nwmo
NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

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NWMO BACKGROUND PAPERS
2. SOCIAL AND ETHICAL DIMENSIONS

2-3 KEY SOCIAL ISSUES RELATED TO NUCLEAR WASTE, OR WHAT DO CANADIANS WANT TO DO ABOUT NUCLEAR WASTE?

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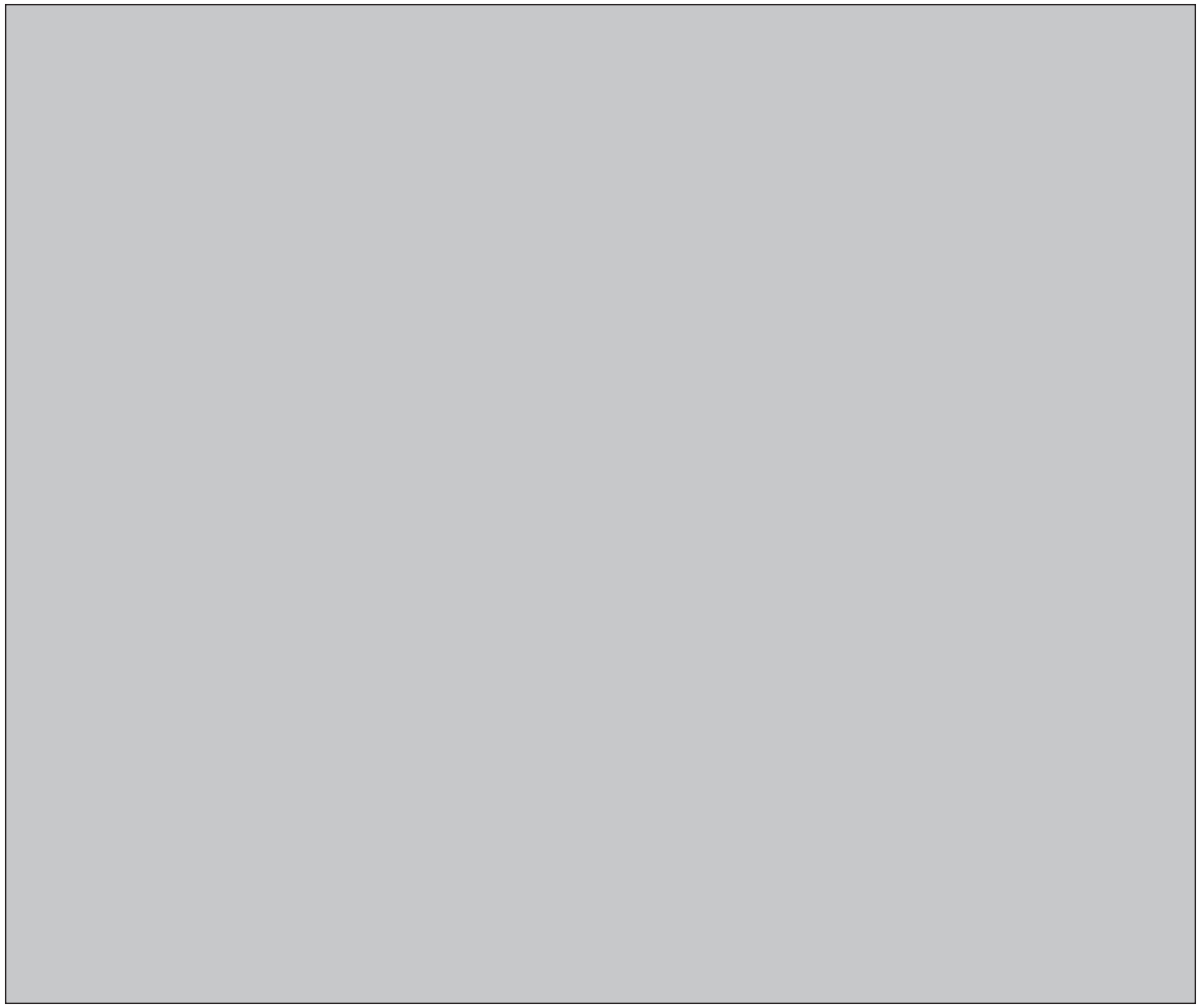

NWMO Background Papers

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.

Key Social Issues Related to Nuclear Waste, or
What Do Canadians Want To Do About Nuclear Waste*?*

Maria Páez Victor, Ph.D.

