Burying Nuclear Waste, Exposing Nuclear Authority:

Canada's Nuclear Waste Disposal Concept and Expert-Lay

Discourse

by

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A thesis submitted in conformity with the requirements of the Degree of Doctor of Philosophy

Graduate Department of the Institute for the History and Philosophy of Science and Technology

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Abstract

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This thesis investigates Canada's debates about nuclear waste disposal, concentrating on the

public inquiry into a nuclear waste disposal concept (held 1996-97). My evidence is an analysis

of public inquiry transcripts, plus industry and Government documents (produced since 1954).

My focus is on disputes about what the issue was that was in contention. I identify several

different ways in which the issue in dispute was framed, specifically how expert and public

groups enacted competing framings. I show that proponents of the waste disposal concept shifted

grounds in terms of how they framed the issue: from solving the nuclear waste problem as

intimately connected to ensuring a future for commercial nuclear power, to separating these two

issues. Proponents also initially excluded the public from involvement in decision-making, but in contemporary times they embrace public involvement. This shift was mediated by declining support for nuclear power in general, as well as failures to retain control over the terms of debate and assessment themselves. Disposal concept supporters framed the issue as one of how to proceed in the face of technical uncertainty, and have thus marginalized deficiencies in present-day evidence for safe disposal by arguing future site-specific investigations will resolve all technical issues. This 'viable in principle' defense has been strenuously opposed by public opposition groups, who have framed the issue as involving more than just narrow questions of concept feasibility and safe disposal. Public critics have framed the issue as intimately connected with the legitimacy of present-day democratic procedures for ensuring the accountability of decisions. An analysis of the history of these competing framings suggests that much skepticism should attend recent nuclear industry claims to be accountable to public feedback. I also draw upon this history to comment upon debates about what is more salient: public capacities as experts or public rights as citizens. I show that ensuring democratic accountability, rather than just representation, has been an underlying political demand of public opposition groups, and that their main concern has been with the very ability to negotiate what the nuclear waste disposal issue ought to mean.

Acknowledgements

University of Toronto guidelines stipulate the doctoral dissertation ought to be the "unaided work of the student" and, for the most part, this dissertation certainly conforms to that requirement. At times lonely and frustrating, this dissertation came together over a few more years than planned, mostly as I worked through the process of winnowing it down into something that matches the definition of a good dissertation (a done dissertation). I would like to thank Professor Mary (Polly) Winsor, who became my supervisor even though nuclear waste disposal is far from her specialty in biological topics like evolution and systematics. Polly took on the task of ensuring my penchant for exploring conceptual issues would be disciplined by rigorous historical inquiry and the goal of reaching substantive conclusions about the empirical material under study. To the extent this dissertation accomplishes that task it is due to Polly instilling some good old fear in me, and I thank Polly for both setting high standards and for also being a genuinely lovely human being (and for undeniable patience). Other thanks are due to all those anonymous science and technology studies scholars whose work constantly provided insights into how experts and publics interact. Of course it is conventional to say remaining errors are due to me, but I will break tradition and blame the field itself, which keeps open-minded scholars guessing and complicates neat narratives. I would not have it any other way. Last but certainly not least I thank Vivi, who helped steer the project to completion by taking care of so many things while I went sleeplessly crazy on the final copy, and who provided stern but very wise encouragement. I have been and am very lucky to have you my dear.

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Table 1 Timeline: The History of Canada's Nuclear Waste Management Debate

1946-1980s	Birth, growth & stabilization of commercial nuclear power
1968-92	Commercial construction & operation of power reactors (Pickering A (1971-73), Bruce A (1977-79), Point Lepreau (1980), Gentilly 2 (1983), Pickering B (1983-86), Bruce B (1985-87), Darlington (1990-92)). Pickering & Bruce have 8 reactors each (Ontario), Darlington has 4 (Ontario), Point Lepreau (New Brunswick) & Gentilly (Quebec) have 1 each. Total = 22 reactors (2 million used fuel bundles as of 2005).
1977-87	Internal (government & nuclear industry) policy-making
1978-81	AECL does initial siting assessments
1981	Government decision to approve a concept prior to siting
1984-89	Internal federal/provincial government & AECL/Ontario Hydro negotiations concerning the terms of reference of a future public inquiry
Jan. 1985	AECB releases Regulatory Document R-71, a policy document setting out an assessment procedure for a waste disposal concept
4 Oct. 1989	Final terms of reference released, establishing the definition of the public inquiry and its boundaries (its 'mandate') and the Seaborn panel
1990	Scoping sessions (outline the details of which critical parameters & potential project impacts should be assessed; discuss scope of the mandate)
13 June 1991 – 16 Sept. 1991	Draft guidelines for AECL Environmental Impact Statement (EIS) released for public review ('adequacy & completeness' criterions)
18 March 1992	Final guidelines issued to AECL and made public
26 Oct. 1994	AECL releases its EIS: pre and post-closure assessment studies, plus 9 supporting documents
8 Nov. 1994 – 8 Aug. 1995	65 written submissions regarding the adequacy & completeness of the EIS were received by the Seaborn Panel
1995 – 1996	Seaborn Panel receives several reports from the Scientific Review Group
1996-97	Public hearings held in 3 phases
March-May 1996	Phase 1 (social issues of long-term management of nuclear fuel waste)
10 July 1996	Natural Resources Canada, *Policy Framework for Radioactive Waste*
June & Nov. 1996	Phase 2 (discussed scientific and engineering issues)
Jan-March 1997	Phase 3 (final statements; community visits)
Feb. 1998	Panel releases its report, with two primary findings. 1) From a technical perspective, the safety of the AECL concept has been "on balance adequately demonstrated for a conceptual stage of development", but from a social perspective it has not. 2) "As it stands, the AECL concept for deep geological waste disposal has not been demonstrated to have broad public support."
Dec. 1998	Government of Canada response to the Panel findings.
Nov. 2002	Nuclear Fuel Waste Act (NFWA), or Bill C-27, passes in federal legislature (establishing the Nuclear Waste Management Organization (NWMO). Bill-

	C-27 differed from the Panel recommendations in four key areas. 1) Panel's references to "social safety" (it had not been shown) was translated into "the public is misinformed and needs to be educated" 2) AECL/nuclear corporations as implementing agencies, despite Panel wishes for an arm's length agency (trust issues) 3) The (NWMO) Advisory Board does not *necessarily* have to include as broad a constituency as the Panel wished (i.e.: sociologists, ethicists) 4) The responsible Minister reviews final reports of the NWMO, rather than Panel requests for multiple review mechanisms
Nov. 2002 – 15 Nov. 2005	The Nuclear Waste Management Organization (NWMO), established via the NFWA (Bill C-27), under-takes a 3 year project to review approaches to and recommend a long-term approach for managing used nuclear fuel. - *Asking the Right Questions* (November 2003), Discussion Document 1 - *Understanding the Choices* (Sept. 2004), Discussion Document 2 - *Choosing a Way Forward* (May 2005 Draft Study Report, November 2005 Final Study Report) - Adaptive Phased Management is recommended
Aug-Sept 2006	OPG and Bruce Power apply to build more reactors
14 June 2007	NRCan accepts the Adaptive Phased Management recommendation of the NWMO

Glossary of Acronyms, Associations, and Terms

AECB	Atomic Energy Control Board. Known as the Canadian Nuclear Safety Commission (CNSC) since May 2000.
AECL	Atomic Energy Limited Canada
APM	Adaptive Phased Management
CAD	Concept Assessment Document
CEAA	Canadian Environmental Assessment Agency
CNA	Canadian Nuclear Association (lobby group)
CNS	Canadian Nuclear Society
Concept only	The public inquiry dealt only with a concept for disposal, and did not consider actual sites, an implementing agency, or energy policy
EIS	Environmental Impact Statement
EMR	Energy, Mines and Resources (preceded NRCan, prior to 1993)
Environment Canada	Becomes a player in nuclear regulation in the 1990s; pushed for a broader environmental assessment during debates over the inquiry mandate
IAEA/UN	International Atomic Energy Agency/United Nations. An inter-governmental forum, working on non-proliferation safeguards and verification, upgrading safety and security of nuclear technology, and directing research on nuclear applications.
NEA/OEC	Nuclear Energy Agency/Organization of Economic Co-Operation. The NEA consist of 28 countries, acting as a forum for sharing information on the scientific, technical and legal bases for the use of nuclear energy for peaceful purposes.
NFWA	Nuclear Fuel Waste Act (passed in 2002, established the NWMO)
NGO	Non-Governmental Organization
NRCan	Natural Resources Canada; AECL reports to the Minister of NRCan
NWMO	Nuclear Waste Management Organization
Ontario Hydro	Provincial utility; began by building reactors but then shifted to managing reactors. Known as Ontario Power Generation since 1999
OPG	Ontario Power Generation (see Ontario Hydro)
R-Public	Document dealing with participation and social aspects, produced as one of the primary references with the AECL EIS (Greber et al)
R-71	Regulatory document produced by AECB in 1985, dealing with the scope and schedule of a concept assessment phase
Seaborn Panel	Chaired by Blair Seaborn. Panelists: Denis Brown, Mary Jamieson, Louis La Pierre, Dougal McCreath, Louise Roy, Peter van Vliet, Lois Wilson (and William Fyfe at one stage, prior to resigning)
SRG	Scientific Review Group: independent committee, Chaired by Dr. R. A. Price, and comprising 14 other engineers and scientists
Stripa Project	A project (three hours West of Stockholm) to investigate ground-water-rock/engineered barriers interaction in granite (1977-92)
TAC	Technical Advisory Group AECL in-house group of experts; central body for reviewing the EIS and primary references

Chapter 1

Introduction

1.1 Introduction: the issue is 'what is the issue?'

In 1996-97 Canada held a public inquiry into a nuclear waste disposal concept. Despite over

twenty years of research and development on nuclear waste disposal prior to the public inquiry,

and despite every single technical and bureaucratic group at the inquiry recommending the

concept be accepted and site-specific inquiries commence, the panel established to run the

inquiry recommended rejecting the concept:

> ... from a technical perspective, safety of the AECL concept has been on balance
> adequately demonstrated for a conceptual stage of development, but from a social
> perspective, it has not (CEAA 1998, 2 and 41).

