealed-off at the interface between the plates.
- This method provides inaccessibility to eliminated weapons material,
- This method removes waste from the biosphere faster than it can return,
- Any waste that might escape a repository constructed in accordance with this method would be bound-up in the overlaying buffer of turbidite sediments that, it has been demonstrated, have a propensity to cling to radionuclides that have fallen onto the ocean floor as a result of accidents,
- The waste would be deposited at least twice as deep in the crust of the earth as the proposed buffer between the waste and the surface for a Canadian Shield site.
- The thickness of buffer between the waste and biosphere would increase annually by 2 cms.



- An overlaying buffer of 2 kilometers of water would further separate the waste from mankind for the initial period of greatest radiological risk and would ensure the waste could only be got at via the access which could be readily secured.
- Over the centuries the subduction process would deform a backfilled and sealed access, ensuring perpetual isolation of the relegated material.
- The subducting plate is a renewable resource and is replenished continuously at its originating oceanic ridge.
- The water table would not mingle with wastes deposited in the oceanic crust and accordingly radiolysis of ground water would not be the corrosive influence on the repository and waste containers as would occur at a conventional geologic site. Nor can ground water be contaminated because of waste containers being breached by such corrosion or otherwise as is inevitable with any geologic disposal site.
- The temperature moderating effect of the ocean on the seabed in conjunction with the fact the oceanic lithosphere of the Explorer Plate contains one fifth the naturally occurring radiogenic substances found in continental lithosphere makes the Explorer Plate a superior potential dissipater of the thermal heat of high-level waste.
- Wastes deposited in the Explorer Plate would not render overlaying property useless in perpetuity.
- Wastes deposited geologically would be more vulnerable to sabotage, an act of war, glaciation or impact from a celestial body than waste deposited within an oceanic subduction zone.
- There are volcanic risks, amongst others, associated with the United States Energy Department's Yucca Mountain site. Professor Fyfe stated, during the Seaborn hearings, "I think there is total agreement that Yucca was stupid from the beginning, you don't put nuclear waste on top of a modern volcano."
- The Explorer Plate is naturally predestined for destruction.
- The Brook's Peninsula is more remote than any proposed geologic site and thus the ramifications of an unforeseen incident would be minimized.
- The Brook's Peninsula is accessible by water which is the safest means of transporting waste to a disposal site.
- For reasons of transportation alone the Subductive Waste Disposal Method is more suited to an intermediate fuel element storage/reprocessing plant/final disposal scenario than geologic

repositioning. In the September 1990, Special Issue, "Energy for Planet Earth," of the Scientific American, Wolf Hafele, in an article "Energy from Nuclear Power," relates such a scenario located on an island or peninsula. Preferably under the auspices of an international institution. He states, "International storage facilities offer several advantages. They encourage the development of global institutions that would be immune to national politics. Such facilities would allow the nuclear-power industry the time it needs to develop scientific, technological and institutional final waste disposal methods. Access to these facilities would give countries that steered clear of nuclear power because of the waste issue a chance to develop nuclear energy. The sites could also play a key role in disassembling nuclear weapons and ensuring nonproliferation of nuclear material."

- The Subductive Waste Disposal Method is the final waste disposal method Hafele affirms is still being sought. It is also the logical extrapolation of the intermediate fuel element storage/reprocessing plant scenario he describes though the once-through cycle, for security reasons, is preferable.
- A few cold war submarines might best be diverted to the usage of transporting spent fuel or weapons material from the East Coast of North America, Europe or the Baltic to a Pacific Coast repository via the Northwest Passage because cross country transportation is touted as any continental repository's principal drawback.
- The Law of Gravity would have to be repealed in order for waste disposed of by this method to return to the biosphere.

### **Worker health and safety**

- Proprietary improvements to the subductive waste disposal method have been developed which address this issue and will remain proprietary.

### **Community Well-being**

- As a major supplier of both uranium and reactors to the global market Canada has an obligation to provide for the by-products and to do everything possible to prevent proliferation.
- There is a growing recognition and discomfort amongst Canadians with this country's steadily eroding international influence as exemplified by the recent Canadian Time magazine cover and feature article, "Would Anyone Notice If Canada Disappeared? – The nation's influence in the world is shrinking. How-and why-it should be rebuilt." (There is no better way than for this country to walk its own talk with respect to global security and the environment.)

