

Paper #2: How might communities organize their discussions about hosting a site for used nuclear fuel?

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NUCLEAR WASTE
MANAGEMENT
ORGANIZATION

SOCIÉTÉ DE GESTION
DES DÉCHETS
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The Nuclear Waste Management Organization (NWMO) was established in 2002 by Ontario Power Generation Inc., Hydro- Québec and New Brunswick Power Corporation in accordance with the *Nuclear Fuel Waste Act (NFWA)* to assume responsibility for the long-term management of Canada's used nuclear fuel.

NWMO's first mandate was to study options for the long-term management of used nuclear fuel. On June 14, 2007, the Government of Canada selected the NWMO's recommendation for Adaptive Phased Management (APM). The NWMO now has the mandate to implement the Government's decision.

Technically, Adaptive Phased Management (APM) has as its end-point the isolation and containment of used nuclear fuel in a deep repository constructed in a suitable rock formation. Collaboration, continuous learning and adaptability will underpin our implementation of the plan which will unfold over many decades, subject to extensive oversight and regulatory approvals.

NWMO Social Research

The objective of the social research program is to assist the NWMO, and interested citizens and organizations, in exploring and understanding the social issues and concerns associated with the implementation of Adaptive Phased Management. The program is also intended to support the adoption of appropriate processes and techniques to engage potentially affected citizens in decision-making.

The social research program is intended to be a support to NWMO's ongoing dialogue and collaboration activities, including work to engage potentially affected citizens in near term visioning of the implementation process going forward, long term visioning and the development of decision-making processes to be used into the future. The program includes work to learn from the experience of others through examination of case studies and conversation with those involved in similar processes both in Canada and abroad. NWMO's social research is expected to engage a wide variety of specialists and explore a variety of perspectives on key issues of concern. The nature and conduct of this work is expected to change over time, as best practices evolve and as interested citizens and organizations identify the issues of most interest and concern throughout the implementation of Adaptive Phased Management.

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Three Discussion Papers on Community Engagement about Used Nuclear Fuel Storage and Disposal

PAPER #2: HOW MIGHT COMMUNITIES ORGANIZE THEIR DISCUSSIONS ABOUT HOSTING A SITE FOR USED NUCLEAR FUEL?

2A. Introduction.

Beginning in the late 1990s, there emerged a strong consensus among Canadian policy-makers about the necessary conditions for finding an appropriate solution to the problem of storing used nuclear fuel safely in this country. Those conditions are, first, that there must be a broad public understanding of the underlying issues, and second, that there must be explicit public support for the preferred solution. A third condition is that, as the search for a solution moves toward the siting of a permanent storage facility for used nuclear fuel, any community being considered as the site for the facility must have expressed a clear and adequate level of support for the project. And over the course of the preceding decade, a number of other countries which also have nuclear waste to store safely have come to the same conclusions.

The expected involvement of communities in four Canadian provinces (New Brunswick, Québec, Ontario, and Saskatchewan) in discussions about a siting process will take place on an entirely voluntary basis. This is intended to be the initiation of a gradual process that begins with informal information exchanges and concludes some years later with a formal agreement, involving a single community, for hosting a storage site for used nuclear fuel (NWMO 2009).^{*} Between the beginning and the final step, however, a number of communities might participate in these discussions for a certain period of time before deciding not to proceed further with the idea of hosting a storage facility.

At the end of this process, only a community which has convinced itself that it has become fully informed about all aspects of this project, and also later has concluded that it wishes to be the host community for the facility, will fulfill the criteria for being called a “willing host.” In addition, of course, in the context of the formal environmental assessment that will precede any final decision on siting, the potential host community will have to convince others outside its boundaries that its candidacy truly reflects the will of its citizens.

The importance of thinking ahead is very important, for one simple reason: Almost certainly, only one facility of this type will be constructed in Canada over the course of the foreseeable future; on the other hand, the desirable geological features required for safe storage of this waste are found across wide swaths of this country.