What was this social perspective that was enough for the panel, known as the Seaborn panel after

its chair Blair Seaborn, [1] to use it as a basis for rejecting the concept? Related to this question is

why the technical perspective was not enough to secure acceptance? That is, how did the

technical and social perspectives inter-relate, and what were the ways in which competing groups

and interests at the public inquiry sought to relate technical and social matters? Moreover, was

this recommendation to reject the disposal concept in fact a victory for the social perspective

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[1] Seaborn was noted as an expert in arbitrating between warring factions, and as being no stranger to politically charged controversy. For instance, Seaborn had been head of Canada's delegation to the International Commission for Supervision and Control in Vietnam. Controversially, Seaborn delivered a message to Hanoi in Spring 1964, from US President Lyndon B. Johnson, that "America was determined that South Vietnam should be given the opportunity to develop as a viable state", and that the USA would provide "political, economic, and military support . . . [to prevent] a string of collapses". Seaborn recounted this story on the CBC Radio program *As It Happens*, "Diplomacy or Complicity?", 25th April 2002. The interview can be accessed at http://archives.cbc.ca

over the technical perspective? I argue it was a temporary victory. The terms of debate and assessment of nuclear waste disposal were shifted away from a narrow framework within which the need to act could marginalize public demands for democratic accountability. Nevertheless, several assumed separations between technical and political matters remained unaffected by this push for the merits of a social perspective. This study thus explores the political-economic and epistemic mechanisms by which public participation in policy-making involving expertise can be "the new tyranny" (cf. Cooke and Kothari 2001).

The scope of this inquiry is delimited by a central puzzle I seek to address. My starting point is the undeniable observation that technical and policy elites supportive of approving a nuclear waste disposal repository entered the public policy dispute with most factors in their favour. Corporate and government groups enjoyed both greater economic and political resources, as well as confidence in their continuing involvement in decision-making venues, than public groups. Yet public groups succeeded in making a case that a broad (social) basis of assessment was required in order for nuclear waste disposal to be politically and socially acceptable. Nevertheless technical and policy elites re-asserted their ability to control the agenda, though on a new, publicly inclusive basis that may in fact beat the critics at their own game. This parry-and-thrust public contestation poses problems for any view that presupposes (powerful) expert groups can reliably ignore public protest, or that expert discourses are inevitably insensitive to public demands, or that public victories in helping reshape the social bases of assessment necessarily bode well for continued public influence. The problem I address can thus be summarized as saying that public groups entered the waste disposal public inquiry at a disadvantage, and hence I want to show how public critics coped with that situation, and thus

contextualize the response of technical and policy elites (where that 'response' is thus the contemporary nuclear waste management public policy scene).

The scope of my inquiry is thus delimited by the problem outlined above. For instance, I do not focus upon intra-group differences between proponent, supporter and critic of the waste disposal concept, but instead focus upon inter-group conflict. This means in practical terms that I do not use interview material, and other sources, to comment upon the intentions and motivations of technical and government groups. In many ways I have black boxed their claims, focusing instead upon the form those claims did take in public contexts. This has the advantage of keeping at the forefront of consideration the actual claims and persuasive strategies used in concrete settings, and thus making clear the kinds of battles public critics saw themselves involved in. I want to convey a sense of 'the other' that public critics saw themselves as confronted by, and to do this it is public profiles that matter, even though public critics of course speculated about the goals that lay behind the public positions they were confronting. Similarly, I do not tease out the internecine differences between public critics. This is done for two reasons. One is that critics were largely unanimous in their view of what was the real issue at stake, and that involved issues of democratic consideration of options, and this common focus is important to elucidate (though in Chap. 6 I discuss differences in recommendations regardless). The second is a matter of the politics of inquiry: an imbalance in willingness to freely discuss strategic decision-making, and an imbalance in access to such information, means public critics can have the social bases of their assessments aired in a way which suggests technical and policy elites were less 'socially interested'. There is little by way of 'analytic' solution to such problems of access and willingness, except wise selection by the analyst. Hence the focus here becomes the public positions taken, though this ought not to be seen as any kind of analytic weakness. It is vitally

important, if one is to understand the social dynamics of contemporary disputes involving policy preferences and technical choices, to understand how public arenas facilitate and/or constrain the kinds of deliberative practices able to take place.

A follow-on limitation is that what could be called the agenda-setting literature, or that area of academic policy discussion that focuses upon how agendas are set for public discussion, is largely absent from this work. This limitation has much to do with the fact that establishing agenda-setting mechanisms has a lot to do with accessing the records and thoughts of the agenda setters. Yet gaining access to corporate documents, the main agenda setting actors discussed here, faced severe limitations. Yet there is also a substantive reason for not focusing specifically on agenda setting as a topic, which is that the agenda shifted over time in response to the failure of corporate interests to restrict the decision-making field to technical and policy elites. The flip side to not focusing upon agenda setting is that I also do not focus upon what kinds of 'better arrangement' might have made for a better public inquiry. That is, my concern is not to suggest how differences could have been transcended, but instead to make clear how and why they were not. I see this focus as a necessary prelude to speculating about better arrangements which, for better or worse, constitute a concern for later stages of research. Hence this work focuses upon the larger political-economic situation within which agenda-setting efforts, and discussions of better arrangements, took place. I seek to place public critics within this overall context, and thus to convey a sense of the political world within which critics perceived themselves to be operating. In some places I argue their assessments of that world were accurate, though in other places I suggest they over-estimated the discretionary power of advocates of commercial nuclear power. The point here is to draw attention to the discursive moves proponent, supporter and critic of the disposal concept made as the disposal concept moved through different stages of

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assessment, and as the disposal concept itself became successively refashioned as a very malleable conceptual apparatus. I want to convey a sense of the challenges public critics faced, both in responding to perceived political machinations by disposal concept proponents and supporters, and in their efforts to have the disposal concept fixed down to a specific form for evaluation and to a specific context within which an evaluation could be rendered.

If there is thus an overall puzzle lurking beneath all of this, then it might be stated as follows. Is the issue to consider, in terms of the how the public can be involved in public policy where it involves technical matters, to decide who will debate what issues in what forums with what limitations? The trouble with this formulation is that it necessarily freezes time, in that the formulation is modeled on a situation in which what is at stake is a particular proposal to be debated by particular groups in a particular place with particular limitations. Yet the Canadian waste disposal dispute broke these bounds of temporal freezing, because not only was the disposal concept itself an elusive project that could morph into required states of fixity, but the forum for decision-making itself seemed to stretch itself out over time in a number of ways. Public critics thus attempted to ensure the public inquiry would be the testing forum, but concept proponents and supporters shifted that forum into future site-specific locales. This meant relevant groups also acquired a hazy shape, because the future shape of presently involved groups or to-be-involved groups was at issue even before there was a decision about what the future would in fact be. Hence the in-flux character of the dispute, the hazy shape of the concept, relevant groups, and relevant forum for decision-making, all meant that settling such issues was necessarily tied up with evaluating a supposedly clear concept proposed by apparently clear groups in a seemingly obvious place of assessment. The real puzzle here is to understand how parties to the waste disposal dispute sought to establish their own present-day goals and values in

a situation where future 'states of the world' were directly relevant to what the concept would be, who might be involved in working on it and making decisions about it, and where and under what conditions such activity might take place.

To illuminate this puzzle, I focus upon how (what became known as) the 'social perspective' itself arose in the dialogical situation of a twenty-year dispute over nuclear waste disposal public policy. Ultimately I suggest the limited nature of the victory of this social perspective, but in order to show how both the victory itself and its negation could take place I show the dynamics of the contestation that took place. As such, this study investigates how nuclear waste disposal proponents and their supporters framed their claims about nuclear waste disposal, how public critics rejected this dominant framing and offered their own framing of the issues at stake, and how experts and policy elites clashed over what was at stake and which meanings were appropriate. By 'framing' I refer to the choices, prioritizations, and cultural givens that conditioned the scope and quality of deliberation at the inquiry. In more specific terms, framing also refers to either tacit, implicit, presumptive and prescriptive impositions of meanings and conceptions of what concerns are relevant and what the issue is, or to more deliberate and strategic social actions intended to tacitly (or overtly) steer processes toward outcomes favouring particular interests and goals. These two forms of framing are not independent of each other, but are contingently related according to relevant dynamics and processes within the prevailing political-economic field. What became significant at the public inquiry was whether the issue in dispute could be framed as the pressing technical problem of handling nuclear waste? Or, was the issue a much broader matter of securing democratic deliberation about technical proposals, especially given the acknowledged uncertainties, and their potential associated policy consequences? My focus is thus on disputes about what the issue

was that was in dispute, and this focus situates the study in opposition to any approach that would too easily read policy relevant disputes *involving* expertise as simply *about* that expertise.

My claim in this study is thus to have illuminated how, although public critics made claims that *related to or involved* scientific and engineering matters, this did not thereby automatically and restrictively make their claims *about* those matters. This reflexively applies to proponents and supporters as well, for while they (mostly) made very technical arguments, this does not imply their claims were only and strictly about scientific and engineering issues. Proponent and supporter, on a host of occasions, offered quite politicized defenses of the waste disposal concept, and they also enunciated broader meanings than just propositional questions about safety. In each case, proponent, supporter, and critic made technical claims within a context of recommending how the domain of public policy should proceed in the face of acknowledged uncertainty, industrial planning issues, and the reality that public involvement was going to remain crucial no matter what the outcome of the public inquiry. Indeed, what is suggested here is that the very notion of a 'scientific issue' or even 'science' suffers from a strategic ambiguity in many actual occasions of use. For public critics especially, the object they perceived themselves to be facing was not something they recognized as expertise *per se*, but as expertise being deployed as contentious public authority when, in fact, the public was sitting right there in the hearings rooms and demanding to be heard on their own terms.

1.2 The combatants and their competing framings

This study aims to contribute to current debates within the fields of Science and Technology Studies (STS) and the Public Understanding of Science (PUS), but also to make substantive

claims about why Canada's nuclear waste disposal debates unfolded in the way they did, and what divided (and continues to divide) expert, bureaucratic, and public groups. Analyzing this dispute, with a view to unearthing the sources of conflict, the different meanings in play, and the different questions and issues that competing groups would prefer to see addressed – especially in regard to public groups already at a disadvantage in both epistemic and political-economic power – can offer valuable insights into the mechanisms and assumptions that might undermine the democratic legitimacy of public participation programs. I make no claim here to be offering convenient plans for reforming public consultation programs, but I do claim to offer an interrogation of one in aid of illuminating salient problems that could do with being avoided.

Section 1.2 thus sets the groundwork for making such substantive claims by introducing the relevant groups in the nuclear waste disposal controversy, and thus developing in the reader a familiarity with the human and organizational terrain of the controversy. Section 1.3 introduces the empirical material utilized in the study, which primarily consists of an in-depth analysis of public hearings transcripts, along with technical, policy, and consultative documents produced by various parties to the dispute since the early 1970s to the present. I also briefly indicate why analyzing actual dialogue from a public dispute is advantageous in understanding expert/public disputes. Section 1.4 briefly outlines the main contours of how the disposal concept was framed. Section 1.5 introduces some contemporary disputes within STS and PUS, which centre on whether it is best to approach potential conflicts between expertise and democracy as the task of figuring out who knows what they are talking about or as conflicts in which the definition of and control over what constitutes the issue is, indeed, the issue. This study adopts the latter perspective, in part because it is closer to the empirical findings of this study, but also because of normative reasons. Theorizing relations of democratic accountability appear to be a fruitful

means to assist public groups that routinely face the problem of having their concerns and issues de-legitimated by the imposition of hegemonic expert/bureaucratic frames of meaning. Section 1.6 notes some of the findings of this study, as well as some of the theoretical resources utilized for specific purposes within specific chapters, and provides a brief description of each chapter.