November, 2003

INTRODUCTION

Canada, as indeed every other country with nuclear power, has the serious challenge of finding a way to permanently and safely dispose, disable, store or use high level radioactive waste generated by the nuclear energy industry. Currently, Canada has 1.5 million used fuel bundles weighing 29,400 metric tonnes[1]. About 85,000 spent fuel bundles are produced per year. [2]

This paper is an analysis of certain key social issues related to nuclear waste disposal with a focus on the conditions for and barriers to the emergence of social acceptability towards long-term management options for nuclear waste.[3] The Seaborn Report defined social acceptability in this case, as follows

> ***"To be considered acceptable, a concept for managing nuclear fuel wastes must***
>
> ***a) have broad public support;***
>
> ***b) be safe from both a technical and social perspective;***
>
> ***c) have been developed within a sound ethical and social assessment framework;***
>
> ***d) have the support of Aboriginal people;***
>
> ***e) be selected after comparison with the risks, costs and benefits of other options; and***

[1] Fuel bundles for the Bruce reactors weigh about 24 kilograms and are filled with 19 kilograms of uranium pellets. Spent fuel rods contain plutonium and have extremely high temperatures.

[2] Canadian Environmental Assessment Agency, *Nuclear Fuel Waste Management And Disposal Concept,*(Seaborn Report), Feb. 1998, p. 12

[3] This paper refers to high-level radioactive waste from reactor fuel; it does not include uranium mill tailings or uranium refinery waste.

f) Be advanced by a stable and trustworthy proponent and overseen by a trustworthy regulator." [4]

HISTORICAL BACKGROUND

Decision to develop nuclear powered electricity

In Canada, the production of nuclear power began when Atomic Energy of Canada (AECL) was allowed to start a research reactor in 1962; then, in 1968, commercial electricity production with CANDU nuclear reactors was begun at Douglas Point. Subsequently, 19 nuclear reactors were built in Ontario, 1 in Quebec and 1 in New Brunswick.[5] There was no significant formal process to consult Canadians or to seek their participation in the decision to go ahead with nuclear power. The benefits of nuclear power seemed self-evident to government and social acceptability was to a large degree, taken for granted.

Hare Panel

By 1977, the question of what to do in the long-term with the nuclear waste that was rapidly accumulating led to the appointment of a federal panel to study the issue led by Dr. Kenneth Hare. The Hare Report concluded that,

"Canada urgently needed a plan for the management and disposal of nuclear waste."

AECL nuclear disposal project

The following year, the Government of Canada, in conjunction with the Government of Ontario, directed AECL to develop plans for the deep geological disposal of high level radioactive waste originating from used nuclear fuel of the CANDU nuclear reactors. The plans were to be maintained at the conceptual level, as no facility siting would occur until there had been a full

[4] Seaborn Report, February 1998, p. 34-35
[5] Each reactor uses about 80 metric tons of uranium fuel per year, which produces 200,000 tons of uranium tailings per year.

public hearing on the concept of geological disposal.[6] AECL spent $575 million on the research for this proposal.

The Seaborn Panel

In 1989, a FEARO panel was appointed to head the public hearing on AECL's nuclear waste disposal proposal, chaired by Blair Seaborn. Funds for participants to engage in the panel discussions amounted to only $842,515. After ten years considering the AECL proposal, the Seaborn Panel concluded that

> "*The AECL concept for deep geological disposal has not been demonstrated to have broad public support...The concept in its current form does not have the required level of acceptability to be adopted as Canada's approach for managing nuclear waste."*

The AECL proposal had inefficient public consultation and failed to take social science approaches as seriously as those of the natural sciences. In stating that the concept of deep geological disposal had been on balance, adequately demonstrated from a technical perspective, if not from a social perspective[7], the Seaborn Report really indicated that the concept has not been demonstrated at all. Technical situations do not exist in an objective fashion, in some sort of social limbo. Technique and technology are the application of science in a real world of human beings, natural environment, society and culture.[8] If a concept (deep geological burial) can meet certain engineering standards (the calculations of probabilities of risk) but does not meet social standards (the valuation of what that risk means to people and communities), then the concept or project is unacceptable in any real sense (except perhaps in a totalitarian society). The Seaborn Report concluded that,

[6] Ontario Hydro owns of most of Canada's nuclear waste, and it provided some studies for the AECL proposal (*Used Fuel Disposal Concept*), including the environmental impact assessment for the pre-closure stages of the project.
[7] NWMO, Fact Sheet
[8] Ursula Franklin, *The Real World of Technology,* 1990

"It became clear that there are widely differing views on the definition of safety, and on the question of how safe is safe enough, based on different technical and social perspectives."[9]

The panel recommended the creation of a waste management agency to undertake a study of long-term nuclear waste management options.