^{*} See the overview of the first six steps of community engagement in the Appendix at the end of this paper. References to other documents also will be found at the end of this paper.

In principle, therefore, there could be dozens of different communities that could be, at least at first glance, suitable hosts for this facility and which might wish to become engaged in some of the steps in any siting process. Still, each of them must recognize that all but one of the communities which start down the road in this engagement, and all but one of the communities which happen to go quite far down that road, will not end up being the host for a nuclear fuel waste storage facility.

Ideally, all participating communities, whether their engagement in this process is relatively short, or alternatively quite extensive, should come away from their participation in it with the view that it has been a positive experience for them. However, many citizens have strong feelings about both nuclear power and nuclear waste and vocal disagreements among citizens should be expected to occur throughout the period when the idea of hosting a facility is under active consideration. Thus it might be desirable for communities to think through the process of engagement in advance, and in some detail, before their discussions about storing used nuclear fuel get under way.

The procedure for eventually finding a willing host community necessarily involves openly engaging a fair number of possibly interested communities during the early stages, and inviting some of them to consider entering into a gradually more intensive involvement over time, even though all but one of them will not end up being the host. But the other side of this process is that many others will have taken part in extensive discussions about the possibility of being a willing host. For all of them, and not just for the one that may be eventually chosen, it would be unfortunate if they were to conclude that their participation had not been a positive experience.

Some protection against this eventuality has been built into the design of the engagement process itself, in that it envisages a series of discrete steps, beginning with some fairly straightforward information-gathering exercises. However, it should not be assumed that all unpleasantness caused by strong disagreements among community members necessarily can be avoided even in the early stages of this process. There may very well be those among them who are adamantly opposed to the whole concept, for whom even taking a first step on this journey is something to be avoided at all costs, lest the first step lead by small increments to an ever-deeper involvement in the process.

It is for this reason, if none other, that each community should spend some time considering how the process of engagement might unfold in the context of its own unique situation, in the period leading up to taking a decision about the initial engagement. The following sections of this paper are designed to be helpful in this regard, by describing some types of formal and informal methods for facilitating reasoned debates about controversial issues. Of course, many communities may have had extensive prior experience with some or all of these methods in dealing

with other types of serious issues or options, for example, economic development initiatives or conservation and environmental protection challenges.[†]

Before some of the ways through which productive community debates can be carried out are described, the idea of the “safety case” for the nuclear waste storage facility will be presented briefly. The reason for doing so is to use a concrete example for the types of subject matter that are likely to be raised in the community dialogues. *The safety case can be regarded as the minimum necessary topic of discussion for every community that wishes to consider the possibility for hosting this facility.* In other words, although communities will differ in terms of the range of issues that will or will not be raised for debate – for example, energy policy or sustainability – none of them will be able to avoid dealing with the safety case.

2B. The Safety Case.

“A safety case is the synthesis of evidence, analyses and arguments that quantify and substantiate a claim that the repository will be safe after closure and beyond the time when active control of the facility can be relied upon” (NEA 2004, p. 7).

A safety case for the long-term storage and disposal of used nuclear fuel is an argument intended to persuade government regulators to approve an engineering design at a specific location for the storage facility. The presentation of the safety case will be made in an elaborate set of technical documents and in presentations at public hearings of the review board authorized by the federal government. Many of these formal documents and presentations will not be available until sometime much later in the decision process – in part because one or more specific locations for a possible site need to be identified first.

However, members of interested communities certainly will want to hear and debate the elements of the safety case long before the formal hearings phase gets under way. This is why technical experts seek to prepare a “conceptual” safety case well in advance – and, in fact, in Canada and elsewhere they have been doing so for decades. The conceptual case takes the known features of geological formations such as the granite of the Canadian Shield, plus the known features of fabricated materials such as steel and copper casings, and evaluates them against a set of necessary performance criteria or objectives for a specified purpose: in this case, storing used nuclear fuel over a very long period of time.