What was the nature of the problem that nuclear waste disposal proponents, in their terms (as critics operated with a very different conception of what the problem was), sought to solve? Canada has built a total of 22 nuclear reactors, not all of which have always been operating or are operating presently. The first commercial nuclear reactor came on-line in 1971, and the last in 1993. Nuclear fuel waste is produced in and through the operation of these reactors and, since the early 1960s (with experimental reactors), has been stored in either water storage bays or dry-storage casks at reactor sites. A quantifiable measure of the problem created in this industrial activity is that the number of highly radioactive fuel bundles in storage, as of 2005, was estimated at approximately 1.9 million (NWMO 2005b, 350). A colloquial means of representing the quantity of waste at issue is to say that all the waste produced by Canada's reactors would fill several hockey rinks to the height of the boards. Yet the problem is not simply one of the present situation, but also about the future. Depending upon whether commercial nuclear power is expanded, maintained at existing capacity, or phased out, estimates for the amount of waste that may accumulate ranged from 4.3 to 10 million in the 2033 to 2075 period (AECL 1994a, 114 and 263). A subsequent estimate, exploring similar contingencies involving the life-time of reactors, produced estimates of 4.4 to 30 million in the period 2043 to 2200 (NWMO 2005b, 393-97).

At the public inquiry of 1996-97 the nuclear waste disposal concept proposed as a solution to such problems of accumulating nuclear waste was explicitly advertised as flexible

and capable of being instantiated in and through a number of different engineering and geophysical parameters and conditions. As will become clear in Chapter 6, it is thus a contentious matter to claim one can represent the disposal concept without ambiguity. Nevertheless, from the perspective of the proponents, the nuclear waste disposal concept in question proposed to bury nuclear waste, in some kind of canister, and emplaced in some fashion within a disposal vault, and which would be buried 500-100m deep within plutonic rock of the Canadian Shield. The vault would be sealed, and a multi-barrier system of engineered and geophysical barriers was projected to be capable of protecting people and the environment from radioactive contamination for a period up to 10,000 years. The proponents of this deep geological disposal concept were Atomic Energy Canada Limited (AECL), Canada's nuclear research and development crown-corporation, and Ontario Hydro, the province of Ontario's publicly owned utility (now known as Ontario Power generation (OPG) since 1999).

Bureaucratic agencies, various technical review groups composed of credentialed experts, and nuclear industry lobby groups and associations, constituted the main body of supporters of the disposal concept. Prominent bureaucratic agencies included the Atomic Energy Control Board (AECB; now Canadian Nuclear Safety Commission (CNSC) since 2000), the federal regulator of nuclear matters, and Natural Resources Canada (NRCan; which succeeded Energy, Mines and Resources (EMR) in 1993), the federal Ministry responsible for promoting and developing nuclear power (along with other industries, of course). Most prominent among the technical review groups was the Scientific Review Group (SRG), established to offer independent technical advice to the Seaborn panel. Prominent industry supporters included the Canadian Nuclear Association (CNA), the industry lobby group, and the Canadian Nuclear Society (CNS), a professional association of technically trained individuals. In general terms,

proponents advocated the flexibility of the disposal concept and its demonstrated acceptability, while supporters emphasized the viability of the concept in principle even when they noted deficiencies within the evidence offered to demonstrate acceptability and safety. Both proponents and supporter also emphasized the need to take action, regardless of associated issues (such as contentious debates about energy policy options). As one historian noted quite some time prior to the public inquiry, "the Canadian federal Government, its Crown corporations, and its regulatory agencies, probably have a deeper involvement in, and commitment to, nuclear power than does the national Government of any other country" (Helliwell 1979, 214).

Critics of the disposal concept refused to accept that such vested interests in expanding commercial nuclear power could be divorced from assessments of the safety and acceptability of the nuclear waste disposal concept. Moreover, even where technical review groups clearly distanced themselves from such vested interests (and legitimately so, in a number of cases), critics still found their general outlook both puzzling and troubling. Many review groups identified innumerable deficiencies in how AECL had conducted and documented its safety case, in some cases concluding safety had simply not been established, but nevertheless recommended progressing to site-specific inquiries. This defense of the disposal concept, that it was 'deficient but viable in principle', threatened public critics' ability to hold the disposal concept accountable within the confines of the public inquiry hearings. Hence both the perception of explicit politics, in that approving nuclear waste disposal might be taken as default approval to expand commercial nuclear power (as it would solve the 'clean up your wastes' problem), and the perception of implicit politics, one that marginalized problems in aid of taking action in the present, meant the *issue* involved securing democratic scrutiny and accountability. Prominent amongst public critics were Non-Governmental Organizations (NGO) with a long-standing

engagement with nuclear issues in Canada. I cannot list them all here, but NGOs that remained significantly involved throughout the public inquiry process included the Canadian Council for Nuclear Responsibility, Concerned Citizens of Manitoba, Energy Probe, Northwatch, Northumberland Environmental Protection, Nuclear Awareness, and the Saskatchewan Environment Society. Other public groups included the Inter-Church Uranium Committee, a host of lay citizens contributing directly on an individual basis, and some prominent Canadian and America academics.

Public critics constructed the issue as the connections between waste disposal options and practices and past decisions, incumbent interests and their goals, and possible follow-on decisions. The meaning of the nuclear waste disposal concept was not separate from public critics' contention that democratic accountability and transparency should prevail, and that important questions about the acceptability of risk definitions ought to be more broadly debated than just between the nuclear industry and the AECB. What the safety and acceptability of the disposal concept should mean was not something public critics felt should be left to the nuclear industry and its bureaucratic and technical allies to decide upon, and then hand down to the public. Hence the meaning of the disposal concept was tied up with the process of deciding outcomes and meanings. Moreover, public critics refused to accept the meanings that were being tacitly and presumptively forced upon them by the procedural format of the inquiry (just a concept, nothing else). In effect, whatever the issue was going to be defined as, it ought to be the product of much more deliberation than what critics felt had thus far taken place in Canada's nuclear waste disposal debates.

1.3 General Outline and Note on Sources

My empirical focus in this study is the various aspects of the public inquiry process. Though I discuss the forthcoming chapters when discussing some of my findings below, here I indicate which aspects of the public inquiry process are covered in this study and where they are covered. The mandate for the Seaborn panel was established in 1989, limiting discussion to a concept only rather than potentially associated issues such as energy policy and implementing agencies (CEAA 1998, 84-85). In Chapter 3 I predominately utilize existing secondary sources to outline a political-economy of nuclear waste disposal policy-making in Canada 1946-96. I correlate the evidence provided by these sources with an analysis of AECL technical reports to show when deep geological disposal emerged as the preferred waste management method. My goal is to place the narrow mandate of the Seaborn panel in an historical and political context.

Once the Seaborn panel mandate was established, the Panel held scoping hearings in 1990-91, seeking views on the inquiry process and its scope. This stage of the inquiry has been previously analyzed (Wiles 1994, Kuhn 1997), so I do not investigate it here. An important stage in the inquiry process occurred prior to the hearings commencing, involving an initial review of AECL's Environmental Impact Statement (EIS) on a nuclear fuel waste disposal concept. AECL submitted the EIS (AECL 1994a) to the Seaborn panel in October 1994. The Panel had released guidelines in March 1992 (CEAA 1992) in relation to what the EIS should address. From November 1994 to August 1995 the Panel received 65 written submissions in regard to the adequacy and completeness of the EIS with respect to the guidelines (CEAA 1995). The SRG also tabled a report (SRG 1995a) and appeared before the Seaborn panel (SRG 1995b) in regard to the adequacy of the EIS. Chapter 4 discusses this initial review, drawing upon the primary sources of the 65 written submissions, the SRG report, and the transcript of the SRG's

appearance before the Panel; as well as AECB regulatory documents (AECB 1985, 1987) where they are relevant to explaining the form and content of the EIS.

The public hearings proper were held 11 March 1996 to 27 March 1997, and were divided into three phases. Phase 1 discussed social and political issues, Phase 2 scientific and engineering issues, and Phase 3 local residents' statements via direct community visits. Chapter 5 discusses Phase 1, and Chapter 6 discusses Phase 2. Apart from Section 7.2 in Chapter 7, I do not extensively analyze Phase 3. Though I note in Chapter 7 my reasoning for this exclusion, briefly put, in pragmatic terms there was either much repetition of questions previously asked in Phase 1 and 2, or the positions articulated were often far less detailed versions of public critiques already given. A more substantial reason for focusing on Phase 1 and 2 of the public inquiry is that my focus in this study is the boundary work performed by different groups and individuals in respect to what were to be considered technical, and what political, issues. My primary sources for analyzing Phase 1 and 2 consist of the written transcripts of the verbal testimony offered during the public inquiry (CEAA 1997).[2] I have consulted the written submissions that correspond to the presentations speakers made at the inquiry (such as CEAA 1996), but my evidence in the chapters is confined to the verbal testimony presented. This choice to use verbal testimony as evidence follows from the analytic goal of trying to convey the actual character of argument; the claims participants thought were important enough and significant enough to articulate in what sometimes was very little presentation time. This applies equally to public critics as it does to technical and bureaucratic groups. Moreover, in pragmatic terms, the transcripts have the advantage over written submissions that the inquiry format itself allowed for

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[2] To facilitate the identification of individual identity, group affiliation, and source of evidence, each chapter uses footnotes of the following form. Direct verbal testimony, as found in the hearings transcripts (CEAA 1997), is cited as: Name (group affiliation), date of testimony, *Hearings Transcripts* (abbreviated as *HT*) [Volume number], page number(s).

questioning and cross-examination of competing claims. I have thus constructed my account by

paying close attention to where particular arguments came into contact and where they diverged,

in an effort to illuminate what appeared to be the underlying assumptions shared or in conflict.

There are also two arguments of a specifically normative kind justifying the use of public

inquiry transcripts as evidence. One is that no accessible record exists of what public inquiry

participants said and how they responded to various claims. Given contemporary discussions

about the merits and necessity of public consultation about techno-scientific projects (Freeman

2000, Elam and Bertilsson 2003, Jasanoff 2003b), it is important to create an account that

discusses in depth how matters were debated within the often-heated environment of a public

challenge to technical proposals. A focus on actual testimony is also consistent with Habermas's

advocacy of actual deliberation, because "real argument makes moral insight possible" (1990,

15). In this study I do not make Habermasian style claims, to the effect that if forms of ideal

speech situation can be constructed then consensus between even implacably opposed foes might

be possible (Habermas 1990, 1996). However I do follow Habermas in the claim that restrictions

upon deliberation can be part of dominant institutions' efforts to, as Habermas would say,

colonize the lifeworld. For Habermas, the life-world was conceived of as embodying shared,

taken-for-granted cultural knowledge at the heart of social solidarity (1984; 1987, 113-52 and

332-73). Several prominent theorists within STS and PUS follow in this Habermasian tradition.

