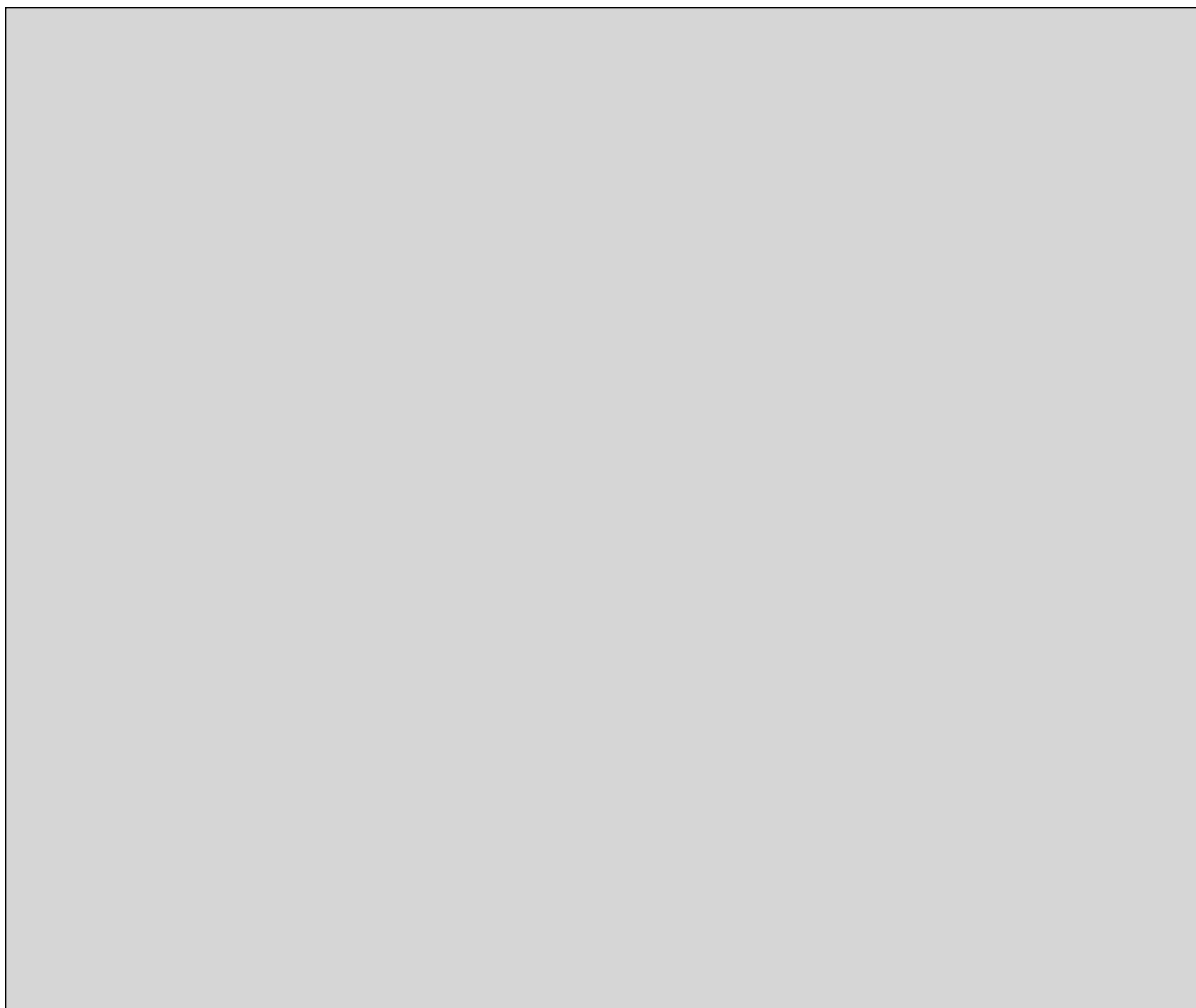


NWMO BACKGROUND PAPERS**1. GUIDING CONCEPTS****1-4 NUCLEAR WASTE MANAGEMENT IN CANADA: THE SECURITY DIMENSION****Franklyn Griffiths****Ignatieff Chair Emeritus of Peace and Conflict Studies, University of Toronto**

NWMO Background Papers

NWMO has commissioned a series of background papers which present concepts and contextual information about the state of our knowledge on important topics related to the management of radioactive waste. The intent of these background papers is to provide input to defining possible approaches for the long-term management of used nuclear fuel and to contribute to an informed dialogue with the public and other stakeholders. The papers currently available are posted on NWMO's web site. Additional papers may be commissioned.