Nuclear Waste Management Organisation

In November, 2000 the *Nuclear Fuel Waste Act* was enacted and the Nuclear Waste Management Organisation (NWMO) was set up to provide recommendations on the long-term management of nuclear fuel waste. The *Act* requires that the NWMO assess at least three approaches for the long-term management of nuclear fuel waste; deep geological disposal in the Canadian Shield, storage at nuclear reactor sites and, centralised storage, either above or below ground. This does not preclude studying other approaches, which may be identified. NWMO must compare benefits, risks and costs of the approaches and take into account ethical, social and economic considerations. It must ensure that its management option recommendation is "socially acceptable, technically sound, environmentally responsive and economically feasible".[10] The NWMO must submit its recommendations by November 15, 2005.

The challenge for the NWMO is to seek social acceptability for an option to deal with nuclear waste by engaging Canadian society as a whole in the decision making process:

"Society as a whole, and not science alone, needs to shape the questions to be addressed in the study. And society, with the assistance of science, needs to judge the benefit or harm, and assess the social implications of a decision to implement a particular management option. It is understood that to a large extent, notions of benefits and harms are socially constructed. The assessment of a risk is an important example of this. While science can speak to the probability of the occurrence of an event, science cannot speak to social tolerance for its occurrence. What poses risk, how that risk should be measured,

[9] Seaborn Report, 1998, p. 19
[10] NWMO, "*NWMO Approach to Development of Analytical Framework"*, July 2003, p. 2

and what is considered relevant for measurement are all decisions which are influenced by social considerations."[11]

Technical issues –such as safety- are to be considered jointly with social issues -such as social acceptability- as indicated by the Seaborn Report. It defined safety as well as social acceptability in the following way,

"By safe, the Panel means meeting, on balance, criteria for safety as interpreted from both a technical and a social perspective. By acceptable, the Panel means broad societal consensus that the proposed course of action is the best available, taking into account ethical, social, technical and economic views."[12]

FOUR SEMINAL SOCIAL ISSUES

Hearing participants, the Scientific Review Group and the Seaborn Panel identified any social issues and shortcomings of the AECL Nuclear Fuel Waste Management Disposal Concept. These fall into the following categories,

- deficiencies of the "generic concept", its appropriateness, need and timing;
- lack of consideration of alternative management options;
- inadequate public participation process including inadequate policy and decision-making;
- inadequate, flawed Environmental and Social Impact Statements including site selection; human health and safety impacts, transportation and costs;
- inadequate, incomplete risk analysis, inadequate modelling, unacceptable levels of uncertainty, insufficient capacity to make predictions over time;
- inadequate development of regulations and standards;
- inadequate ethical analysis;

[11] NWMO, "*NWMO Approach to Development of Analytical Framework"*, July 2003, p. 2
[12] Seaborn Report, 1998, p.21

- culturally inappropriate consultation with Aboriginal people and decision making process that ignored their rights;
- lack of trust or credibility of the proponent, the industry, the regulator and government to undertake, regulate or oversee this project.

There are, however, four seminal and inter-related social issues that set the contextual parameters for these and all other social issues on nuclear waste:

- The need to appropriately identify social values
- The solutions proposed do not include reducing or stopping production of nuclear wastes
- Scientific uncertainty and perpetuity of the risks challenges social institutions
- The need for a process that is trusted

(1) The Need to Appropriately Identify Social Values

Life in society means necessarily making choices, both individually and collectively. Resources and opportunities, never being limitless, inevitably induce conflict between shared values and between groups of peoples. Social values are simply, shared aims which are really important to people. Canadian society is rich in cultural diversity, which means that there are differing value systems among significant groups, in particular, those of the First Nations and Aboriginal peoples.

A situation in which two social values clash, that is, the two values cannot be upheld and attained equally, is more properly defined as a dilemma. Most environmental projects requiring impact assessment are enmeshed in such a clash of values. Typically economic values (desire for jobs, income, development) can clash with environmental values (desire for preservation and nurturing of the environment), or cultural values (desire to maintain a way of life or traditions), or ethical values (desire for social arrangements that reflect notions of truth, justice, equality, compassion).

The issue of what to do with nuclear waste is not a problem *per se*, but a dilemma. On the one hand, there is the search for a benefit: the Canadian government, seeking to provide Canadians

with the necessary electrical supply, made the decision to develop nuclear powered electricity. On the other hand, that very benefit posed a risk. There has been all along, grave potential for harm to human health and the environment [13]which, we are bound to try to diminish because, as a society, we so highly value human health and life.

Values are intrinsic to evaluating risks

To address the issue of high level nuclear waste is to address the issue of risk and shared social values. Risk is an inherent characteristic of any project or proposal to deal with any level of nuclear wastes, as all of these wastes are potentially detrimental to human health.