Thus Wynne has spoken of the need to interrogate dominant frameworks of understanding,

especially where they are held by expert institutions and furtively and tacitly imposed upon

public groups (Wynne 1992b, 2007). Similarly Jasanoff has noted that many conflicts between

experts and the publics are not simply instances where the different knowledge claims are or are

not additive of one another, but more so represent conflicts between positions rooted in different

understandings, life-worlds, and 'civic epistemologies' (Jasanoff 2003a, 2005).

When I turn to Chapter 7 I begin to trace what happened after the public inquiry. As

noted, the Seaborn panel rejected the disposal concept as unacceptable from a social perspective

(CEAA 1998, 2 and 41). I discuss the federal Government response (NRCan 1998), especially

how that response was structured by Government adherence to a *Policy Framework for*

Radioactive Waste (NRCan 1996) arrived at in the absence of public consultation. I then push the

analysis into contemporary times, analyzing the public consultation work of the Nuclear Waste

Management Organization (NWMO) in the period 2002-2005. The NWMO was mandated, with

the passing of the *Nuclear Fuel Waste Act* (NFWA) in 2002, to investigate nuclear waste

management approaches. In Chapter 7 I (briefly) draw upon verbal testimony from Phase 3 of

the public inquiry to illustrate public disaffection with nuclear elites, but mostly base my account

upon an analysis of other primary sources: the Seaborn panel report, the Government response,

documents pertaining to the policy framework obtained via the *Access to Information Act*, and

more than a dozen consultative reports produced by the NWMO. In chapter 8 I conclude with an

analysis of the NWMO's Adaptive Phased Management (APM) approach (NWMO 2005b) to

managing used nuclear fuel. This recommendation was accepted by Government in June 2007

(NRCan 2007). Aside from updating Chapter 3's political-economic analysis of nuclear politics

(here covering the period 1995-2007, in section 8.3), I suggest both a sympathetic and more

critical interpretation of the NWMO's public participation credentials and APM approach. My

sources here are NWMO consultative documents and technical reports. I show how the NWMO

appears to be marginalizing public dissent via strategic absorption of public critics' demands.

1.4 Competing framings

This study investigates the interactional conflicts between nuclear waste disposal proponents, and their technical and bureaucratic supporters, and a range of public opposition groups and individuals. Rather than focus upon each group and person's capacities as epistemic agents, which would quickly become a study dedicated to ascertaining whether or not such agents know what they are talking about, this study investigates clashes over the nature of the issue in contention. In general terms, I explore what the public meaning of the nuclear waste disposal concept was; indeed what the public meaning of the issue was, including how the issue was defined. Given that differences in epistemic power are clearly evident in clashes between experts and publics, in that while publics may wield persuasive claims to political rights experts are normally granted tremendous discretion in their capacity as authority figures, part of my focus is upon how epistemic power is simultaneously exercised and contested in public arenas. Yet at a deeper level I pursue the topic of epistemic power by exploring conflicts over what it is that is to be known in the first place: what issues do different groups wish to have addressed? What purposes and priorities are available to be scrutinized? What relationships are admitted into evidence and/or consideration? Which meanings are considered valid and credible?

Indeed, my focus in this study is with how the drawing of particular boundaries, or in fact the collapsing of boundaries, were social acts that were constitutive of the accounts of the object(s) in dispute at the public inquiry. For instance, I argue that the nuclear waste disposal debate was not a political debate *about* technical matters. Arguing such presumes a particularly narrow conception of what was at issue, of what the meaning of the concept was, and of what the relevant meanings in the debate were. Rather, this was public policy-making *involving* expert

claims, and I suggest this formulation of the problem preserves the openness and ambiguity that characterized the disputes analyzed here. In short, what I show is that two different framings of the debate developed. Technical and bureaucratic elites constructed the problem as a narrow one about whether the disposal concept ought to be approved. It was argued that even though deficiencies in the concept were identified, such deficiencies did not impinge upon the fact that the disposal concept was viable in principle. This viability in principle defense had three interlocking components to it. One, that the concept was flexible and adaptable. Two, that residual uncertainties could be eliminated or mitigated at site-specific inquiries. Three, that international groups looking at the nuclear waste management problem also supported deep geological disposal. Moreover, not only did technical and bureaucratic groups deny that interests in nuclear expansion were behind their support of nuclear waste disposal, or marginalize the import of this vested interest, but they also defined the meaning of the concept as 'the need to act'.

Public critics constructed the problem in much broader terms, as a techno-scientific project intimately linked to demonstrable vested interests in nuclear expansion. Not only did critics thus collapse the science/politics boundary that concept proponents and their supporters attempted to erect and sustain, but they also maintained that efforts to draw the boundary were in themselves political. Public critics did not deny that a category called 'expert' existed, in other words most public critics asserted that something close to neutral expertise was a possible state for an expert institution to be in. But they refused to separate the expertise that was on offer from its institutional housings. Moreover, when public critics took aim at either implicit or explicit politics, their point was not that politics itself was illegitimate. Rather, it was the particular kind of politics that was at issue. Public critics mobilized a conception of authoritarian politics; though it was authoritarian politics so entrenched that it could afford to secure its patron's wishes

in a silent fashion. With authoritarian politics the target, rather than politics *per se*, critics interpreted the public inquiry as, even if just a temporary window into the policy-making echelons, nevertheless a valuable opportunity to enforce publicly arrived at standards on a nuclear industry previously inaccessible to either scrutiny or rebuke. Critics also framed future political contexts as likely to return to the historical situation of nuclear matters in Canada, in which competitions between technical and policy (nuclear) elites was like a battle between an elephant and a mouse. This encouraged critics to protect the public inquiry as the proper forum within which the disposal concept ought to be tested, with critics concerned that going to siting with a concept approved despite deficiencies would grant the nuclear industry too much discretion in siting contests of unequal epistemic and political-economic power.

1.5 Expertise & Democracy: debates within STS and PUS

This section situates my study within a particular debate that has occurred recently in the fields of STS and PUS. I claim that my findings in this study confirm much of Brian Wynne's theorizing about public uptake of knowledge and public dissent from expert pronouncements, but pose difficulties for Harry Collins and Robert Evans's efforts to demarcate science from politics in aid of reserving a place for expert authority in democratic decision-making. The implication I draw is not that demarcating science from politics is totally forlorn, or even that the normative project of securing a conception of expertise not entirely entangled with politics is completely misguided. Rather, my claim is that if demarcations are to be drawn then the normative project worthy of such analytic demarcation exercises is one in which the accountability and

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responsiveness of expert institutions is at issue rather than simply the representativeness of those involved in decision-making.

Much of PUS denies the kinds of gap between lay public and expert presupposed in deficit models of public understanding. In such models, the gap between public and expert knowledge of technical facts is presumed to be the source of public misunderstandings about technical projects and policy proposals involving expert claims. The one who has done most to discredit such deficit models is Wynne, in many ways the founder of the field of PUS. Wynne argues that deficit models fail to appreciate that, not only might the gap in understanding be less than that presupposed by expert institutions, but public dissent from expert-based claims may be related to publics having their own autonomous frames of meaning which publics view experts as ignoring (Wynne 1992b, 1995). The PUS tradition thus focuses upon the relations between the lay public and experts, often in order to demonstrate how lay public groups can have distinct knowledge and experience-based contributions to make in resolving technical questions. More importantly, the PUS tradition expands beyond the question of what publics might or might not know. Policy issues involving expertise are thus considered more than just scientific issues, for they also involve disputes about the deployment of expertise as public authority (Irwin and Wynne 1996, Kleinman 2000). Especially in Wynne's PUS writings, there is a sustained exploration of the way public groups seek to challenge just what the issues are in the first place (cf. Wynne 2007). Wynne is concerned to illuminate how publics bring their own autonomous frames of meaning to bear on what questions should be addressed, and what knowledge might be relevant, when experts confront the public over technical proposals. The normative concern, for Wynne, is to illuminate the processes and practices whereby expertise slips from informing

public policy about technical claims to providing public policy with its meanings about those technical claims.

My analysis of Canada's public inquiry into a nuclear waste disposal concept shows that, when Wynne's approach is interpreted as an empirical hypothesis, the conflicts between expert groups, their bureaucratic supporters, and NGOs and other public critics, can be read as confirming that hypothesis. NGOs and other public critics did dispute technical claims, sometimes by hiring counter-experts, other times by drawing upon their own experience-based knowledge or their familiarity with relevant regulatory standards. Critics also advanced philosophically and sociologically based claims, objecting to the relations waste disposal proponents drew between their observations and their models, or between finding deficiencies in documented evidence but still recommending proposals were sound. Critics also advanced objections to technical claims based on a lack of trust of those making them; either because proponents had not acted in a trustworthy fashion in the past or because the proponents had clear vested interests at stake in having their claims accepted (i.e. accepting waste disposal plans would facilitate the expansion of commercial nuclear power). Yet my analysis shows that Wynne is correct at a far more fundamental level than the fact the public is not as ignorant as expert institutions often seem to presume, or that public groups are more adept at engaging with specialist knowledge claims than experts and policy-makers might think.

My analysis shows that public critics wanted to debate what the issue was in the first place. Was nuclear waste disposal about solving a pressing problem in the present, or was it about solving a remaining puzzle in the political-economic project of ensuring a future for commercial nuclear power? Public critics objected to the fact that, as they saw it, the proponents' assessments of safety were unreliable because an interest in nuclear expansion encouraged

overly-conservative modeling and risk analysis work. Moreover, public critics struggled to ensure the public inquiry would remain a forum for testing claims in the present. Disposal concept supporters marginalized the import of deficiencies in the waste disposal concept, concluding it was nevertheless viable in principle. This defense threatened to bypass the public inquiry as the forum for deciding safety and acceptability, in effect deferring such decision to future site-specific inquiries. Hence for critics the issue was more than just whether a repository would leak radionuclides. For critics, to the extent answering this question was possible it involved also answering what forum (future sites or the public inquiry) was the relevant testing context, and what kinds of other decisions were associated with decisions about waste disposal.