The topics of the background papers can be classified under the following broad headings:

1. **Guiding Concepts** – describe key concepts which can help guide an informed dialogue with the public and other stakeholders on the topic of radioactive waste management. They include perspectives on risk, security, the precautionary approach, adaptive management, traditional knowledge and sustainable development.
2. **Social and Ethical Dimensions** - provide perspectives on the social and ethical dimensions of radioactive waste management. They include background papers prepared for roundtable discussions.
3. **Health and Safety** – provide information on the status of relevant research, technologies, standards and procedures to reduce radiation and security risk associated with radioactive waste management.
4. **Science and Environment** – provide information on the current status of relevant research on ecosystem processes and environmental management issues. They include descriptions of the current efforts, as well as the status of research into our understanding of the biosphere and geosphere.
5. **Economic Factors** - provide insight into the economic factors and financial requirements for the long-term management of used nuclear fuel.
6. **Technical Methods** - provide general descriptions of the three methods for the long-term management of used nuclear fuel as defined in the NFWA, as well as other possible methods and related system requirements.
7. **Institutions and Governance** - outline the current relevant legal, administrative and institutional requirements that may be applicable to the long-term management of spent nuclear fuel in Canada, including legislation, regulations, guidelines, protocols, directives, policies and procedures of various jurisdictions.

Disclaimer

This report does not necessarily reflect the views or position of the Nuclear Waste Management Organization, its directors, officers, employees and agents (the “NWMO”) and unless otherwise specifically stated, is made available to the public by the NWMO for information only. The contents of this report reflect the views of the author(s) who are solely responsible for the text and its conclusions as well as the accuracy of any data used in its creation. The NWMO does not make any warranty, express or implied, or assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information disclosed, or represent that the use of any information would not infringe privately owned rights. Any reference to a specific commercial product, process or service by trade name, trademark, manufacturer, or otherwise, does not constitute or imply its endorsement, recommendation, or preference by NWMO.

Nuclear Waste Management in Canada: The Security Dimension

Franklyn Griffiths

Ignatieff Chair Emeritus of Peace and Conflict Studies, University of Toronto

The Canadian Nuclear Safety Commission, in a draft statement of April 2003, has declared its support for consistency in national and international standards for the management of radioactive waste. This paper brings international thinking about security to bear on the Canadian discussion of nuclear waste management.

Security is a contested concept the world over. Particularly since the end of the Cold War there's been growing debate on what 'security' means and how the concept is to be applied. The attacks of 9/11 and the ensuing focus on terrorism have put something of a hold on the debate. But it's not over. Today we hear of national security, international security, cooperative security, common security, soft security, human security, environmental security, energy security, food security, and so on. To use a security-studies term, it's as though some of us were determined to 'securitize' our existence in making ever more, and not less, security problems for ourselves. If others of us believe it's better to have less fear and insecurity in our lives, we will want to treat parts of the evolving international discourse with a grain of salt.

To get this paper started, let us take security to be *a condition, never fully realized, in which a referent entity or process is made and kept safe against harmful acts, events, and situations*. This is conservative wording. That's because the person, thing, or activity to be secured is assumed to face a real external danger which is not a social construction. There's much to be said for taking threats as real and trying to figure out which of them need uppermost attention. Above all, it keeps the discussion relatively simple. But, still, think about it: how much of the terrorist threat in the world today is objective and real, and how much of it is the result of hype, spin, and the post-Cold War need for an enemy? Similarly, to what degree ought very long-term nuclear waste security measures in Canada to be governed by the counter-terrorist objectives of today?

This paper looks to the global discourse on security for what is most relevant and do-able for Canada as it considers an approach to nuclear fuel waste management that commands broad public support. The accent is on the actionable, on conceptual frameworks which have been road-tested. Opinions will differ, but it's the view here that only two international security frameworks are capable of meeting our concern to

safeguard all aspects of the nuclear waste management process. These two conceptual frameworks are commonly referred to as *national security* and *human security*. Both are obviously concerned to make things secure, but they conceive of the job and how to go about it in different ways. Neither is much interested in how a society constructs and then responds to its threat list. But the two of them cannot be right at the same time for the same referent object. Each serves as a lens that brings certain aspects of the nuclear-waste security problem into focus, while marginalizing or obscuring others. We explore the differing imagery that results. We end with a set of questions. These, it turns out, are as much about choices in the way we look at things, as they are about threats to nuclear waste management in Canada.