Risk is, broadly, the existence of a threat to life and health.[14] Technically, risk is defined as the probability of an event ("objective" calculation) multiplied by its consequence ("subjective" evaluation).[15] The significance of social consequences and implications of a risk event can only be surmised by taking into account the valuations of the people who may be affected. Risk research reflects the fact that even scientific assessment cannot be performed independently of values and assumptions.[16] Therefore, social values play a role in both scientists and lay person's assessments of risks and it is incumbent on those who will make decision about risks to seek the valuations of those who will, ultimately, bear the consequences of those risks. In the case of nuclear waste, inaction, that is, the option of doing nothing about the waste is a risk in itself. However, the situation becomes more complicated because of uncertainty. Whereas risk implies an event on which there is a certain level of information that allows an estimate of probability, in the case of uncertainty, there is little or no reliable information on which to estimate a probability. In order to deal with uncertainty, the rule is to follow the "precautionary principle". By this is meant, that it is best to choose the option that will minimize risk.

[13] This includes environmental risks and occupational risks from normal operation of nuclear power plants, and extraordinary or accidental risks that could include the broader environment and communities.
[14] Advisory Committee on Nuclear Safety, 1986
[15] Even a probability can be seen as a statement of belief about the world.

Different levels or types of social values

There are some important distinctions to be made about social values. First of all, they are shared, and not simply an individual preference. Some social values are core values. These are strongly felt, closely linked to a society's main social institutions and very hard, in principle, to be flexible about. These core values deal with rights, freedoms, duties, morality, life's ultimate aims and meanings. In our society, for example, two such values are the sanctity of human life and the pre-eminence of democratic rule.

Instrumental level social values relate to particular, more concrete situations, events or actual things that are esteemed by persons in a society such as money, social standing and jobs. These social values are more open to change, negotiation and even dissonance. Thus, while persons may uphold the sanctity of life, they may also value an army or automobiles, both, which may be detrimental to human life.

Process related social values have to do with the manner in which decisions and negotiations are made. These refer to principles such as fairness, openness, transparency, and accountability. For example, persons may justify soldiers taking life in war, if the war was legally declared according to its own constitution, UN rules and/or Geneva Convention, or may approve of automobiles so long as traffic rules and regulations are effectively enforced.

New social values emerge

Social values are not discrete nor are they immutable. They can change over time, especially in the light of new life challenges and social changes. For example, as the Seaborn Report indicates, there are today environmental values, such as conservation or sustainable development that were not widespread in the 1960's. Presentations to the panel

> *"...stressed the obligations of current generations not only to themselves but also to future generations and to the well-being of planet Earth itself; the need to reduce*

[16] Kasperson, 1978; Schrader-Frechette, 1991)

consumption and waste generation; the importance of re-using and recycling resources; and a trend away from disposal as a waste management approach."[17]

We are witnessing the emergence of social values that stir a growing awareness in our society of the fragility of the natural environment and of the responsibility of our industrial activities and consumer consumption for the extensive damage to it. At the same time, there is a growing reluctance to rely unquestionably on technocrats, planners, industry or even politicians, to decide for the rest of society in matters where the environment, technology and economic activities meet to pose situations of risk.[18]

Given that all knowledge is a social construct, new values within the scientific community have also emerged with different perspectives that have implications for the management of nuclear wastes.

Values are not mere opinions

It is important to distinguish social values from transitory issues such as public opinion, concerns or trends. Values can be seen as a common conscience in individuals that is shared with the group or society, as opposed to simply an individual conscience.[19] Not only do values guide an individual's behaviour, but also his/her society's because values are linked to the major social institutions such as religion, law, family, morals, economy, and polity.[20]

There are important methodological implications if we want to identify social values. The methods by which social values are assessed have to be in tune with their nature, the gravity of the inquiry and the characteristics of the different social groups that comprise Canadian society. One does not seek people's core social values, or even medium-level values, as one would seek public opinions of taste, trends or and preferences. The run-of the-mill telephone polls, focus

[17] Seaborn Report, February 1998, p. 17.
[18] M. Paez Victor, *Interactive, community-based SIA, (Or, not a another paper on what is wrong with SIA!), IAIA Conference, Washington D.C., August, 1992*
[19] Emile Durkheim, *"Rules of the Sociological Method" 1895, "Judgements of Reality and Judgements of Value", 1911*
[20] This paper considers ethical values as part of social values, but does not specifically focus on them.

groups and questionnaires may not be adequate to convey the seriousness of the issue of nuclear waste nor the far ranging consequences of answers received. It needs a reflexive process that gives people a chance to consider what is important to them *and the reasons why.*

Consultation processes need to be tailored adequately; particularly those that intend to gauge "society as a whole" within a democratic framework. Along the same lines, the OECD Nuclear Energy Agency indicates:

> *"A variety of motivations influence social acceptability. Some of them are of an ethical nature, whilst others concern public opinion, trends and fashions. It is important in this respect to make a distinction between social convictions and ethical justifications, in order to avoid reducing the question of morality to one of acceptability or the question of acceptance to what can be justified ethically."* [21]

(2) Solutions Proposed Do Not Include Reducing or Stopping Production of Nuclear Wastes

A circular political and economic problem exists: there is a need for electricity, its production via nuclear power creates toxic waste, and the options to deal with the waste tend to ensure, not its decrease or elimination, but the further creation of nuclear waste. Despite having no means yet for disposing, destroying, using or de-toxifying it, there is apparent government and industry commitment to continue to produce nuclear waste and to continue to sell CANDU reactors overseas.