While Wynne has thus done much to explore the *connections* between dimensions within any dispute, recently Collins and Evans (2002, 2007) have wondered how far those connections can be explored before we no longer have a usable sense of expertise. Collins and Evans have thus advanced questions about the various roles and capacities of experts and publics in public policy disputes involving technical knowledge and expert judgment. As shown in Chapter 2, Wynne (2003), and Collins and Evans (2002, 2003, 2007), differ over the extent to which debates are or should be characterized as about propositional questions (i.e.: will waste escape an underground repository?). Collins and Evans want to restrict participation in the technical phase of debates to those "who know what they are talking about" (2007, 2 and 113), but they draw their boundaries around participation in a fashion sensitive to the fact that expertise is not value-free. Thus the category of expert is expanded beyond credentials alone, to incorporate experience-based, interactional and referred experts as well. Yet because for Collins and Evans what is important is how to set boundaries around the legitimate contribution of the *public* to technical debates, what they call the problem of extension, they draw a distinction between

technical and political phases of a debate.[3] The technical phase is focused on the credibility and reliability of knowledge claims, while the political phase focuses on policies and frameworks (spanning the spectrum from regulatory to life-style) within which technical disputes take place. The main difference is that while politics is *intrinsic* to the technical phase and *legitimately extrinsic* in the political phase, it is not deemed *legitimate* for politics to be *extrinsic* in the technical phase. This has the effect of moving the locus of legitimate interpretation, in technical matters, towards experience-based experts and their claim to reason and evidence as the values informing their judgments. The distinction between science and politics thus articulates Collins and Evans' commitment to a picture of the form-of-life enacted by Western science: its stress on evidence-based argument, and rejection of the influence of extrinsic politics, are formative intentions that act to shift the locus of legitimate interpretations about technical matters to those closest to the point of origin of the knowledge (Collins and Evans 2002, 243-46, 261-62, 267, 276, 282; 2007, 120-26; Evans and Plows 2007, 833-36).

The fact that many public groups arrived at similar criticisms as did technically-oriented groups supports Collins and Evans' point that 'expertise' needs to be expanded beyond credentials: experienced-based and interactional experts existed within the public.[4] As would be confirmed at the public inquiry of 1996-97, and especially in the work of the NWMO 2002-05, involving a heterogeneous set of experts can encourage deeper scrutiny of evidence, critical reflection about hidden values, the introduction of new evidence, and revisions in standards of proof. For Collins and Evans that is the point of expanding the notion of expertise: groups

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[3] Where 'phase' refers, not to a time dimension where politics follows science or where different decisions are taken by different groups at different times, but to the different but complimentary approaches needed to ensure mutual influence between science and society (cf. Collins and Evans 2007, 124; Evans and Plows 2007, 834 and 848).
[4] NGOs, for instance, either have technically-trained members or utilize technical consultants (experience-based expertise). Many public critics have developed interactional expertise, especially because of 'local discrimination' abilities, from years of engagement with AECL, Ontario Hydro and the AECB, They are thus familiar with the terms of debate, various regulations, and the institutional history and behaviour of dominant groups in the policy process.

previously excluded because of a lack of credentials can legitimately contribute to the making of technical judgments relevant to policy making. Nevertheless, the technical/political boundary deployed by Collins and Evans runs the risk of obscuring just as much as it reveals. This is not because Collins and Evans' goal itself is not laudable, for they intelligently defend the notion of Western scientific culture as an evidence-based form of life in which scientists "want to be right" (Collins and Evans 2007, 125). What is nevertheless obscured is the degree to which there is more to the formative intentions of science than Collins and Evans admit.

For Collins and Evans, the distinction between science and politics "is easy to accept once one accepts the idea of formative intentions" (2007, 125), where formative intentions are public and collective intentions available within a form of life rather than being the private intention of any particular individual. Collins and Evans implicitly claim to have adequately captured the formative intentions of science: their normative categories of expertise and boundaries between science and politics hinge on the adequacy of the picture of science they deploy. Yet Wynne's starting point indicates some problems with Collins and Evans' outlook. Wynne is concerned with the *slippage* from science as research to science as agent of public meaning (Wynne 1996a, 2003, 2007). Wynne agrees with Collins and Evans that politics is intrinsic to science, but wishes to explore how to place boundaries around the role of *science and expert culture*, because of the extent to which science is implicated in politics. That is, the way that science as a research culture imposes normative framings on what public policy involving science actually means, indeed on what the salient issues and concerns *are*. Whereas Collins and Evans want to limit the extent to which politics impacts upon science, to be true to their picture of scientific culture, Wynne wants to limit the extent to which science impacts upon politics, to be true to his picture of political culture. That picture does not hinge on the extent to which

ordinary citizens can compete with scientists regarding propositional questions about knowledge claims, which Wynne largely treats as both contingent on experience and also not the most salient issue regardless (Wynne 2007). Rather, Wynne's picture of political culture hinges on the notion that "every democratic citizen" (2003, 411) is qualified to participate in the negotiation of public meanings.

Wynne's normative lament is that such civic exercises, where they have involved technical content, have been progressively subsumed within a hegemonic scientific discourse. Science has come to exaggerate its levels of control and prediction, to minimize uncertainties and ignorance, and to actively delete public meanings and concerns as either strictly invalid (i.e.: misunderstandings) or as too variegated to inform policy. An apolitical politics is thus being imposed on the public, as science shields its own normative prescriptions from democratic scrutiny by defining public issues involving science as (legitimately) debates about technical claims alone (Wynne 2005). Thus, public debates about risk are reduced to 'what is the risk', rather than the broader public meaning of determining what social purposes and priorities establish the criteria for what is to count as a risk or as knowledge (Wynne 2002). The normative project pursued by Wynne is clear in the following quote:

> To take seriously these extra dimensions would help STS to engender the
> necessary extents of open and democratically accountable institutional reflection
> within and around science and its emergent global patrons (Wynne 2007, 109).

In the discussion section at the end of Chapter's 4, 5, 6, and 7 (Sections 4.8, 5.9, 6.7, and 7.6) I draw upon the empirical material of that chapter to discuss the general issue of the slippage from research science informing policy to science colonizing the public meaning of an issue.

The normative framework I thus seek to illuminate is one that focuses on accountability relations rather than representation *per se*. My approach is thus in alignment with Wynne's in general, though in drawing out the critique of cultural slippage I emphasize the structural relations in question over the social identities on display. I should add here that a focus on accountability is consistent with a host of STS/PUS theorists who have been writing on expertise and public participation issues. Thus Jasanoff has consistently written of 'civic epistemology' as socially arrived at and socially sustained assessment practices for technical proposals (2003a, 2003b, 2005). Similar to Wynne's focus on restricting the ability of experts to presumptively and tacitly impose narrow framings on issues, Jasanoff has also written of the need to "look at expertise as a form of delegated authority" (2003b, 158). As such, the public may delegate to experts particular tasks, but does not thereby give over control of the scope of expert authority. We will see that public critics of the nuclear waste disposal concept consistently claimed technical and bureaucratic elites were over-stepping their delegated authority. Similarly, Turner (2001) has noted that expertise itself is often not at issue, just its apparently sectarian character when coupled closely to bureaucratic decision-making. Again, public critics distrusted safety assessments arrived at by making them compatible with regulatory standards that had not been subject to public review in themselves. Finally, Fuller (2007) has noted that accountability matters when what is at stake is whether a context exists within which rival claims can be sufficiently and adequately tested. As Fuller notes:

> ... rather than worry about the resemblance between the representative and the represented, the political focus should be on the accountability of the representatives to the represented. ... the best course of action for those interested in improving the quality of science in policymaking ... is to beware *not* the politicization of science, but the *authoritarian* politicization of science. The *democratic* politicization of science ... is fine (Fuller 2007, 104 and 138; emphasis in original).

We will see that public critics felt such a context, which was supposed to be the public inquiry, was being surreptitiously removed from their grasp by treating the concept as inadequate in the present but viable (in principle) in the future. Reminiscent of Habermas, Wynne's normative stance also emphasizes accountability, noting that there is a problem when

> … politics is defined as science, and citizens are prohibited from engaging with this 'science'-protected politics. There is no evidence of deliberate scheming here, just of culturally-sedimented, presumptive and in-effect dictatorial habit (Wynne 2007, 103).

My specific claim to contribute to the dispute outlined here is that Collins and Evans' demarcation criteria are shown to fall short of adequately capturing either the nature of expert/public debates, or the conceptual underpinnings of public critics' positions with regard to expert claims. Moreover, these demarcation criteria appear to have the ability to destroy more than they create, with the kinds of conceptions of expertise and democratic debate they install failing to safeguard against the slippage from research science to agent of cultural meaning that appears to be at issue in the dispute studied here.

1.6 Summary of chapters

Chapter 2 is a critical analysis of Wynne's work in PUS. I suggest a specific mechanism for why Wynne's work is often read as romanticizing the public (partly what Collins and Evans claim in regard to Wynne). That mechanism is an analytic oscillation between emphasizing social identities and social relations as the primitive explanatory variable. I argue that Wynne prescribes a model of the public as unfulfilled reflexive agents, and a model of experts as

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unreflexive, and that avoiding the romanticization charge could fruitfully be done by being more

diligent (analytically) in stressing the level of social-structural relations. My goal in Chapter 2 is

thus constructive criticism of what I acknowledge as an otherwise powerful analytic scheme

within which to understand experts and the public.

Chapter 3 traces a political-economy of Canadian nuclear culture 1946-96. I show that

consensus formed about endorsing nuclear waste disposal in the mid-1970s, in response to the

political ramifications of having waste available for retrieval. I discuss how initial siting

assessment work of 1978-81 was halted by public protest and Parliamentary criticism. A 1981

federal-Ontario policy statement declared a nuclear waste disposal concept would have to be

approved prior to any further siting work. Nevertheless nuclear waste disposal was explicitly

situated as solving a puzzle within commercial nuclear power until 1989; hence divorcing the

two is an historical anomaly. This political-economic analysis is consistent with my Chapter 2

recommendation to focus on situational power as a means to theorize how experts and the public

will interact. To deepen Wynne's project in this regard, and because it illuminates salient aspects

of this political-economic history, I import into the Chapter 3 discussion the use of Barnes

(1995). Barnes usefully distinguishes between status groups and social movements, the former

practicing exclusionary social action and the latter inclusive social action. The type of action

practiced partly reflects available opportunities, including the potential costs of exclusion

compared to the relative profit to be had by including or excluding. I show that nuclear elites

behaved like a status group (exclusionary action) up to and implicitly including the public

inquiry, having failed to recognize and adjust to changes in the political-economic landscape

relevant to nuclear projects by the mid-1980s. Nuclear elites were slowly losing control over the

terms of assessment and debate within which nuclear projects would be discussed, but only with defeat at the public inquiry would nuclear elites shift to inclusive social action.

Chapter 4 analyzes the AECL EIS (AECL 1994a). I draw upon Hilgartner's (2000) dramaturgical analysis to depict the EIS as a public performance to secure credibility. I analyze the 65 written submissions (CEAA 1995) to this initial period of assessment, as well as the SRG reports and evidence before the Panel (SRG 1995a, 1995b). I show a tremendous degree of overlap, in terms of criticisms offered by NGOs and other public groups, and the SRG and other technical/bureaucratic groups. Nevertheless the SRG differed markedly from the public in concluding the concept was adequate despite the deficiencies. In the discussion section I indicate some problems with treating intrinsic politics as harmless and trivial, and suggest Collins and Evans' (2007) notion of the formative intentions of science runs into empirical difficulties in the case under consideration here.