- Vancouver Island is one the most underperforming regions economically in North America.
- This is the most significant and socially beneficial economic opportunity extant and would be a boon to the Vancouver Island economy.
- Transportation makes the Subductive Waste Disposal Method the best option for an international repository.
- Many countries consider international institutions the best offset to U.S. unilateralism.
- This service would be a valuable adjunct to the international sales efforts of both AECL and Cameco.
- The West has been plagued by Beef and Softwood trade issues that many ascribe to a US backlash over Iraq. Affording this solution to humanity's greatest security risk would provide leverage over these and other Trade irritants.

## **Security**

- The need to prevent the spread of nuclear weapons has been evident from the first days of the nuclear era. In 1945, the United States, the United Kingdom, and Canada proposed the establishment of a United Nations Atomic Energy Commission for the purpose of "entirely eliminating the use of atomic energy for destructive purposes." The Baruch Plan of 1946, offered by the United States, sought to forestall nuclear arms proliferation by placing all nuclear resources under international ownership and control. A timely opportunity exists to revive that approach, preferably in Canada.
- A recent adaptation of the Baruch plan was offered by the U.S. Baker/Cutler task force that recommended the buying and removal as quickly as possible of all the nuclear weapons and weapons-usable material Russia is prepared to sell. This would provide Russia with the funds it needs to maintain control over the weapons it keeps plus its commercial waste.
- It is increasingly recognized that nuclear weapons material are a liability and certainly not the national treasure they were once characterized as. Even in the US, administrators of the Los Alamos National Laboratory are planning to remove weapons-grade nuclear materials from a section of that lab after determining the area is prone to security lapses.
- The Subductive Waste Disposal Method affords the sole practical means to eliminating nuclear weapons materials and sequesters and eliminates, spent fuel and chemical or biological toxins equally as well. It is also a solution that can be implemented at a fraction of the cost of current

approaches with a Canadian site providing the opportunity for the U.S. to reciprocate to Russia's disarmament, as that country will legitimately demand.

- Environmentalists have recently been balking together to purchase habitats they wish to preserve. The purchase of global stocks of nuclear weapons materials would be a rational exercise in self-preservation.
- Saying "recent events have made it clear that the nonproliferation regime is under growing stress," Mohamed ElBaradei recommended to the Fifty-Eighth Regular Session of the United Nations General Assembly limiting the processing and production of nuclear materials that can be used for bombs and placing facilities under international control.
- In presenting the International Atomic Energy Agency's annual report to the General Assembly, Dr. El Baradei said, "We should consider multinational approaches to the management and disposal of spent fuel and radioactive waste. More than 50 countries have spent fuel stored in temporary sites, awaiting reprocessing or disposal. Not all countries have the right geology to store waste underground and, for many countries with small nuclear programs for electricity generation or for research, the costs of such a facility are prohibitive."
- Russia has been recommended and has in fact volunteered for this facility but recent events demonstrate that such a project would be fraught with problems. A thousand rubles, or about \$45, was enough to bribe an airline agent to put a Chechen woman on board a flight just before takeoff, according to Russian investigators. The agent took the cash and, on a ticket the Chechen held for another flight, simply scrawled, "Admit on board Flight 1047." Flight 1047 exploded shortly thereafter killing all on board.
- Recent bloody attacks in Russia like the Beslan school siege have highlighted the need to prevent the worst-case scenario of nuclear terrorism. Russia, which has the second biggest nuclear arsenal after the United States and lies fifth in terms of civil nuclear power, is under pressure to act to guard high-risk atomic sites from attack after the collapse of Soviet rule left nuclear stockpiles under-protected. International criticism of the way Russian security forces handled attacks in August and September -- two plane crashes, a suicide bombing in Moscow and the hostage-taking in Beslan in which over 300 people died - - exposed the threat even further. "We've declared war on proliferation. Now we need to decide how to deal with this problem," Alexander Rumyantsev, head of the Russian Atomic Energy Agency, said recently. Russia's nuclear facilities, including 30 reactors and dozens of military sites with nuclear warheads, are attractive to extremists for their arms-grade nuclear material. All terrorist scenarios include attacks on atomic

reactors," Romyantsev said. "In the wake of these gruesome acts of terror ... we must realize we need to step up efforts to prevent terrorists from getting nuclear materials. We need new approaches."