Indeed, the creation of a nuclear waste repository will have international repercussions as it would make possible a significant market for nuclear wastes and services and even wastes from nuclear weapons, could possibly be imported into this country. Some who favour the continuation of nuclear power have pointed out that eventually, storage will be a global problem.

[21] A Collective Opinion of the Radioactive Waste Management Committee of the OECD Nuclear Energy Agency, *The Environmental and Ethical Basis of Geological Disposal of Long-Lived Radioactive Wastes,* p. 10

[22] A decade ago, Wolf Hafele went so far as to suggest that there should be an international institution to construct and operate the facility.

> *"International storage facilities offer several advantages. They encourage the development of global institutions that would be immune to national politics…Access to these facilities would give countries that steered clear of nuclear power because of the waste issue a change to develop nuclear energy."*[23]

Unfortunately, since then we have seen serious erosion of international law and institutions, lack of resolve to make and enforce environmental agreements, and the increase in the risks of terrorism. Today, the idea of a nuclear repository being "immune to national politics" would be positively frightening to anyone democratically minded.

Decreasing or discontinuing the creation of nuclear waste in the first place has not been a serious option presented to Canadians either as a political platform of any major party, nor through the provincial or federal parliamentary processes. The nuclear industry continues to promote nuclear power, depicting it as environmentally sustainable but the existence and implications of the growing pile of nuclear waste receives, comparatively, very little attention in the public discourse.

An important political consequence of this situation is that many scientists, non-governmental, environmental organisations, Aboriginal peoples and interested stakeholders who recognise the need to deal with nuclear wastes and who could lend knowledge, insight and effort to find an acceptable management option for nuclear wastes, are unwilling to do so. Until Canadians are allowed to democratically participate in a decision- making process that includes the option to phase out the production of nuclear waste, they fear that any management option will only lead to further nuclear power with increased wastes, and even, possibly, importing nuclear wastes from elsewhere.[24]

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[22] There are about 400 commercial nuclear reactors in about 30 countries.
[23] Wolf Hafele, *Energy from Nuclear Power,* Scientific America, September 1990
[24] For example, the Canadian Coalition for Nuclear Responsibility

(3) Scientific Uncertainty and Perpetuity of the Risks Challenges Social Institutions

It has been said that nuclear power represents a Faustian bargain: seemingly inexhaustible energy is given in exchange for eternal vigilance and control. [25] Nuclear risks have the potential to affect physically, socially, economically and politically, the local environments, people and communities and also the entire country for generations.[26] The nature of the waste is such that it remains toxic for tens of thousands of years [27]therefore, the need to control this substance, in human terms, essentially, will be forever. And, there is a significant scientific and technological degree of uncertainty associated with any known option to deal with nuclear waste. And, when dealing with risk, the controllability of the risk has been found to be the most emphasised factor in public views on risk.[28] This is a challenge to people's imagination, to government and industry's resolve, to scientific endeavours and, particularly, to our society and culture's sense of purpose and continuity.

Ecosystem and social system complexity

The series of decisions involved in finding a management option for nuclear wastes will be complex. This is because nuclear technology is complex but also because the economic and political context is also complex, diverse and fragmented. It is of no use separating the technical from the social –that road was taken by AECL and led to the rejection of its proposal. We must consider them both: nature and society, i.e. ecosystems and our technology and our political and social way of dealing with them.

It is pertinent to review the advanced thinking that has emerged in the understanding ecosystems and their relationship to social systems. The standard approach to ecosystem management was to seek a level that would maximise, or maintain productivity at a particular level, in a linear,

[25] Alvin Weinberg, *Science and Trans-Science,* Minerva, 10, 2, April 1979, pp. 209-22
[26] The radioactivity of the uranium in the fuel bundles declines to that of natural uranium after about one million years. Canadian Environmental Assessment Agency, *Nuclear Fuel Waste Management And Disposal Concept,*(Seaborn Report), Feb. 1998, p. 12
[27] While some toxic substances will permanently remain so (mercury) and radioactivity will, eventually, be broken down, the time scale is such that it makes little difference in human or societal years.

mechanistic way (i.e., the optimal number of trees in a forest or fish in a lake). New observations have led to a different perspective: that all ecosystems exist in cycles of growth, collapse and new types of re-birth, which allow for novelty and adaptation. This perspective has enormous implications for the nuclear waste options.