Chapter 5 discusses Phase 1 of the public inquiry, dedicated to social, ethical and political issues. I show that public critics refused to accept the legitimacy of the procedural divide between the disposal concept and energy policy. Critics perceived any approval for nuclear waste disposal to run the risk of granting default approval for nuclear expansion. I suggest that different social experiences of trust and control encouraged different kinds of framings of the disposal concept. I further suggest that procedural restrictions on the scope of the mandate, what Habermas would call a performative contradiction (1973, 1990), constituted a framing in which downstream risks and consequences were emphasized over upstream democratic issues of involvement in decision-making, resulting in a situation in which technical and policy experts tacitly presumed to decide the *public* meaning of the disposal concept.

Chapter 6 discusses Phase 2 of the public inquiry, dedicated to science and engineering matters. I show that AECL and Ontario Hydro presented the concept as flexible and adaptable from the beginning of Phase 2, but after introducing extensive new documentation (a new reference case) toward the middle of Phase 2 were unable to restrain even supporters of the disposal concept from regarding it as having become a little too fuzzy and vague. While proponents emphasized flexibility and the ability to optimize the concept at siting, supporters shared that approach but also argued that, despite identified deficiencies, the concept was viable in principle. In order to fully understand this defense of the concept, I utilize the literature on expectation dynamics (Van Lente 1993, Van Lente & Rip 1998). This literature has been extended into STS as a means to view expectations as performative and to highlight the importance of looking at the future in situations of uncertainty or present contestation (Brown, Rappert & Webster 2000; Brown and Michael 2003). I show that the future was mobilized in two different ways. Proponents/supporters mobilized the future as a solution to present problems, effectively allowing them to marginalize present difficulties and emphasize a proactionary framework in which the need to act outweighed the import of deficiencies. Public critics mobilized a future in which unequal power relations at siting encouraged them to elevate the importance of the public inquiry as a decision forum, as well to emphasize how even an approved concept would nevertheless come with some notion of how to restrain elites' discretion in advance. Critics outlined a precautionary approach in which present deficiencies mattered and technical solutions in the future were irrelevant for assessing present safety and acceptability.

Chapter 7 analyzes the Seaborn panel report (CEAA 1998), as well as the federal Government response (NRCan 1998), showing that the Government rejected any panel recommendation that conflicted with a policy framework (NRCan 1996) developed via internal

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Government-industry negotiations. Much of the public inquiry was thus implicitly bypassed. I then analyze NWMO public consultation work 2002-2005. I use Hilgartner's (2000) dramaturgical perspective to show how the NWMO brings to the front stage a fractured public, and I use Guston's (2000) principal-agent theory to theorize how the NWMO acts as a boundary organization and how it manages a host of problems of delegation.

Chapter 8 concludes with an analysis of the NWMO's proposed Adaptive Phased management (APM) approach to managing used nuclear fuel (NWMO 2005b), which was accepted by Government in June 2007 (NRCan 2007). I Use Hume (1740) to suggest a sympathetic interpretation of APM, one that theorizes how an institution lacking social trust might go about winning trust by creating an action-situation within which it can lose institutional discretion. Nevertheless the NWMO recapitulates too many of the separations prominent at the public inquiry, such as between waste disposal and energy policy, and the 'decisionistic' framework (each decision isolated from the other), for its public consultation work to be spared critical interrogation. Invoking Mills (1959), the NWMO appears to marginalize public dissent by strategically absorbing public critics' demands.

Chapter 2

Accounting for Expertise

2.1 Introduction

In much of the public understanding of science (PUS) literature, case-study analysis often

buttresses the assertion that lay publics possess expertise, understanding(s), and

knowledge(s) of its own (cf. Irwin and Wynne 1996, Kleinman 2000). Much of PUS denies

the kinds of gap between lay public and expert presupposed in deficit models of public

understanding, which presume public dissent from technical claims is due to

misunderstanding the science (cf. Wynne 1995). Rather than presume policy issues involving

expertise are thereby about expert claims *per se*, PUS goes beyond debating what the public

may or may not know. Especially in the work of Brian Wynne, in many ways the founder of

the PUS field, what is explored is how publics possess their own autonomous frames of

meaning. Publics are often not only able to contribute to the resolution of narrowly-based

technical questions, but more importantly they are often concerned to debate what the salient

issue is that is in dispute, and thus what ought to be the relevant questions and knowledge

involved. Where expertise is deployed as public authority, Wynne's concern is to illuminate

processes and practices whereby expertise may slip from informing public policy about

technical claims to providing public policy with its meanings about those technical claims.

Read as an empirical hypothesis, Wynne's concerns capture what was at stake in Canada's

public inquiry into a nuclear waste disposal concept. Public critics directly disputed technical

claims, but their main target was a series of conceptual and political slippages they perceived

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to be in progress. Solutions to waste disposal threatened to hand a default political mandate to nuclear expansion, while accepting technical deficiencies in present evidence for safe disposal (on the grounds the concept was viable in principle) threatened to bypass the public inquiry as a context for deciding safety and acceptability (pushing it to future siting).

Although Wynne seems to be clear that his concern is with the social-prescriptive role that science plays as it goes public (Wynne 1995, 362), recent criticism from within the STS/PUS ranks has argued that Wynne's work "has helped establish the idea that technical expertise can be found beyond the normally recognized qualified groups, but it has also given rise to much confused thinking about the extent to which laypersons can be experts" (Collins and Evans 2007, 48). This critique by Collins and Evans continues earlier work, in which they argued that case-studies which sought to rehabilitate public knowledge in the face of deficit model practices by experts often placed too much emphasis on valorizing the public and too little on recognizing the merits of science (2002). For Collins and Evans, STS/PUS has established that the scope of involvement in decisions about expert claims ought to be widened beyond core groups of certified specialists, but it has not shown where the limits to that participation reside. For Collins and Evans, exemplary case-studies on expert/public interactions, such as Wynne's on Cumbrian sheep farmers and radioactive fallout from Chernobyl (see below), do *not* show what Wynne and others claim it shows. Rather than showing that expertise is found among the public, it shows that some of the public are not *lay* public at all, but possess experience-based knowledge, or interactional expertise, relevant to decisions about technical claims (261). For Collins and Evans, defining categories of expertise that build upon experience and interactional abilities - rather than credentials - is a means to theorize where the limits to public participation in expert debates may reside.

Wynne's response to such re-interpretations has been to argue that the important democratic issue is not whether "practical and experience-based expertise" is acknowledged and admitted into decision forums and deliberations, but "more about the institutional neglect of public meaning" and "how proper knowledge for relatively new domains like 'environmental' and 'risk' problems should be negotiated as matters of 'civic epistemology'" (Wynne 2003, 402). Collins and Evans respond that their theories of expert/public interactions address such issues by encouraging "more heterogeneous expert debate". They argue that Wynne obscures the difference between political rights and technical abilities by confusing local discriminatory abilities (gained by close experience or familiarity) with ubiquitous discrimination (normal social skills). Moreover, they think making a place for expertise means having to justify it, rather than just complicating its separation from politics. Justifying expertise means treating science as a component of culture rather than just another resource within it (Collins and Evans 2003, 437-41; 2007, 48-54, 113-33).

In this chapter I engage with this debate, which can be represented as two different sensibilities concerning expertise and democracy. Collins and Evans seek a rationale for the role of science as an agent of culture, arguing that we need to retain distinctions between science and politics lest all technical matters become treated as purely political. They are committed to the notion that drawing such boundaries can be done in a fashion that is nevertheless sensitive to the fact that experts have routinely exercised a monopoly over the framing of issues. That is, that drawing boundaries can be done in a way that safeguards public meanings being colonized by narrow expert conceptions of contentious issues. At the end of my empirical chapters (4, 5, 6, and 7) I include a discussion section, drawing upon that chapter's empirical materials, to comment upon Collins and Evans' suggestions. In each

case I argue that suggested means to demarcate science from politics, though laudable in their intent, nevertheless fail to empirically capture what the salient issues were that were in dispute. Moreover, given that Collins and Evans utilize a *normative* conception of science/politics boundaries, I suggest in each section how conceiving of such boundaries in the case under discussion fails to safeguard the public from the colonization of public meanings. Hence there are empirical as well as normative problems with the demarcation criteria utilized by Collins and Evans, and I suggest these failures place Wynne's project in a normatively superior light. That is, Wynne's focus on the slippage between experts informing policy-making and experts colonizing public meaning captures more of what the salient issues were for public critics, while also suggesting productive means for addressing issues of democratic decision-making.

Nevertheless I also wish to explain how confusions about Wynne's project, such as whether it concerns the capacities of the lay public or whether it is about presumptive expert framings colonizing public meanings, have arisen. I see this as an exercise in constructive criticism, making clear how an otherwise very sophisticated account of expert/public interactions can be misread as a relatively simple valorization of the public. I suggest that while PUS has undermined the assumption of an 'understanding gap' between lay public and expert, it has in some ways erected a new gap between the character of lay public members and experts as human agents in themselves. When care is not exercised, it appears too easy for much PUS to suggest an ontological gap. This is more than the claim that PUS generalizations might romanticize the public. Rather, the suggestion that PUS opens up an ontological gap between the lay public and expert involves the claim that the lay public is modeled as reflexive agents whereas the expert is modeled as unreflexive. Given PUS

empirical concerns to rehabilitate lay public understanding, it would seem that the public as reflexive agent stems from close empirical analysis. However, this chapter suggests an equally important cause is the concern of the PUS analyst to preserve the autonomy of the lay public actor in the face of hegemonic control of meanings by experts. My own normative proclivities render my arguments susceptible to the problem I note; hence I deem it important to be able to theorize how accounts of experts and the public are constructed.

The thesis I pursue in the chapter, to illuminate the process of accounting for expertise alluded to above, is that different programs for increasing the legitimacy of science as a social institution embody different models of the human actor and point to different systems of social, technical and moral reorganization. Given Wynne's centrality to and exemplary status within PUS I explore the inter-locking topic of human agency and institutional reform via an analysis of Wynne's work. This provides an opportunity to simultaneously examine how claims of romanticizing the public arise, and to make clear how Wynne's work can illuminate challenges to the potential autonomy of public actors in public controversies involving expertise. In what follows I begin by outlining the so-called 'crisis of late modernity' and the differing responses of Beck, Giddens and Wynne. I show how Wynne accounts for the public uptake of knowledge, how a 'fulfillment' thesis is central to Wynne's theorizing, and how the general problem of ontological pictures of the actor figure in Wynne's theorizing. I indicate how a particular model of the actor is deployed to preserve public autonomy, and I show how such models of the actor inform some ongoing solutions to public engagement efforts. I conclude by suggesting an asymmetry arises in Wynne's theorizing, but it is an asymmetry eradicable by grounding the theorizing in social-institutional considerations rather than social identities. Possibly the PUS field may wish to

focus more attentively on social-structural relations rather than a quasi-normative conception of actors. I also indicate that, despite the accidental asymmetry, Wynne's work nevertheless remains a powerful statement to the effect that, if science and society are to be brought closer together, scientists need to come closer to the ordinary public rather than the inverse. I suggest the kinds of 'civic epistemologies' endorsed by both Collins and Evans, and the likes of Wynne and Jasanoff (2003a, 2005), improve their chances of being instantiated to the extent attention is directed to accountability relations rather than issues of representation in political life.