As described in many publications that are available to the public on the Internet (for example, NWMO 2003a), the radioactive materials in used nuclear fuel represent a serious risk to humans and the environment. The well-described nature of this

[†] See, for example, the three articles in the references section under “Oskarshamn Model,” which deal with a community engagement process for repository siting developed in Sweden.

hazard is what determines the key objectives for the performance of the facility, which are:

- To *isolate* the waste from the biosphere;
- To *contain* the waste as its radioactivity slowly decreases;
- To *inhibit* the migration of radioactive substances beyond the bounds of the facility;
- To *identify* the uncertainties in the analysis.

The basic engineering strategy for the storage site is to construct what is referred to as a *multi-barrier* facility featuring *passive control* of the waste:

1. The *barriers* designed to prevent the radioactive material from moving from the space into which they are deposited include, among others: the steel-and-copper containers in which the waste is packaged; the clay shield around the containers, which inhibits movement of water; the features of the rock formation, deep underground, that will be excavated in order to hold the waste, which isolate the area from groundwater movement; and the location of the facility in an area that does not normally experience dangerous levels of seismic activity (earthquakes).
2. *Passive control* refers to the idea that, once the waste is emplaced as above, those barriers will be sufficient to keep the waste isolated and contained where it is, indefinitely into the future, without the need for any additional active human intervention.

Finally, a credible safety case is expected to be prepared in a way that reflects the requirements for transparency, traceability, openness, and peer review:

- *Transparency*: Using clear language and, where the general public is concerned, showing an effort to present technical material in a way that is understandable to non-expert audiences, without sacrificing rigour;
- *Traceability*: Sources for the data are indicated, and assumptions are identified and justified;
- *Openness*: Uncertainties are specified and reasons are given for the estimates of the confidence in the expected performance of the facility;
- *Peer Review*: Independent critical review has been undertaken by experts of established reputation who are not connected to the organization that prepared the original studies.

The safety case can be taken as illustrating an important discussion topic (one of many) for community dialogues about storing used nuclear fuel. What are some

ways in which a community could organize for itself a variety of forums for holding such a discussion?

2C. Some ways of organizing community discussions.

Three quite different strategies for discussion are presented, and a number of different methods for implementing such discussions will also be offered. The three types are:

1. *Deliberative*, relying on expert presentations and technical information;
2. *Instrumental*, involving a balancing of perceived benefits and costs (risks);
3. *Values-driven*, using reasoning based on ethical principles.[‡]

Each of them has great potential value, and obviously some communities will want to utilize all three, especially if they are among the group which decides to maintain their involvement in the engagement activities through more than just the first of the series of steps. This is because the level of intensity of the community dialogues might be expected to rise as a community's involvement progresses toward the later steps.

It is possible that some communities might want to begin using one or more of these strategies as early as the transition between Step 1 (information exchange) and Step 2 (preliminary screening for site suitability) in the sequence presented in the Appendix, at the end of this paper. Or perhaps, these strategies could be deployed during the transition period between Step 2 (preliminary screening for site suitability) and Step 3 (potential site feasibility study).

(a) Deliberative discussion processes.

In this orientation for discussion community members will seek ways in which qualified experts can help them comprehend the many and complex technical issues that will be raised in connection with a repository siting. There are two aspects to this need: first, the simple translation of technical terminology into terms understandable to non-experts; and second, figuring out whom to trust among the experts addressing these issues when challenges are raised to the credibility of any specific experts. Neither of these aspects is easily dealt with, and that is why formal procedures of some type are usually found to be necessary when confronting them.

Since the safety case is being used here as an example of technical complexity, an example drawn from a recent document on this topic, available on the Internet, will illustrate the need referred to above:

“The deep horizontally-layered shale and argillaceous limestone sedimentary sequence that will overlie and host the DGR [deep geological repository] is

[‡] See the discussion of a values framework in Paper #1.

geologically stable, geometrically simple and predictable, relatively undeformed and of large lateral extent.” (Kempe et al. 2007, p. 5)

Obviously, the geological characteristics of a candidate repository site are a very important part of any such safety case, and therefore this type of analysis simply cannot be omitted from the discussion. But few among the rest of us who are not geologists would presume to be able to evaluate fairly, on our own, the accuracy of this statement. Thus the need for help.