In ecosystem management, the complexity of the system increases as levels of uncertainly increase, and ability to control stressors decrease. Complexity does not just means complicated. It refers to phenomena that involves profound uncertainty that cannot be resolved through traditional scientific research alone; where there are a multiplicity of legitimate perspectives and for which, therefore, "the process towards a decision may be as important as the details for the decision that is finally achieved".[29] This is precisely the type of scientific and social situation inherent in decisions over nuclear wastes. The management of nuclear waste involves a high level of uncertainty and a low level of social, political, economic and technological controllability (due to the time scale). Outcomes therefore can only be forecast as possibilities.

Deep geological burial of wastes is predicated on the assumption that we will isolate nuclear waste from all ecosystems so that we need not worry about cycles and change. Most of all the concerns expressed in the Seaborn hearings [30]about the technology come from the concerns that we are just not sure we can do this, or for how long. If the management framework is rigid, fixed for all time, it will also be unresponsive, not flexible, and not adaptable. If in fact, the isolation fails at any level, we would have made an irreversible mistake.

There is a tension between two major scientific "world views" or social values. The perspective (post-normal science) that ecosystems and social systems are interrelated, that we live inside the nature you are evaluating, challenges the old-fashioned idea that we can simply control nature from the outside. Dynamic change is the order of the day,

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[28] Decima Research, 1985
[29] S. Funtowicz and J. Ratetz, *Post-Normal Science –Environmental Policy under Conditions of Complexity,* NUSAP.net, Feb. 20, 2003 from www.NUSAP.net
[30] Review of the presentations to the CEAA (FEARO) Hearings of the Seaborn Panel

"Rather than assuming stability and explaining change as often done, one needs to assume change and explain stability".[31]

The conclusion arrived at from the perspective of complex systems thinking is that management processes can be improved by making them adaptable and flexible, able to deal with ecological uncertainty and surprise, and by building capacity to adapt to change. It emphasises the importance of process and the crucial need for feedback in shaping policy.[32] This is a far cry from the idea of building an impregnable repository that will eventually be sealed forever from nature and equally independent from social systems. It is also a far cry from basing key decisions on the latest opinion poll - snapshot approach- on nuclear power or nuclear waste.

(4) The Need for a Process That Is Trusted

Impacts of the NWMO

We know that impacts on the social environment are determined by the relationship between facility/project requirements and the dynamics of the community. NWMO can properly be considered as the project agent whose characteristics include the mandate, activities and its use of resources. The actions that the NWMO has already initiated (documents, meetings, web pages, contacts) can be regarded as "project effects", and as such will be given meaning by the community of interest. In this case, social and political impacts will result from the interaction between the NWMO and the community of interest (environmental, non-governmental organisations, Aboriginal peoples, and interested stakeholders).[33]

In turn, the community of interest has certain definable characteristics:

- degree of cohesiveness or consensus among its different groups
- its vitality which enables it to mobilised economic and other resources
- its political efficacy to exert pressure and influence

[31] F. Berkes, J. Colding, C. Folke (eds), *Navigating Social-Ecological Systems,* Cambridge Press, 2003
[32] F. Berkes et al, op. cit, p.10

Considering the results of the Seaborn hearing, this community has proven cohesiveness, vitality and efficacy. The relationship between NWMO and the community of interest will be tested on the process of public participation.

It has been said that attention to process is the first wisdom in facing environmental problems. A wise process for citizen participation is the only way that a significant degree of social acceptance for any nuclear waste management option could emerge. We can have an advanced technological society, but unless we develop ways to incorporate deeply felt shared social values in planning and decision making that includes the decision on the very existence, development and implementation of technologies, such as nuclear power then, we will not have an advanced democratic society.

Future governmental decisions regarding nuclear waste will not be as easily taken or regarded as was the initial decision to establish nuclear power, because of a host of subsequent safety incidents, inefficiencies and communication deficiencies attributed to the nuclear industry. These have led to a palpable degree of mistrust among interested non-governmental organisations, Aboriginal groups and environmental stakeholders. [34] The Seaborn Report recognised such mistrust:

> *"The process of developing an appropriate plan for managing nuclear wastes must reflect our societal context. That context includes widespread public concern over the handling of all toxic and persistent industrial wastes, fear of losing control in the planning and decision-making process, lack of trust in political and institutional leaders, scepticism of scientific predictions that are based on uncertainty, and a healthy suspicion that, in the final analysis, no one will be accountable…A deeply entrenched fear and mistrust of nuclear technology exists within some segments of our society. This "dread' factor is real and palpable."*[35]

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[33] M. Paez Victor, 1993, op. cit., p. 20
[34] Incidents at Chernobyl and Kyshtym (former USSR), Three Mile Island, Savannah River, Hanford (USA), Sellafield, UK. The CANDU reactors have had a much better accident record than others but have had numerous operation and environmental problems.
[35] Seaborn Report, 1998, p. 18

AECL failed to engage the general Canadian public, Aboriginal peoples and interested groups in meaningful and honest dialogue. In that first round, AECL's poor attention to the intrinsic nature of social and technical issues and its consequent deficient public participation process have left a much soured relationship with the social community in its wake.