2.2 A transformation in modernity?

Wynne's work forms part of a broader debate about the troubles attending modernity and how to solve them. Beck's work is central in this regard. Following Weber's (1918) articulation of the ambivalence of science (the source of comforts, efficiency, *and* disenchantment), yet in contrast to the claim science is now just one story among many (Bauman 1991, 243-44), Beck's notions of the 'risk society' (*Risikogesellschaft*) and 'reflexive modernization' (1992b) recognizes that science is *more than* just one story among many. According to Beck, the 'scientization' of protest against science means that even to dispute the scientific position of an opponent one usually relies upon science to make a persuasive challenge. We thus find lay public critics of technical proposals using scientific techniques and argumentation in order to research and present their cases (as indicated in Chapter 4 and 6). According to Beck, the risk society consolidates a shift from industrial conflicts over positives ("profits, prosperity, consumer goods") to ecological conflicts over

negatives ("losses, devastation, threats"). Having struggled to uncover the threats, the risk

society now faces an accountability crisis, when the threats are acknowledged in principle but

there is as yet no action taken (Beck 1995, 2-5).

The public becomes involved in such disputes because of what Beck calls "reflexive

scientization": with increased public exposure, science is subjected to increased

demystification and deconstruction, especially where legal and rational means are sought as

legitimation. Consequently, a dialectic between expertise and counter-expertise is set in

motion. Knowledge sources multiply with the increased presence of technical and public

actors entering debates (Beck 1992b: 157-63). As Shapiro argued, the jurisdictional zones

bounding the operation of expertise, a function of specialization and professional ideology,

become increasingly open to attack in the form of jurisdictional conflicts (Shapiro 1993). For

Beck, the problems with expertise are a microcosm of the problem afflicting modern social

institutions: unreflexive in regard to their founding presuppositions in Enlightenment

rationalism, especially in terms of certainty, control and provision of the public good, they

have become self-refuting. For Beck, such structural failures in social management can only

be solved by a reformulation of the institutions of modernity.

Yet Wynne argues that Beck's solution overstates the capacity of the institution of

science:

> ... [Beck argues] modern institutions might, as it were, save themselves from
> themselves, and rescue some public legitimacy, by becoming more self-
> reflexive about those very rationalist discourses which make up their own
> identity. Science is the key here because it is assumed . . . to be the epitome of
> the unremittingly skeptical, reflexive modern institution... (Wynne 1993, 322)

Wynne certainly shares with Beck and Giddens[1] a critique of the self-refuting institutions of modernity, which Wynne had written of as rationalism's "self-deligitimation" (Wynne 1987). Wynne also shares Beck's emphasis upon the need for a pluralization of expertise (Beck 1992b, 172-73). Yet Wynne differs on a number of key points.

Wynne's critique of Giddens and Beck (set out in Wynne 1996a) begins by noting how their transformation hypothesis postulates a genuine socio-historical transformation in modernity: from simple to reflexive; or from automatic trust in experts to actively chosen and calculated trust. Wynne opposes this thesis on three grounds: the condition of simple modernity has never been met, the notion of active choosing and calculating is too heavily premised in a rational-calculative model of the individual actor, and the model over-emphasizes cognitive dimensions at the expense of the cultural dimensions of public response to expertise. Wynne also opposes what he sees as the realist epistemological underpinning of the basic risks postulated by Beck and Giddens. The claim is that Beck and Giddens contrast 'real impacts' with social and cultural knowledge of those impacts: institutional failure to control modern hazards leads to a sense of risk and the public feeling betrayed by modern institutions. Rather than simply failure in fiduciary responsibility to control 'real risk', Wynne views risk as a cultural and hermeneutic phenomenon. Risks constitute intrusions into social identities: in-human models are imposed on the public. Risks are also relational, in that 'risks' derive from social dependency on untrustworthy institutions (2002). Wynne also disagrees with Beck and Giddens that science is the epitome of a self-

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[1] I admit to conflating Giddens and Beck at this point. Such a conflation is, of course, an over-simplification at best, and a significant error at worst. Nevertheless, both agree that a transformation in modernity is in progress; both adopt a semi-realist epistemology and tend toward an instrumental-calculative model of the public actor's response to experts, and both recommend a unified expert/lay public sphere. Giddens at first argued the questioning of authority was due to globalization and alienation, tending to take for granted public trust in experts. Giddens later moved toward Beck's position, in which the public feels betrayed by experts. See Giddens (1990, 1991, and 1994).

reflexive modern institution. Rather, Wynne argues science is the *least* self-reflexive of any social institution (1993). Wynne argues that social and political reform will only come from challenging the self-proclaimed cultural role science has assumed as the default agent of public meanings.

Wynne's solution to the problems of modernity involves 'institutional reflexivity': the exploration of prior commitments framing knowledge (1993). Given a number of conditions, all of which Wynne argues exist, the solution is to curtail the authority of science. The conditions include: if "rationalities embody moral and social prescriptions"; if science deploys rational-prescriptive models on the public routinely; and if publics find them wanting in human terms. The solution thus becomes: not recourse to more science, evenly shared, but less scientism (Wynne 1992a).[2] Wynne argues public participation must be premised on a broader base than simply the cognitive; it must be hermeneutical and cultural. It must preserve agency, responsibility, and genuine social identity, but curb alienation and social dependency. Science itself must be re-fashioned, its institutional self-reflexivity allowing the problematizing of its own foundations. Science must become less deterministic and more ambiguous in its cultural identity, and more flexible and open to negotiation in its interactions with the public. It is scientists who should look to the public for a model of self-reflexivity. Here is where the ontological gap begins to appear. Yet at present it looks like the reporting of empirical findings alone. Below I show how the ontological gap is a consequence of both empirical findings and an imported picture of the actor.

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[2] For Wynne the rejection of scientism has a distinct political edge, as seen in his defense of the Strong Programme: "SP's whole point was surely to disinter the social underpinnings of 'natural' truth and authority. What else could this imply if it was not ultimately to encourage greater reflexivity in public discourse about the roles, agency, and responsibility (and hence the identities) of social actors? [The SP project, with hindsight, is] . . . continuous with questioning the dire effects of Enlightenment categorical distinctions of subject-object, with reflection upon 'human interests' and with the reflexive impetus toward problematizing, bringing into authorial view, and ultimately renegotiating the human subject" (Wynne 1996b: 358).

2.3 On Brian Wynne

Arguably Wynne's early experiences with the 1977 Windscale Inquiry (UK) into a proposed

thermal oxide reprocessing plant, during which he was an advocate for the Network for

Nuclear Concern, provided the germinal empirical basis for his less than sanguine view of

institutionalized science. The ritual character of the inquiry, and the self-delusion of the

nuclear industry, was sustained by an institutionalized inauthentic politics that obliterated

social relations. As early as 1982 Wynne was thus asking what happens when such processes,

possibly functional for organizational coherence, are not taken into account when such

organizations acquire decision-making power (Wynne 1982). Wynne has continued to

ground his critique of institutionalized science in empirical studies (including hazardous

waste management, Cumbrian sheep farmers, climate change science, and GMOs).

Yet Wynne's critique also incorporates Latour's (1993)[3] argument that we can only

conceive of modernity and post-modernity by trading on a realist epistemology of expert

knowledge (Wynne 1996a, 46-47, 60-61). While thus sensitive to Latour's point that hybrids

regularly blur the boundaries between political and technical, Wynne nevertheless shares

with Beck and Giddens a sense of crisis, which for Wynne involves forms of boundary

transgression. The driving force in Wynne's dynamic self-deligitimation of modernity is a

hermeneutic/cultural intervention (experts and their prescriptive models of the human and

social) generating a hermeneutic/cultural response (the protection of identity and the re-

negotiation of social dependency). I suggest we thus have competing models of crisis at

work. We can call the model of crisis posited by Beck and Giddens a house-of-cards kind,

and the model of crisis posited by Wynne a stimulus-response kind. Given that experts

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[3] As Latour concludes: "Modernism was not an illusion, but an active performing" (1993, 144).

impose on the public prescriptive models which the public finds wanting in human terms (what I call the 'stimulus'), what is the 'response'. That is, how does the public take up knowledge? If there were no general answers to this question, and only case-specific answers, then quite simply PUS would be devoid of theory. But what makes Wynne's work an exemplary model in PUS is a consistent line of theoretically-informed argument about how the public takes up knowledge and generates knowledge. Below I analyze two key papers setting out Wynne's account of the public uptake of knowledge (1992b, 1993), much of it referring to an exemplary case-study on Cumbrian sheep farmers.[4]

Wynne's account begins with the claim that the public experiences science as a "social package"; a package of material social relations, interactions and interests. I suggest this social packaging claim functions like an axiom in the system. It grounds Wynne's claim that experts are reasonably evaluated according to their "body language", or their material, intellectual and cultural links to the institutions and organizations of which they are a part (Wynne 1991a, 115-16). At the collective level, Wynne thus argues the central issue becomes the extent to which the public is prepared to invest trust and credibility in scientific spokespersons and institutions. Wynne thus notes the public uptake of science is mediated, not by public capabilities in understanding technical information *per se*, but by trust and credibility. For Wynne this represents a move from the cognitive to the social dimension, yet for Wynne it would be incorrect to think trust and credibility are intrinsic to actors or institutions. Trust and credibility are relational terms, about the nature of the social relationships between the actors concerned.

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[4] Further discussion of the sheep farmer's case can be found in Wynne (1989), which is reprinted in Wynne (1991b).

To use the language of 'variables', we can say trust and credibility are not the independent variables on which Wynne rests the theorizing. Rather, trust and credibility are the dependent variables, for they are derived from social relationships, networks, and identities (the independent variables). Yet Wynne does not posit these independent variables as static. Wynne conceives of social identities as incomplete and open to continual renegotiation in response to cultural interventions in public life-worlds. Similarly, Wynne conceives of social relationships and networks as evolving, plural, multifaceted and multivalent. Public ambivalence in relation to trust and belief are said to reflect the multiple and conflicting social networks, relations, and identities which various publics inhabit. Wynne stresses that incomplete and contingent social identities are not necessarily in full alignment, or enrolment, with plural and multifaceted networks of social relations. For Wynne knowledge (or beliefs about trust and credibility) is thus a function of social solidarity (the social networks with which one identifies), mediated by relational elements of trust, dependency and social identity. Wynne's account of the public uptake of knowledge thus entails the construction of understanding being a process of social identity formation.