What is required is a set of forums that have been designed to incorporate presentations by reputable experts within the larger purposes of a community dialogue. A few examples are provided below.

(a1): A citizens’ “grand jury.”

Here a community would agree on a fair process for selecting a representative, relatively small sample of its members, say 10 to 20 in number, who would serve as a kind of grand jury. The jury would first select a knowledgeable professional person, perhaps an outside consultant, to conduct proceedings in its presence and, in effect, to act as a “prosecutor.”

The jury members would instruct the prosecutor as to what specific issues of a technical nature it wishes to have examined during its time in this role. The prosecutor, perhaps assisted by others, would then select a number of well-informed individuals, groups, and organizations and invite them to appear before the jury. Notes of these meetings would be kept, but preparing a verbatim transcript almost certainly would be unnecessary.

The invited persons would submit in advance some materials appropriate to the issue, including technical documents and briefs. A kind of “cross-examination” of the expert witnesses would be conducted by the prosecutor, who would include in the list of questions those submitted by jury members. In specific matters where the jury was presented with sharply conflicting points of view by witnesses, an effort could be made to find “neutral” parties who could attempt to reconcile the conflicting statements or at least assist the jury in interpreting those differences. Neutral parties could also be asked to help the jury to understand some of the most difficult matters that are common to all technical assessments, especially the interpretation of uncertainties and probabilities.

At the end of the hearings the jury members would decide on how to report its “verdict” on the matters before it – perhaps by a vote, or else by some other way of indicating its collective judgment. Its reasons for judgment, and any recommendations for further steps that might be needed, should be written up, perhaps with assistance by a professional writer, and released to the public.

(a2): Consensus conference.

Here the kinds of discussions that would occur in a long series during the grand jury sessions would happen all at once, over a period of days, in a conference setting open to the community (and recorded for later playback by others). Panels of diverse experts would be asked to prepare short papers on specific technical topics, and to orient those papers to a non-expert audience. They would speak to their papers at the conference sessions and respond to questions from the audience. Conference organizers would assemble a written record of meeting, including the Q and A sessions, for later dissemination in print and web-based formats.

Depending on the scope of the topics that is of interest to community members, either one conference, or a series, could be planned.

(a3): Focus group meetings and background papers.

Professionals with an expertise in conducting focus groups could be retained and asked to meet with community volunteers for intensive discussions, designed to elicit the specific concerns of community members at a particular point in time.

Using inputs from these meetings, community officials could then commission the preparation, by neutral third parties who are recognized experts in the relevant fields, of short papers that addressed directly the most common and serious of the issues raised in the meetings. Print and web-based formats would be used for dissemination.

(b) Instrumental discussion processes.

Community members can take an entirely different view of their most crucial information needs from what is suggested in the preceding section. In other words, they can reasonably take the view that it is government agencies, working on their behalf, which should and must resolve all of the technical issues implicit in the safety case, for example. The rationale for this view is that the full safety case is of such great complexity that only qualified experts can truly understand it and ultimately recommend its rejection or approval. Governments, on this view, must configure the decision process that subjects the analyses and recommendations of technical experts to rigorous examination, resulting ultimately in a judgement that the safety case has or has not been made satisfactorily.

Thus from this standpoint, rather than listening to debates among experts on many subjects in which they have little or no expertise, citizens should have a quite different kind of debate among themselves. This may be called an “instrumental” discussion, because it would be about their own *perceptions* – in other words, their own considered personal judgements – about how the storage facility project would impact daily life in their community.

For such discussions they would use their own personal information base, as gathered from Internet searches, occasional talks with friends and neighbours, participation in community meetings, or whatever. The main difference between

this approach and the preceding one is that, in the present case, they would have made their own selection about what information is relevant to the decision options they have been presented with from among the information sources familiar to them.