The Seaborn Report counterbalanced that mistrust when it rejected the geological burial proposal and by setting important public participation guidelines for the new agency, NWMO. The Seaborn Report stated the following,

> *"The Panel believes that the chances of finding an acceptable concept and site(s) will be remote unless there is early and thorough public participation in all aspects of managing nuclear fuel wastes...Past public participation strategies, although well intended, do not appear to have been effective because a significant portion of the public did not trust the nuclear industry and the regulatory agency.*

One way for the NWMO to overcome public mistrust is not to ask for it but to help the citizens and the community of interest have open access of information and resources through its own venue and through that of other organisations and institutions.[36]

Obtaining Broad Canadian Participation

A key ethical principle (and process value) concerning environmental risks has been widely recognised: that those who are to bear the risks –i.e. the citizenship in general and the local communities- have the right to fully participate in the decision-making process concerning those risks.[37]

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[36] Peter M. Sandman, *Getting to Maybe: Some Communications Aspects of Siting Hazardous Waste Facilities*, Seton Hall Legislative Journal, vol. 9, 1986, No.2

[37] M. Paez Victor, Ontario Hydro, "Framework for the Social , Cultural and Economic Impact Assessment of the Used Fuel Disposal Concept, Support Document A4 to Ontario Hydro Pre-Closure environmental and Safety Assessment of the Used Fuel Disposal Concept, September, 1993

This is implicit in the NWMO mandate, which indicates that the NWMO must obtain broad Canadian participation to reach its recommendations. Broad however, might simply mean wide and scattered but the spirit of the Seaborn recommendations implies more than that. It points to representativeness and inclusion. Considering the long-term implications and risks, it is certainly essential to obtain significant social acceptability of any nuclear waste options. In fact, it will be necessary for this generation of Canadians to feel they have been consulted and have had their say.

There may be interim, gradual or even partial decisions to be made in a process that is bound to take many years. In a way, this is an advantage because it means that there is time to engage the broad spectrum of Canadian citizens, with its different cultures and grouping, in a meaningful dialogue. A broad public participation process of this magnitude could have two basic phases.

Phase 1: Reflexive dialogue across the country

The first step toward informed consent is an informed citizenry that is reflexive that ponders the dilemma that consciously considers what is important to them, their society and its future. This must be a dialogue, not an attempt to "educate" the public, i.e. to convince citizens to accept a particular government or industry view or to manoeuvre for a quick "solution". Its specific aim would be to enhance Canadians' ability to reflect on their own degree of knowledge, judgements and values in the decisions and tradeoffs that will be required to deal with nuclear wastes.[38]

The NWMO could facilitate this value-oriented debate on the social and ethical issues represented in nuclear waste during the next two years of its term. It could thus discover and articulate what the citizens want and why they want it. It could engage the help of respected institutions such as churches, schools, universities, professional and environmental organisations to reach Canadian men, women, youth, of different income and education levels, from all geographical areas and of different faiths and ethnic backgrounds. The aboriginal peoples should have a process with the same aims but tailored by them to their own cultures.

There is a growing body of knowledge on how to incorporate people's values into policy and decision making.[39] The standard approach to risk and policy decision has been to forecast. That is, starting with a status quo scenario, one looks at how the situation would unfold if nothing were done and how it would unfold if a series of specific decisions were taken. The weak part of this approach is that our ability to predict the future is full of uncertainty and scenarios are, at best are probabilistic. The principal role in this process belongs to scientists and analysts who decide the likelihood of scenarios.

Instead of forecasting, the approach of "backcasting" can be applied. This is an approach grounded in the intentional nature of human decision-making and in interactive social research. In backcasting, instead of guessing the future, the objective is to choose the desired future and then make the human decisions necessary to achieve it. The aim of the analysis is not to predict the most likely future but to assess the feasibility and desirability of different outcomes. The principal role belongs to the layman: to people, groups and communities who will express what they value, what is the future they desire.