Nuclear Waste Management as Process

Right now, Canada is in possession of some 1.6 million spent CANDU reactor fuel bundles weighing roughly 40,000 metric tonnes. About 86,000 bundles are currently added to our holdings each year (SAIC, 2003, p. 6). The uranium-235 content of CANDU fuel waste is around 0.22 percent by weight. Plutonium is present at 0.38 percent (Roots, 1994, p. 74). Worldwide, Canada, which really means Ontario, is a great power when it comes to plutonium. According to an authoritative source, plutonium cumulatively discharged from nuclear power reactors to 1993 amounted to some 67,000 kilograms for Canada, and 58,000 kilograms for Russia. The late-1990s estimate for 2010 was 99,000 and 63,000 kilograms respectively (Albright et al., 1997, pp. 143-144). All plutonium that's been separated from spent fuel can be used to make a bomb, but some stuff is better than other stuff. About 8 kilograms, called a 'significant quantity' or SQ, are required. The United States has tested a nuclear device with a yield of 'less than 20 kilotons' using an unspecified amount of reactor-grade plutonium (Hinton et al., 1996, pp. 4-5 and 4-6). By way of comparison, the bomb that obliterated Hiroshima had a 16-kiloton yield.

It's been estimated that a determined group of six persons who have familiarized themselves with the unclassified technical literature could produce 1 SQ of plutonium metal eight weeks after the receipt of a sufficient quantity of spent fuel. This would be once they had set themselves up in a warehouse or small industrial plant which could be made ready within six months using conventional industrially supplied items (Hinton et al., 1996, pp. 4-1 to 4-8). Such a prospect is worrying. On the other hand, it would be no easy matter to obtain the requisite spent CANDU fuel: some 2.5 tonnes would have to be seized and then processed without detection, or stolen piecemeal over a period of years, in order to procure 1 SQ of plutonium. A sense of proportion is therefore essential in evaluating the threats we face. It's not two minutes to midnight. But still, when we put all of the above together, add uranium, add the dirty-bomb potential of spent fuel, and consider health and environmental risks which have nothing to do with diversion or attack, it becomes evident that significant security issues are attached to Canada's nuclear fuel waste and to the question of how it is to be managed.

The legislation that set up the Nuclear Waste Management Organization specified three long-term management approaches: (1) storage at nuclear power plant (NPP) sites; (2) centralized storage either above or below ground; and (3) deep geological disposal in

the Canadian Shield (AECL, 1994). Given that still other approaches could be added, it's apparent right away that Canadian nuclear-waste management scenarios vary greatly in matters of storage, transportation, disposal, and disposition (which is when materials are moved and treated to become less dangerous but are not disposed of in the sense of being put away for good). There is also great variety in the planning horizon (from one to 500 generations), and in the threats (from attack on a transport vehicle to incremental environmental effects of radioactive transport in deep groundwater) that can be envisaged. We are therefore going to look at the relative merits of three main approaches to nuclear waste management as seen through the lens of two different conceptual frameworks for understanding and action on matters of security.

This paper argues that we need security not only for nuclear waste as such, but also for the approach to nuclear waste management that's to be adopted in this country. The reasoning will become apparent as we proceed. Let us therefore regard nuclear waste management as a process which occurs on two interconnected planes, the physical and the societal, *both* of which have to be made secure.

Physically, nuclear waste management comes down to materials processing and storage. The process and installations are built to be robust in the face of accident, provided with all the necessary physical protection, and operated with rigorous insistence on standardized procedure. Viewed from this perspective, security threats to a nuclear waste management process take the shape of non-violent civil resistance, hostile infiltration of facilities, theft of material, sabotage, attack, operating and natural accident, and breach of very long-term containment. Some of this we've already touched upon. It's all quite physical and material. And also fairly easy to understand.

On the societal plane, nuclear waste management is a process in which Canadians create and maintain the capacity for collective action which is required for anything to be ventured on the physical plane in the first place. In this paper, 'capacity for collective action' will henceforth be taken as synonymous with the term *agency*. If agency weakens or cannot be sustained at some point after a management approach has been decided upon, the entire enterprise could be brought to a halt or even abandoned. Agency must be secured. Seen as a societal venture, nuclear waste management is vulnerable to threats associated with adverse media attention, divided public opinion, a divergent as distinct from a consensual understanding of the scientific testimony, divergent scientific testimony in itself, adversarial behaviour on the part of proponents and opponents, perceived bias in the nuclear waste management decision process, public dread of things nuclear, available anger in search of a lightning rod, and so on. Experience shows there can be formidable consequences when people are uncertain about nuclear security. To cite a foreign example, near Gorleben in Germany not long ago, literally thousands of people gathered along a stretch of railway track in an attempt to stop a train carrying nuclear fuel waste. All very social and indeed political. Also quite inseparable from what happens on the plane of physical security.

To pursue the interconnections, failure on the physical plane that's attributed to operator error could take away from agency when the political will to proceed is already

frail. On the other hand, geological burial, a physical solution which minimizes the need for human agency over the long haul, could answer the needs of a future society that's burdened and unfortunately less capable of collective action than we are today. Meanwhile, a good performance on the societal plane can generate and maintain the agency needed to proceed in the face of accident or attack. It can make it more likely that the physical activities of a nuclear waste management entity will be recognized as just and representative of the best in Canadian values and identity. And, to the extent things go wrong in the societal domain, the consequences could be fatal for nuclear waste management, and this not so much over the long haul but at the outset.