- Sixty years into the nuclear era, despite global expenditures of billions, not a single ounce of high-level nuclear material has been permanently isolated. A dozen years after the end of the Cold War, not an ounce of plutonium has been destroyed. Dr. Garwin is right, the market can do it better, faster and cheaper and that is precisely what is required. As former U.S. Senator Nunn articulates it, "the new arms race is terrorist racing to acquire weapons of mass destruction, while the rest of us have to run even faster to prevent such an eventuality."
- Where spent fuel disposition is resisted by the public, as is burning plutonium in commercial reactors, its elimination in conjunction with weapons material becomes a saleable proposition.
- Intellectual integrity is critical to the resolution of this problem for which the public will accept nothing less than the state-of-the-art.
- The precedent for this solution has been set. At the 1996 G-8 Moscow summit on nuclear safety and security Prime Minister Chrétien agreed in principle to consider using U.S. and Russian weapons-grade plutonium as fuel in Canadian reactors. The rationale was Canada is committed to, and strongly advocates, world nuclear disarmament. Eliminating the risk of theft and proliferation posed by plutonium from nuclear weapons helps mankind to reach this goal. Other countries view Canada as a safe and responsible country that can act as a respected third party in converting both Russian and U.S. weapons-grade plutonium.
- The same rationale applies to an international repository in which spent fuel, which can either be harvested for plutonium or used in a dirty bomb, or nuclear weapons materials will be eliminated directly, rather than first being irradiated before being placed in a Canadian repository, as would have been the case had the Prime Minister's offer been taken up.
- The anticipated savings this proposal affords over a Yucca Mountain repository would provide a substantial down payment on the global inventory of nuclear weapons materials plus the means to safely transport them to the proposed repository.
- "We're racing toward unprecedented catastrophe former US secretary of defense Perry warns in an August 11, New York Times op ed article entitled, An American Hiroshima, by Nicholas D. Kristof. "This is preventable but we're not doing the things that could prevent it." He added.

- Mr. Kristof responded, “That is what I find baffling; an utter failure of the political process.
- Al Qaeda spokesman Suleiman Abu Gheith has stated Al Qaeda's objective: "to kill 4 million Americans — 2 million of them children — and to exile twice as many and wound and cripple hundreds of thousands."
- Nearly 3,000 died in the Sept. 11 attacks. It would take about 1,334 similar assaults to reach 4 million. Or it could take one nuclear weapon.
- In the two years after 9/11, fewer potential weapons in Russia were secured than in the two years prior to the attack. Underlying this lack of urgency is a failure to grasp a fundamental insight: Nuclear terrorism is preventable.
- A serious campaign to prevent nuclear terrorism needs to be organized under a doctrine of Three No's: no loose nukes, no new nascent nukes, and no new nuclear weapons states.
- Canada can and should, for its own security, provide the solution to the first two and remain compliant with the third.
- Although the United States and Russia have deactivated thousands of nuclear warheads since the end of the cold war, tens of thousands remain activated or sitting in stockpiles where they can be quickly reassembled. The arms reduction agreement signed by President Bush and President Vladimir Putin in 2002 calls for most of these warheads to be deactivated by 2012, but no reductions are required sooner than that and many of the deactivated warheads will still be retained in stockpiles. America's stored and deactivated weapons are well secured, but many of Russia's are not.
- The G8 is helping Russia upgrade its storage security, but at such a slow rate that hundreds of tons of highly enriched uranium and plutonium will be lying around for many years. Every ton of highly enriched uranium can be used to make more than 100 nuclear bombs. A ton of plutonium can go even further.
- The answer is to sharply increase funding for the broad range of programs intended to secure this material and reduce or eliminate other threats from cold war weapons. This is the most cost-effective defense spending any government can make. A bipartisan US commission in 2001 recommended tripling spending for these programs, but the Bush administration has failed to follow through. Senator Kerry proposes a significant increase aimed at securing all of Russia's loose bomb fuel in four years.
- There is nothing secret anymore about how to process uranium or plutonium to the purity needed for bomb-making, nor is hard to acquire

the raw ingredients. And every nuclear wannabe has now learned how to disguise the early phases of a nuclear weapons effort as part of a civilian nuclear energy program, a trick pioneered decades ago by India, with the help of Canada, and most recently employed by Iran. Unfortunately, the Nuclear Nonproliferation Treaty was explicitly intended to encourage such power programs, making it much harder to fend off the emergence of new nuclear weapons states. Obviously, the treaty needs to be toughened.