The first step is to choose the desired future through an iterative process. This involves answering two crucial questions: Who will chose? What will be the process for choosing? Once these have been answered the backcasting process is carried out. Essentially, it is a feedback loop whereby people are given information on what their choices mean and how they would be achieved. It is an exercise in social learning whereby the discussion on the future becomes integrated into the analysis of the means to achieve the desired future. An important aspect of this approach is that it gives people the opportunity to reflect upon their decisions and to change them on the basis of the feedback received. [40] John Robinson explains backcasting,

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[38] William Leiss, *Applying Risk Communication and Risk Perception Research To the Understanding of Disagreements about Risk,* Risk Abstracts, Institute for Risk Research, 1989, pp.179-186

[39] See the Sustainable Development Research Initiative at UBC and the work on the Future of the Georgia Basin

[40] The concept of backcasting is based on the work by John Robinson, *Future Subjunctive: Backcasting as Social Learning*, Futures 35 (2003) 839-856, www.sciencedirect.com

"It does not require that the elements of a desired future be known in advance. Instead the user goes through a process of learning and discovery, in which the desired future is a product of the process of trying to reach it."[41]

Using computer technology and knowledge of risk communication, it is not only plausible but also feasible to arrange a program whereby Canadians from coast to coast can take part in such an exercise. It is clear that the mandate of the NWMO indicates that it must obtain the participation of the broad Canadian public in the decisions regarding nuclear waste. This approach would be geared to the broad citizenry and within a knowledge-based framework and in a systematic way.

This type of program would need ample co-operation of people, institutions, groups, and Aboriginal people. It would require, however

- that the role and responsibility of the NWMO is clearly defined
- assurance that the end results of the dialogue will feed a clearly defined formal institutional decision making process
- that there is open consideration of multiple options and would not exclude the future of nuclear power and sustainable energy development
- that the participation procedures across the country are clear, fair, accessible, inclusive, understandable and culturally appropriate

<u>Phase 2</u>: Democratic, institutional decision-making

Once the values (core, instrumental, and process) and the future Canadians desire with respect to nuclear wastes have been discerned, in the end, a political decision will have to be made. Most of the nuclear waste belongs to Ontario but the risk implications pertain to the nation as a whole.[42] Because the Canadian system is a representative democracy, at some point, decisions will have

[41] John Robinson, op.cit. p.849

[42] As we have seen this year, a relatively small epidemic of SARS in Toronto affected tourism throughout the country. Also, one animal with mad cow disease in Alberta affected all Canadian beef. The stigma attached to radioactive risk would be comparable if not, greater.

to be made by political representatives either in the government party and the federal Parliament and, particularly if it comes to a process of siting, one, several or all provincial legislatures and municipal councils. There is no doubt whatsoever that the duly elected government has the legitimate right, and indeed mandate, to make decisions concerning nuclear waste. However, in terms of the participation of the citizenry, there are those however, that believe that only a referendum would give this generation of Canadians a sense of having been consulted and that their vice was heard. As C.P. Wolf insightfully stated with regards to nuclear waste

> *"Some kind of decision process must be established that even the loser will find acceptable, and we doubt that anything other than public referenda will be able to accomplish this goal."*[43]

As the Canadian political experience well shows, a referendum option would need to be very precise, with clear options presented to the public. This option would be elaborated on the basis of what was discerned about Canadians' values and desired future through the first, reflexive, phase of the process. As the Swedish experience on nuclear referendum has shown, a referendum may not be enough because its outcome needs to be accompanied by the political will to implement it.[44] The issue of the political will to implement the wishes of the electorate as to the energy future they desire, is in fact, a key, though implicit, social issue. The Government of Canada has already invested a great deal in CANDU reactors, nuclear energy and AECL. The Government of Canada in fact, is in the position of having to choose between or to balance, the interests of the nuclear industry and the interests or wishes of its citizenry, and these are not necessarily, or even likely, to entirely coincide.

In conclusion, in order to manage nuclear fuel wastes in a manner that could have broad public support, with reasonable assurance of technical and social acceptability, with the guidance of sound ethical principles, that is inclusive and includes the support of Aboriginal people, and that has robust politically viability and support, it will be necessary,

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[43] C.P. Wolf, *Issues in the siting and management of high-level nuclear waste facilities*, in "Location and Management of Special Facilities, Manas Chaatterji (ed), 1987, p.108)

[44] Instead of a Yes/No question, the Swedish referendum question was complex with three options.

- **to have an innovative, representative and iterative process for identifying Canadian social values relevant to nuclear management**
- **to include as part of any management scheme the need to and the means to reduce or stop the production of nuclear waste**
- **to face scientific uncertainty from the perspective of complex systems thinking**
- **to obtain broad, representative, clear, participation of Canadian citizens in a reflexive dialogue on the issue that can dovetail into a democratic, institutional, politically sound decision-making process, that may, ideally, include a referendum.**