The relative importance of the physical and the societal in nuclear waste management vary with the lapse of time. The longer the duration of problem-free physical operations, the more the approach taken will be seen as normal, the more solidly will agency for it be institutionalized, and the further off it'll be from anyone's agenda for change. In short, the longer it proceeds without misadventure, the more nuclear waste management becomes a process on the physical plane. Conversely, the more socially conflicted the launch of an approach that takes some years to get up and running, especially if it calls for a departure from prior practice, the greater its vulnerability to societal as distinct from physical challenge. In sum, very early on, which is *now* when any new physical activity has yet to commence, it's the societal dimension of nuclear waste management that may be most in need of protection against adversity.

This much said, some are sure to reply that a nuclear waste management process conceived as occurring on two planes at once is not what we need to secure. All too complicated and unwieldy, they will argue, the approach taken in this paper understates the real problem which is to secure Canada's nuclear fuel waste, nothing more and nothing less. The answer is: Yes, the waste must be fully secured. But to believe that's the essence of the job is to take the view of the lower-echelon official who acts vigorously on her mandate while leaving it to her administrative and political masters to produce the necessary agency and the enabling conditions that make for agency. It is to accept a self-imposed limitation which is capable of threatening the implementation and the very ability to arrive at a broadly supported approach to nuclear waste management in this country. This is decidedly not what we want. Societal and physical activity must be integrated in the endeavour to make nuclear waste management secure.

Two Takes on Security

Today's international discussion of security is marked by a struggle of tendencies and incipient coalitions. These alignments tend to be transnational, which is to say they cut across national frontiers and are part of global conversations and efforts. Each represents at times radically different ideas of what needs to be done, who is to do it, and how. Traditional concepts and practices persist. They are well tested and continue to be very well established. Indeed, they are predominant. Nevertheless, new thinking about security has made inroads and is beginning to appear in altered security practices of publics and governments alike. Of the various alternatives to national security as the

established view, it is human security which has emerged as the prime alternative. This said, we should be fully aware that national and human security are models or ways of putting the pieces of the puzzle together. They may indeed have a resemblance to the realities of Canadian security policy and policy-making. But they do not depict it. Instead, they help us see more clearly into our choices when it comes to nuclear waste management in Canada.

National Security

Applied to issues of nuclear waste management, a national security perspective is likely to yield a four-point understanding of the situation and requirements for action. What we have here is a lens which is (1) centred on the state, (2) keyed to an us-versus-them view in which the other is the threat, (3) inclined to take the social and political foundations of official action as given, and (4) relies primarily but not exclusively on physical means in reacting to threats understood in physical terms. This is also a lens which privileges government machinery. If law enforcement, intelligence agencies, and, on occasion in Canada's internal affairs, the military are not involved, the matter is not really one of security.

We are now talking about the perspective of central decision-makers and those inside and outside of government who are associated with them in the exercise of their responsibilities. Highly varied, the latter pertain ultimately to upholding the established order and frustrating all attempts to disrupt and overturn it. In designating a given matter as a security issue, the state affirms a special right to intervene which may extend to the declaration of a state of emergency and the suspension of normal procedure. The 'security' label therefore lends gravity, legitimacy, and rhetorical force to government action which breaks with business as usual. It is to be used sparingly. At the same time, the emphasis on urgency in the national security lens makes it difficult for practitioners to regard very long-term threats, for instance to the environment or to public health, as matters requiring vigorous action now. By the same token, federal government use of the security label could form part of an effort to widen public support for the chosen approach to nuclear waste management in a post-9/11 era of intensified homeland security operations.

A national security lens also tends to treat the internal order that's to be secured as unproblematic. Agency is already there and it's the state that supplies it. Questioning of agency is not normally part of the national security job description. Nor will agency and its requirements be given screen time equal to the physical security plot in a national security script for nuclear waste management. To be sure, the state will consult with local communities; it will hear civil society, non-governmental organizations (NGOs), and individuals; and it will attend to the mobilization of public support for its priorities. In all of this, due diligence on public health, environmental, and safety matters will be done, and done religiously, both on its own merits and in order to meet public concerns. But these will be regarded not as national security matters but as expressions of good governance. Meanwhile, the state will give privileged access to the nuclear industry. Indeed, in a national security take on nuclear waste management, the whole issue could

be seen as a byplay in the perennial supergame over the nuclear industry's long-term survival. In the supergame not only the future of the industry but important aspects of Canada's security can be seen to hang on a solution to the problem of waste.