Their perceptions would encompass a sense of potential benefits from the project, as well as potential risks and costs. They would still have to choose how to conduct their discussions along these lines, but here the most appropriate choices are likely to be in the form of more informal settings, such as town hall meetings or neighbourhood gatherings, without the keeping of a record of meeting.

In the absence of any sustained call for the adoption of more formal settings, such as the ones described earlier, it would be presumed that the informal discussions were a sufficient basis for the expression of a collective judgement, one way or the other, perhaps through a referendum or a resolution by the municipal council, at some point in time, on the facility hosting opportunity.

(c) Values-driven discussion processes.

Debates driven by different senses of fundamental values are likely to be the most difficult to manage well. It is possible to imagine that two members of the same community could feel equally strongly that the place where they live has a clear ethical duty or responsibility in this matter – the one, to accept the hosting role, and the other, to oppose it. If such a division is broadly representative of the feelings of large numbers of people in the community, a rancorous and long-running dispute could be opened up within their ranks.

Although this situation may turn out to be unavoidable for some communities, it also may be possible to seek to confront it head-on and, hopefully, to reduce the amount of discord. This may be done by seeking the assistance of qualified external resources among those who have expertise in ethics and values, such as in university departments. These professionals are experienced in methods for situating values debates in modes of reasoned discourse.

For example, in the period 2003 – 2005, the NWMO used both an International Panel, composed of three members of high international standing, as well as a separate six-member roundtable on ethics, to provide guidance on values issues during its deliberations on the policy choices for a permanent storage site for used nuclear fuel. Records from their activities, available on the Internet (NWMO 2003b), may be consulted by community members who wish to see examples of how ethical reasoning can make a distinctive contribution to the formulation of principled positions on these types of decisions.

2D. Conclusion: The Element of Trust.

The record of public and community engagements (and controversies) over facilities siting, especially for facilities designed to store and dispose of hazardous wastes, has

been studied extensively and reported in the academic literature. A special focus of such studies is the attempt to understand how one of the most important human values, namely trust – as between members of communities, on the one hand, and the people and organizations which are the proponents of the facility to be sited, on the other – can be either generated or destroyed.

As detailed in the published literature in this area, in these situations two elements in the “construction” of trust stand out, namely the perception of the *integrity* and the *competence* of the proponents, on the part of community members. In comparing the two, the qualities that make up competence are perhaps easier to pin down. For example, during the detailed scrutiny of the safety case in open public hearings where evidence and reasoning is examined closely, it should be possible for community members to form a confident judgement that the facility owners will or will not achieve the requisite level of safety in their management of the proposed project over the long haul.

Reaching a judgement on the matter of integrity involves more subtle modes of thinking. But some, at least, of the essential characteristics that are involved here can be specified:

- Do the proponents have an attitude of openness and frankness with regard to their own objectives, ethical principles, and the information sources on which their proposals are based?
- Are the proponents respectful of the diversity of community viewpoints, and do they display a willingness to engage all those who wish to be involved in the process?
- Are the proponents willing to assist community members in their efforts to assess the adequacy and credibility of the information presented by the proponents?
- Are the proponents prepared to provide a reasonable level of assistance to potentially interested communities, in terms of accessing the resources that are needed to define adequately the community’s response to the siting opportunity?

The answers to these and related questions, which can be expected to become obvious over the course of the early stages of the engagement process, ought to be sufficient for the community to make a definitive judgement on the matter of the perceived integrity of the proponents.

Appendix: The Proposed First Six Steps of Community Engagement (NWMO 2009)

1. The NWMO will provide information, answer questions, and build awareness among Canadians and communities about the project and the siting process.
2. At the request of the community, the NWMO will evaluate the potential suitability of the community against a list of initial screening criteria.
3. At the request of the community, a feasibility study will be conducted to determine whether a site in the community has the potential to meet the detailed requirements of the project.
4. For interested communities, potentially affected surrounding communities are engaged and detailed site evaluations are completed.
5. Communities with confirmed suitable sites decide whether they are willing to accept the project and negotiate the terms and conditions of a formal agreement to host the facility with the NWMO.
6. The NWMO and the community with the preferred site enter into a formal agreement to host the project.