- The nuclear industry, until last winter, vehemently denied they were ever a proliferation threat which only diminishes their credibility and capacity to deal with the problems they have created.

### **Environmental integrity**

- Transportation of nuclear material is one of the most contentious, related issues. Accidents are inevitable and the material is most vulnerable to theft or terrorist attack during this phase.
- Most reactors are situated near large bodies of water. Sea transportation to a repository on an island or peninsula ensures least contact between the public and radioactive material.
- Transportation by submarine keeps the material from the reach of terrorists.
- As a result of an accident at sea, waste would either chemically bond with the sediments on the ocean floor or be diluted and dispersed in the ocean, which, although not ideal, is a viable approach to the problem.
- The other environmental advantages of the subductive waste disposal method have previously been addressed.

### **Economic viability**

- During the Seaborn hearings the point was made that the North American nuclear waste problem likely cannot be resolved until it is addressed on a continental basis. Now it is becoming apparent it will take an international effort, with associated economies of scale, to address this issue. Even the United States can not afford to go it alone. The affordability of Yucca Mountain has been called into question for many years by Senator Pete Domenici, who is a nuclear proponent otherwise. Further evidence of this problem is the fact that the current fiscal budget for Yucca Mountain is \$131 million out of a requested \$880 million.
- Russia has offered to store, not eliminate, international waste at a cost of \$20 billion. This is simply an expensive and unnecessary step when a final solution, in the same price range for the equivalent volume of waste, is available.

- The subductive waste disposal method is Nature's own recycling method.
- It does not require expensive accoutrements to keep the waste from harm.
- It is the cheapest available method but for ocean dumping which is barred and will be so for at least another 20 years.
- It makes possible the elimination of spent fuel and weapons material at the same time.
- It would transform a major economic liability for Canada into a great economic opportunity.
- It capitalizes on the currently most significant and socially beneficial economic opportunity.
- A proposal has been submitted to the global nuclear community that would ensure adequate economic resources are available to pay the costs of this approach, now and in the future. If the industry is serious about resolving its problems it will respond to this proposal by the end of this month. If does not it will also send a message. One that bodes ill for its future and that of the rest of us.

### **Adaptability**

- The adaptability of this approach has been demonstrated as has the inertia of the institutions that have been charged with responsibility for the problem to date.
- The main objection to irretrievable disposal is, an expanded nuclear industry might require the unburned uranium left in spent fuel. There is however many thousands of years worth of uranium dissolved in the oceans which will become increasingly cheaper to recover over time.
- The citizens polled in the Maxwell study want used fuel bundles to remain accessible because new technology could come up with better ways of handling waste. In other words Canadians reject the status quo and have been kept in the dark concerning the alternatives.
- Proliferation and terrorism threats preclude paralysis as a strategy.
- For the sake of current and future generations it is time the safest, cheapest and most adaptable solution is implemented.

Sincerely,  
Jim Baird

c.c. Hon. Stéphane Dion



Minister of the Environment  
[dions@equipemartin.ca](mailto:dions@equipemartin.ca)

Honourable John Efford  
Minister of Natural Resources  
[efford.j@parl.gc.ca](mailto:efford.j@parl.gc.ca)

Hon. David Emerson  
Minister of Industry  
[Minister.Industry@ic.gc.ca](mailto:Minister.Industry@ic.gc.ca)

Honourable Anne McLellan, Deputy Prime Minister and  
Minister of Public Safety  
[McLellan.A@parl.gc.ca](mailto:McLellan.A@parl.gc.ca)

Hon. Pierre Pettigrew  
Minister of Foreign Affairs  
[pettip@equipemartin.ca](mailto:pettip@equipemartin.ca)

Dr. James Lunney, M.P.  
Nanaimo-Alberni  
[lunney@canadianalliance.ca](mailto:lunney@canadianalliance.ca)