Whatever its relationship with the nuclear industry, the state as lead agent for national security will ultimately act on its own understanding. It will favour secrecy in security matters; it will find it difficult to respond to calls for transparency and accountability. When everyone has been heard and as the national interest warrants, the state will or will not move ahead in the face of divided opinion. Either way, a national security view of things gives central decision-makers comparatively little incentive to take the societal plane into account. Agency will of course not be ignored. But it will tend to be taken as a given. The focus will be on the national interest, what's most beneficial to it, and on the physical plane.

This is not the place for detail on the likelihood and consequences of various threats to three or more different nuclear waste management approaches as viewed through a national security lens. To simplify, let's assume central decision-makers incline broadly to a can-do, no-problem appreciation of the industry's ability to avoid operating accident, to deal with unlikely natural disaster, and to design for extremely long-term containment. Accordingly, the security threat will be seen as human and external to the nuclear waste management system. The human threat, in turn, will consist of non-violent and violent opposition. The former will likely be consigned to the nuisance category: it needs to be handled carefully but does not present a mortal threat unless taken over by others bent on violence, for example in demonstrations. The national security analyst is therefore left with the threat of violent opposition from those, Canadians and others, who would infiltrate, steal, sabotage, and attack nuclear waste facilities and also make unlawful use of spent nuclear fuel by selling it, employing it to make a radiological weapon, or processing it to recover plutonium for a nuclear explosive device of major proportions.

The threat of violent opposition seems likely to be focused on only two aspects of nuclear waste management as a physical process: surface storage and transportation including transportation to and interim surface storage at a geological disposal site. Taking them separately, the central decision-maker could reasonably determine that the less diverse and the more heavily protected the storage facilities, the more secure nuclear fuel waste would be against air and ground attack with weapons ranging from large aircraft to shaped charges fired from anti-tank guns. Targets here would be spent fuel holding pools and dry storage canisters, all with the aim of radioactive release in or upwind of urban areas. And if the threat were infiltration and covert action to divert amounts of spent fuel without detection, the preference could again be for fewer and indeed more remote sites. If so, a national security lens would likely yield a site-based preference for (1) geological disposal, (2) centralized underground storage, and (3) storage at NPP sites, in that order. Transportation, however, presents trade-offs relative to concentration of nuclear fuel waste.

The more spent nuclear fuel is moved about, year in and year out as it is produced, the more it is vulnerable to attack. In principle there's the option to move nuclear waste by ship to a central repository on the Shield, or to the south of it, as the season permits. This however would almost certainly raise the U.S. Great Lakes states in opposition; it would also entail counterproductive on-site storage for some months of the year when the lakes are frozen. Air transport likely being ruled out as too risky for public acceptance, road and/or rail are what's left. Here the national security planner would encounter not only the potential for attack, but perennial dangers of accident no doubt greater than those encountered within nuclear facilities. We could go on to discuss the threats, for example landslide, obstruction and fire set in a tunnel, aircraft flown into a spent-fuel convoy whose urban location is known owing to penetration of the transport control apparatus, and so on. But on the whole it seems that transportation considerations militate for continued on-site storage of nuclear waste.

Is it better to accept the risks and costs of spent fuel storage and protection on site, or to improve our security by moving the material to a less vulnerable location but at the cost of exposing it to otherwise avoidable danger in the course of year-in-year-out transits to relative safety? This broadly is where a national security outlook on nuclear waste management takes us. It's however been something of an industry mantra that nuclear fuel, fresh and used, has been transported safely all over the globe without incident for decades. Add this to perceived threats of violence against spent fuel at NPP sites, and geological burial could emerge as the preferred national security solution.

Human Security

Since the end of the Cold War, international thinking and national action for security have been demilitarized and decentred to some degree. How far this will continue to go, no one knows. Still, numerous non-military concerns and causes are now routinely framed as security matters, as indicated at the outset of this paper. More interesting, the referent object of security has also changed. Whereas the national order, and in reality the nation-state that stood for it, have long occupied the centre of security practice without challenge, now the individual human and his or her wellbeing are together represented by some as a prime concern, perhaps *the* prime concern. This development stems from many sources but it was Lloyd Axworthy, Canada's Foreign Minister between 1996 and 2000, who helped lead the way. He did so in the Land Mines Ban, in the establishment of the International Criminal Court, in Canadian debate over the Kosovo war, in ongoing international efforts to open a path for coercive humanitarian intervention, and in numerous other practical expressions of what he and others have taken to be human security. Although its staying power in world affairs is yet to be proven, human security as a conceptual framework does offer a Canadian and an internationally actionable approach to security, internal security affairs included.

Human security has been presented as 'an alternative way of seeing the world, taking people as its point of reference, rather than focusing on the security of territory or governments'. It means 'safety for people from both violent and non-violent threats' (DFAIT, 1999, p. 5). Such threats include civil strife, gross violations of human rights,

corruption and organized crime, environmental degradation, and infectious disease. They are to be met with international action for sustainable development, human rights and fundamental freedoms, good governance, and so on—all to improve the safety and wellbeing of the individual. Translated to Canada, a human security perspective would presumably see its practitioners rise to the defence of the individual.