Resources Available on the Internet*

* All of the following web-links were operable as of mid-November 2009.

Section I: Safety Case.

Belgium 2004: Federal Agency for Nuclear Control, Government of Belgium, "Geological Disposal of Radioactive Waste: Elements of a Safety Approach":

http://www.fanc.fgov.be/download/Safety_approach_final_2004.pdf

IAEA 2006: International Atomic Energy Agency, "Geological Disposal of Radioactive Waste: Safety Requirements": [http://www-](http://www-pub.iaea.org/MTCD/publications/PDF/Pub1231_web.pdf)

[pub.iaea.org/MTCD/publications/PDF/Pub1231_web.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/Pub1231_web.pdf)

Kempe, T. et al. (2007), "Developing a Safety Case for Ontario Power Generation's L&ILW Deep Geologic Repository": www.nwmo.ca/publications?media_file_id=630
[L&ILW = low and intermediate-level wastes, thus not including used nuclear fuel wastes; listed here because the safety case is clearly described]

NEA 2004: Nuclear Energy Agency, OECD (Organisation for Economic Co-operation and Development), "Post-Closure Safety Case for Geological Repositories":

<http://www.nea.fr/html/rwm/reports/2004/nea3679-closure.pdf>

Nuclear Waste Watch (Canada, 2009): <http://www.cnp.ca/nww/index.php>

Sierra Club Canada (2005), “Nuclear Waste Disposal: Action Alert and Backgrounder”:
<http://www.sierraclub.ca/national/programs/atmosphere-energy/nuclear-free/reactors/high-level-waste.shtml>

Section II: Other Resources.

COWAM (Cooperative Research on the Governance of Radioactive Waste Management):

COWAM 2003: “Nuclear waste management from a local perspective: Final Report”:
<http://www.cowam.com/documents/cowam-fr2003.pdf>

COWAM 2006: “Final Synthesis Report”:

http://www.cowam.com/IMG/pdf_cowam2_Final_Synthesis_Report_v4.pdf

EC 2008: European Commission, Community Research, Project on Comparison of Approaches to Risk Governance [CARGO], “Risk Deliberation,” by L. Reynolds et al., University of Lancaster: http://www.cargoproject.eu/docs/project-deliverables/wp3_risk_deliberation.pdf

IAEA 2007: International Atomic Energy Agency, “Factors affecting public and political acceptance for the implementation of geological disposal”: http://www-pub.iaea.org/MTCD/publications/PDF/te_1566_web.pdf

NWMO 2003a: Nuclear Waste Management Organization, “Health Effects of Radiation and Radioactivity”: <http://www.nwmo.ca/healtheffects>

NWMO 2003b: Roundtable on Ethics: http://www.nwmo.ca/round_table_on_ethics and International Panel http://www.nwmo.ca/international_panel

NWMO 2009: Nuclear Waste Management Organization, “Moving Forward Together: Designing the Process for Selecting a Site”:
<http://www.nwmo.ca/designingasitingprocess>.

“Oskarshamn Model”:

Harald Åhagen and others, “Repository Siting – Public engagement an asset or an obstacle?” (2004): http://web.wpab.se/lko/Data/public-se/en_dokument_visa.asp?ID=84&MainTyp=1

“Repository of used nuclear fuel, site investigation phase, Municipality of Oskarshamn Organization” (October 18, 2004):
http://web.wpab.se/lko/Data/public-se/en_dokument_visa.asp?ID=96&MainTyp=1

“Site Investigation in the Municipality of Oskarshamn: Decision on Site Investigation, Decision Statement” (October 18, 2004):
http://web.wpab.se/lko/Data/public-se/en_dokument_visa.asp?ID=83&MainTyp=1

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