Advocates of human security would like their approach to be seen as an alternative which complements traditional thinking. They may therefore speak approvingly of bombing Serbia in ‘a war for Human Security’ (Heinbecker, 1999, p. 21), and of national and human security as two sides of the same coin. At the same time, human security does contravene the state-centric and military-political fixation of long-standing national security policy. Human security advocates prefer civil society and civil issues to the state and military matters. Theirs is more a ‘bottom-up’ than a ‘top-down’ understanding of security processes. It is not a state-centred view. Instead, the centre of gravity in security policy-making shifts. Politicians and officials can certainly have a lead role, but good security policy comes from an interplay among the like-minded on the ground, in the media, in international and national NGO offices, and in the civil society and the state apparatus of concerned countries. Similarly, the human security activist inclines to issue-based mobilizations. These are keyed to partnerships in which the state makes its resources available to and accepts guidance from non-governmental actors, especially those persons most directly affected. The land mines convention is the classic example.

The key, however, is to have a well-placed champion within one or more national governments. This is critical for the success of human security operations. As distinct from the practice of national security, where central decision-makers do what comes naturally, human security requires a somewhat unnatural collusion of state and society in obliging other states to show greater care for the individual. Champions may therefore be hard to find. When this is the case, human security becomes the dogged effort of networking individuals to educate, persuade, and to craft joint statements. Whether it might also become primarily a civil-society affair, as in mass mobilizations against globalization and the recent war in Iraq, has yet to be seen.

What then might a human security lens suggest for Canadian efforts to make a success of nuclear waste management? On the plane of physical security, protection against diversion, attack, and accident would presumably be pursued with the same vigour as required by a national security perspective. At the same time, the job of security would be enlarged to meet the needs of the *individual* for physical protection against nuclear fuel waste threats. Not only would the door be opened wide to public discussion of health, environmental, and safety factors, but the deliberative process would take not only industry but individual, community, NGO and civil society views more closely to heart than is likely to occur under a national security view of things. Taking care not to slight industry and its views, the human security practitioner in the federal apparatus would seek guidance from civil society in identifying and countering waste-related physical threats to the individual. He would aim for partnership-based solutions to physical security risks in the process of nuclear waste management. Industry and civil

society would be placed on something like an equal footing when it came to access and information from the state.

As to a choice between the three main approaches to nuclear waste management, a human security lens highlights the importance of dialogue on what's best for the individual citizen. But that is about as far ahead as could be seen into the main choices until people had started hearing and talking across the country, in the three provinces affected, and at the local and community level. This is because, unlike national security, human security thinking and action is heavily dependent upon what the citizen says and does.

Nevertheless, the human security exponent might well find something odd about the situation as of autumn 2003. What is the federal government doing, the practitioner might ask, in moving promptly to a national choice among alternative nuclear waste management approaches when (1) there is no great public controversy over on-site storage, (2) the level of risk associated with interim storage on site appears currently to be acceptable to society, (3) there is no shortage of space for on-site spent fuel storage out to the end of reactor service lives, and (4) when interim on-site storage is all along a viable approach to nuclear waste management (Bunn et al., 2001)? From a 'bottom-up' perspective, it's hard to see why the federal government should order a newly established Nuclear Waste Management Organization to generate a recommendation on the preferred management approach within three years.

Individuals residing near to NPPs would of course have plenty to say to the human security activist about on-site storage. But even when the backlog had been removed to central storage or geological disposal, new nuclear fuel waste would accumulate on site and require transportation. For those who favoured nuclear power, there'd likely be no real problem. For those who were opposed and did not want to relocate, the only way to a life without site-specific radiological hazards would be for the industry to stop generating nuclear waste in the first place. The same could apply to those worried about the potential for direct attack on NPPs. But still, anti-nuclear views would not necessarily be the majority. On physical security grounds, therefore, a human security perspective might initially favour the status quo over centralized storage and geological disposal. But after that everything would depend.

It would depend on issue-based interaction and what it revealed about the beliefs and perceived needs of individuals as they addressed not only the current situation but the outlook for radiological containment ten thousand and more years into the future. Who is to say what the outcome might be? Geological disposal in return for a commitment to phase out the nuclear industry over a period governed by the service lives of existing reactors? Centralized storage below ground, in the expectation that removal of nuclear fuel waste from communities makes for consensus that the nuclear waste problem has been solved? If a common physical security purpose crystallized, human security entrepreneurs could in principle move on to build a coalition of state and civil society participants which extended to representatives from the nuclear industry.

But, in practice, finding common ground is almost certain to pose an enormous problem. No less imposing would be the need for a human security champion within the federal government. This brings us directly to the societal plane and to the problem of agency which lies at the heart of any effort to work out a publicly accepted, and therefore societally secure, approach to nuclear waste management. There's plenty to say here, but let's hold to one set of considerations: the potential for the Nuclear Waste Management Organization itself to act as champion in building common ground.

Reading the Organization's *Annual Report* (NWMO, 2003), we could say it's well on the way to being a human security institution. It aims to be inclusive, open to concerned citizens, transparent, and respectful. Aboriginal peoples will have a participation process of their own. The Organization will be guided by a social and ethical framework in its assessment of the management options. It will strive for public trust and confidence in the process and the outcome alike. The public interest will be paramount. But there is something critical that's missing: civil society is absent from a Board of Directors which consists only of the producers and owners of nuclear fuel waste. Viewed from a human security standpoint, the impartiality of the Board would be wanting, and with it the capacity of the Organization to summon the widest possible support for the recommended management approach. At the same time, the process of consultation which the Organization is mandated to lead does not hinge only on the composition of the Board.

The Board may not wish to change and the Organization may not want to act as human security champion. But there may be other ways to handle the situation. To gain the widespread trust and acceptance it needs, from a human security point of view, the Organization could pull out all the stops to embed its recommendation in a highly pluralist participatory process. Not only would citizen knowledge need to be valued equally with that of the technical expert. Not only would active media engagement be required. As well, the Organization would need to lead a process of mutual enculturation which extended visibly and vigorously to Aboriginal peoples who have much to impart to the rest of us. Enculturation would see active minorities pro and con, and on the side as well, come to understand one another better. It would see them recognize and build on overlapping and complementary beliefs (Roots, 1996) when straightforward agreement was out of reach. An approximation of the human security champion's role might therefore be achieved by the Nuclear Waste Management Organization as it stands.

To Think About

It would be comforting to read that there is *one* way to think about security, and that it's only certain material and technical requirements that have to be met in making nuclear fuel waste secure. It would also be good to hear that a basis for constructive dialogue between the lay public and experts is presently available. But it's not like that. We have to reflect at least as much on our capacity for collective action, as we do on the threats we face. Indeed, the proposition that agency is the first thing we need to secure is central to

this paper. Without agency, there's no capacity for a coherent response to danger. But some will disagree. So let us end with just a few further reflections.

Suppose, first, that neither a national nor a human security perspective is judged likely to be of much help in generating the agency that's required to make a nuclear waste management process secure. What then are we to do? On the basis of the limited discussion that's been conducted here, the Nuclear Waste Management Organization ought nevertheless to make a major human security effort to gain support for an agreed approach. Failing that, Canadians could well hold to continued on-site storage, and join into the international exploration of new opportunities for spent fuel disposition and disposal (transmutation of long-lived radionuclides, creation of one or more international nuclear waste repositories, deep borehole disposal several kilometres deep into the earth's mantle).

There is, second, a view which claims that 'security' has been displaced by risk as *the* conceptual framework for late modern society as it copes with danger (Beck, 1999). The idea here is that we manage our risks as best we can--risks which we ourselves have created, as with nuclear waste--but without any hope of 'security' which is a holdover from an earlier era. Why not explore this challenge to the very idea of security, it might be asked. Indeed, why not take risk as a third lens? Though there's a lot to be said for risk analysis, it is somewhat abstract and unwieldy and of greater appeal to experts than the lay public. As such, it is better considered as an alternative to a conceptual framework on security once the latter has been worked out for nuclear waste management. In any event, Canadians are not going to cease thinking in terms of security any time soon. For now, it's best to encourage critical reflection on the security aspects of nuclear waste management.

Third, it could be argued that human security offers at best a nebulous perspective in comparison with the national security outlook. Accordingly, wouldn't we be better off focusing on national security alone, showing how best to make it work? Why not have a single-lens discussion? The answer here is that especially in its approach to problems of agency, human security is highly relevant at home and abroad today. Not only is it being applied internationally (DFAIT, 2003), but it reflects value change among Canadians as they shift from material to post-material concerns, from a focus on physical security to a growing concern for quality of life (Lee, 2002). The emphasis on societal as well as physical security in this paper is consistent with value change now occurring in Canada and other liberal democracies. The Nuclear Waste Management Organization has an opportunity to pick up on Canadian value change in building a secure nuclear waste management process.

Finally, what of the thought that national and human security are two sides of the same coin? Why not employ both in an integrated approach? The problem is one of combining two different mentalities which are captured by the phrases 'top-down' and 'bottom-up'. Nevertheless, the two frameworks could be used not together but in sequence. This would see, first, a pronounced emphasis on human security in the Nuclear Waste Management Organization's effort to secure acceptance of a management

approach, followed by a stress on national security in the Organization's work as Canada, and especially Ontario, proceed to implement the approach that's been agreed.

References

AECL (Atomic Energy of Canada Limited), 1994. *Environmental Impact Statement on the Concept of Disposal of Canada's Nuclear Fuel Waste*. Document AECL-10711, COG-93-1. Toronto: AECL. The proposal for geological burial.

Albright, David, Frans Berkhout, and William Walker. *Plutonium and Highly Enriched Uranium 1997. World Inventories, Capabilities and Policies*. Oxford: SIPRI and Oxford University Press. For the general reader, a standard reference on nuclear materials.

Beck, Ulrich, (1999). *World Risk Society*. Cambridge: Polity Press. Risk, not security, as the conceptual framework.

Bunn, Matthew, John P. Holdren, Allison MacFarlane, Susan E. Pickett, Atsuyuke Suzuki, Tatsujiro Suzuki, and Jennifer Weeks, 2001. *Interim Storage of Spent Nuclear Fuel. A Safe, Flexible, and Cost-Effective Near-Term Approach to Spent Fuel Management*. Cambridge, MA: Managing the Atom Project, Harvard University, and Project on Socio-technics of Nuclear Energy, University of Tokyo. A statement of the case for on-site and central storage until a permanent solution is found.

Buzan, Barry, Ole Waever, and Jaap DeWilde, 1998. *Security: A New Framework for Analysis*. Boulder: Lynne Rienner. Best single volume on the subject, written basically from a national security perspective.

Canadian Nuclear Safety Commission, 2003. 'Draft Regulatory Policy. Managing Radioactive Waste'. Document P-290 (Ottawa: CNSC, April 2003). Policy outlined.

DFAIT (Department of Foreign Affairs and International Trade), 1999. *Human Security: Safety for People in a Changing World*. Ottawa, DFAIT. A full statement of the approach.

DFAIT, 2003. 'Graham to Participate in Annual Human Security Network Meeting', *News Release*, May 6, 2003. Ongoing Canadian involvement together with Austria, Chile, Greece, Ireland, Jordan, Mali, the Netherlands, Norway, Slovenia, Switzerland, Thailand, and South Africa.

Heinbecker, Paul, 1999. 'Human Security', *Canadian Foreign Policy* 7:1 (Fall, 1999), 19-26. Intervention in Kosovo from a human security perspective.

Hinton, J.P., R.W. Barnard, D.E. Bennett, R.W. Crocker, M.J. Davis, G.A. Harms, L.W. Kruse, J.A. Milloy, W.A. Swansiger, and K.J. Ystesund, 1996. *Proliferation Vulnerability Red Team Report*. Document SAND97-8203. Albuquerque: Sandia National Laboratories. Telling comment on proliferation risks in spent nuclear fuel.

Lee, Steve, 2002. 'Canadian Values in Canadian Foreign Policy', *Canadian Foreign Policy* 10:1 (Fall, 2002), 1-10. Postmaterial Canadian values oriented to quality of life as distinct from physical security.

Lipschutz, Ronnie, ed., 1995. *On Security*. New York: Columbia University Press. Remains an excellent survey of approaches to security in world politics.

Moroff, Holger, ed., 2002. *European Soft Security Policies. The Northern Dimension*. Helsinki: The Finnish Institute of International Affairs. An alternative conceptual framework in the making.

NWMO (Nuclear Waste Management Organization), 2003. *Annual Report 2002*. Toronto: NWMO, March, 2003. A statement of purpose.

Rasmussen, Mikkel Vedby, 2001. 'Reflexive Security: NATO and the International Risk Society', *Millennium* 30:2 (2001), 285-309. Very much a dark horse in the conceptual-framework race, this one is keyed to the view that risk has overtaken security as society's first concern.

Roots, Fred, 1994. 'Radioactive Waste Disposal - Ethical and Environmental Considerations – A Canadian Perspective' in *Environmental and ethical aspects of long-lived radioactive waste disposal. Proceedings of an International Workshop organized by the Nuclear Energy Agency in co-operation with the Environmental Directorate*. Paris, 1-2 September 1994. Paris: OECD, 1994, 71-93. A searching review of Canadian thinking and practice.

SAIC (Science Applications International Corporation), July 2003. *Status of Canadian and International Efforts to Reduce the Security Risk of Nuclear Fuel Waste*. Halifax: SAIC. Useful background paper.

Thakur, Ramesh, 2002. 'Security in the New Millennium'. *Canadian Foreign Policy* 10:1 (Fall, 2002), 71-106. A recent statement of the case for moving beyond national to human security.

Wald, Matthew L., 2003. 'Dismantling Nuclear Reactors', *Scientific American* 288:3 (March 2003), 60-65. U.S.-related but informative on decommissioning and the size of the job if Canada's approach to nuclear waste management is to reach beyond spent fuel.