What of the precise relationship between the variables? Wynne states the dimension of social identities "…should be seen as the level from which explanation of lay responses to science is to be derived …" (1992b, 298). Thus, in Wynne's case study of Cumbrian sheep farmers responding to a ban on sheep slaughter and movement after the Chernobyl accident of May 1986, public consent hid private dissent. Local sheep farmers suspected that radioactive contamination around the hill-farming district may have just as much to do with the nearby Sellafield nuclear fuels reprocessing complex as with Chernobyl. One reason for their ambivalence was a deep sense of social solidarity and dependency with friends, family

and neighbors who were part of the local Sellafield industrial workforce. Farmers, and the

community network they were a part of, "needed to believe Sellafield was well-controlled

and its surrounding experts credible" (Wynne 1992b, 299). Note how Wynne clarifies the

importance of social identities to the situation:

> . . . social alienation and identification coexist in the same persons and
> communities, leaving deep ambivalence and apparent inconsistency in
> relevant beliefs and structures of 'understanding'. *These can only be
> understood by reference to* the multiplex, not necessarily coherent,
> dimensions of *social identities* expressed in interleaved social networks and
> experiences (Wynne 1992b, 299; emphasis added).

Yet social relations are also involved, as when the sheep farmers had rich insights into the

advice scientists were proffering,

> . . . this richness was pervaded by an ambivalence reflecting their multiple and
> conflicting social networks and relations (Wynne 1992b, 300).

We can thus see that social relations and social identifies are contingent and mutually feed

into each other. Thus, where public actors shift their loyalties, going from apparent trust to

distrust, we should conclude, not that a feeling of betrayal was at work, but simply a

> ... very small shift in the balance of components of social identity which
> people are holding in tension with one another. [This signals an] intrinsic
> instability in actors' loyalties... (Wynne 1992b, 300).

Thus, social identities are *expressed* in social networks. Ambivalence is *reflected* in social

networks. Shifts in social identity lead to shifts in social alignment. Hence, although social

identities and social relations are internally related in one sense (they are inter-defined,

involving contingent elements),

> *... social identity [is] the more fundamental concept for explaining responses*
> *to science and risks,* [even if it itself is] not unproblematic. [Social identities
> are] intrinsically incomplete and open-ended . . . an endlessly revised narrative
> attempting to maintain provisional coherence across multiple social roles and
> reference groups. Beliefs and values are functions of social relationships and
> patterns of moral and social identification (Wynne 1992b, 300; emphasis
> added).

Following the Wittgensteinian injunction to locate the "meaning in the use", what is the

'meaning' of Wynne's accounting of the public uptake of science?

I want to suggest a number of things. First, Wynne imports a model of the actor as a

reflexive, autonomous agent, running together an ontological picture of the actor with the

aforementioned *findings* of empirical research. Obviously this is a general difficulty for

social science; hence my point here is this ontological import is central to Wynne's overall

contrastive argumentative strategy. The imported reflexive actor is contrasted with

competing models of the actor, one an instrumental-calculative creature inhabiting a

decisionist model of society, the other a cultural dupe under the sway of dominant discourses

and the ideology of routine (see below for further discussion). This contrast helps generate

the reflexive, autonomous agent of Wynne's accounting: it is the reasonable, humane,

socially beneficial condition for social actors to be in. The elision between an empirically

discovered actor and an ontological picture of the actor thus helps sustain a normatively

preferred picture of the actor.

Second, Wynne replaces Beck and Giddens' postulated mechanism driving

modernity's self-refutation, betrayal in response to real risks, with a 'fulfillment thesis.' That

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is, degree of fulfillment (a social identity) ultimately drives the ambivalence of the modern public. The appropriate metaphor here would be of 'emptying' the actor. Wynne is saying that prescriptive models of the lay actor are imposed by non-reflexive experts, thereby emptying lay public actors of their cultural and hermeneutic ability to respond to intrusions into their identity. For Wynne the lay actor can be conceived as 'unfulfilled' because they are prevented from interacting with experts along the full dimensions of their cultural and hermeneutic identity and set of social relations. Lay actors have their own identity, but are emptied by totalizing expert discourses. Expert discourses in effect lack nutritive value. Prescriptive models empty the public and reconstruct them as particular kinds of social creatures (such as an 'uninformed public' requiring reassurance). Ultimately, the unfulfilled public is alienated. To increase fulfillment, Wynne suggests that at the least expert systems – or bodies of knowledge that organize the material and social world – would have to be expanded into a forum for culture, not just knowledge.

Wynne's reconstruction plan also recognizes that in reforming science "institutional reform of its modes of organization, control and social relations" (Wynne 1992b, 297) is required. Yet Wynne's structural blueprint is enacted by enabling the expression of social identity: "new, socially extended peer groups legitimated to offer criticism" will result in less "inappropriate" authority (Wynne 1992b, 297). The question is whether the two elements of the plan – structural reform and social identities – are suited to working together. The reason for skepticism derives from Wynne's own important suggestion, which was unfortunately buried in a footnote. Wynne argued that "no social actor is innately reflexive," and that one could suggest a "simple law of reflexivity – reflexivity is inversely proportional to power"

(Wynne 1993, fn. 45, 337). Note this is a structural relation and not a social identity, despite the earlier statement that social identity was the more fundamental explanatory concept.

2.4 Reflexive theories of social action

If Wynne's law of reflexivity is a structural relation, then why the claim that the proposed program of institutional reflexivity rests upon social identities? The key is to note that Wynne's reflexivity owes to "debates about modernity and its transformations" (Wynne, 1996b, 358), which he identifies as partly originating within the ethnomethodological literature (fn. 3, 382-83). Hence rather than emphasize "*internal* debates about [SSK's] proper identity, claims and methods" (359; emphasis in original), as in the reflexive turn of the 1980's (Cf. Woolgar 1988; Ashmore 1989), Wynne's reflexivity is focused "*externally*, on the institutional and political-cultural level" (1996b, 359; emphasis in original). This involves the "reflexive identification and articulation of subjective assumptions and commitments shaping positive knowledges . . . in public arenas" (383).

Wynne thus deploys an externally-oriented reflexivity the ethnomethodologists called endogenous reflexivity, which "refers to how what members do in, to, and about social reality constitutes social reality" (Pollner 1991, 370-72). Nevertheless I suggest Wynne inherits a generalization about actors that derives from the more inward-looking reflexivity that Garfinkel called essential reflexivity: all accounts are members' situated accounting work (Garfinkel 1967, 7). Garfinkel noted that the analyst recognizes their own account as an endogenous accomplishment, a product of the circumstances of its production, because the analyst is also an actor, from another perspective, and all actors are reflexive (Garfinkel

1967, 181). That is, all actors are continually engaged in active, interpretive, judgmental work, and in what Giddens called "the reflexive monitoring of action" (Giddens 1984, 3). As Pleasants has argued, there is an elision in these kinds of argument: a slippage from all *accounts*, whether by actors or by analysts about actors, being endogenous and reflexive, to a statement about the character of the actors/analysts giving those accounts. A picture emerges of the individual as active, reflexive, interpretive, and knowledgeable. Actors choose, decide, persuade, and make things evident. This picture stands in contrast to the picture of the actor as a cultural, judgmental, psychological dope: as some kind of reflection of society, an individual that blindly follows routines and rules, in some kind of automatic, instinctual fashion (Pleasants 1999).

Admittedly Wynne both acknowledges the problematic nature of social identities (their fluidity and multivalecy) and that one must often "suspend the problematization of entities which *are* nevertheless problematic" (1996b, fn. 12, 384; emphasis in original). I thus suggest the theoretical suspension at work here, which allows Wynne's accounting method to rest on (reflexive) social identities, is best understood as embedded within the normative project of rejecting models of the lay actor as a judgmental dope. Autonomy is prioritized over determinism and/or conformity, thereby legitimating a model of the public as imbued with its own expertise (social intelligence) and validating calls for democratic participation. The elision between an ontological picture of the actor and empirical findings should be conceived of as both a general difficulty for social theory, and as a theoretical window into the implicit commitments of the analyst. In Section 2.6 I show that exploring implicit models of the human sheds informative light on competing reform agendas for public engagement initiatives. The 'Third Wave' debate pitting Wynne and others against Collins and Evans

involved an implicit division over whether to allow characterizations of the lay actor as a judgmental dope or not. In fact, such embedded assumptions about the character of actors was prefigured in the 1990's 'Left and Right Wittgensteinians' debate (Bloor 1992; Lynch 1992a, 1992b). Wynne (1996b, fn. 3, 383) acknowledged this debate as one of the key reflexive interventions in science studies, yet was otherwise silent in regard to it. I suggest this is an instructive silence, as this debate prefigured an implicit feature of the 'Third Wave' debate: models of the actor.

Ostensibly the 'Left and Right Wittgensteinians' debate concerned the best way to analyze science as a social activity and the most fruitful way to interpret Wittgenstein. Yet models of the actor were prominent. Bloor argued that because meanings can never be fully explicit or context-free, and if we wish to avoid conceiving of actors as endless interpreters, then we must suppose that actors have the capacity to blindly follow rules and routines. That is, actors are some kind of judgmental dope (Bloor 1992, 268-70). Lynch objected, citing both Garfinkel (to the effect the question is really how actors are made out as dopes) and the (Right) Wittgenstein (to the effect 'blindly follow' did not mean causally determined) (Lynch 1992b, 285, 286-87). For Lynch, Bloor oscillated between judgment as "conscious deliberation" and lack of apparent judgment as "caused by an unconscious disposition or internalized norm" (Lynch 1992b, 287). For Bloor, Lynch *presupposed* a consciously deliberative and reflexive model of the actor while nevertheless denying any ontological picture. In contrast, Bloor's strong programme makes the modeling of the human explicit. Some kind of judgmental dope is required: intentional social facts (such as acts of self-reference) rest on non-intentional dispositions (i.e.: habits, custom, biological nature) (Bloor

2004, 596-97). We can be "blindly conscientious" because 'automaticity' is always

embedded within socialization processes and a social framework (Bloor 1997, 51-52).

The debate between Collins and Evans, and Wynne, repeats a key point of dispute

between Bloor and Lynch. Lynch takes reference to the human agent as a judgmental dope as

implying causal determinacy and as threatening the autonomy of the actor. Bloor's account

presupposes that any explanation of an autonomous actor is going to involve theorizing a

level at which the human agent follows routines as a matter of course. In debates over the

respective roles of public and expert, Collins and Evans presuppose a level of social action at

which generalized, routine social competences are at work rather than conscious deliberation

per se. In contrast, Wynne avoids talk of cultural dopes and the power of socialization, *except*

where it applies to scientists. In recent work by Wynne this is explicit. Discussing the

globalizing effect of risk discourse, Wynne notes that (scientific) "institutional actors . . .

[are] . . . immersed in and agents of the discourse culture that reflects the assumption of

[objective risk, for instance]". These "rigid failures" of the scientists are *contrasted* with the

presumed (but suppressed) "autonomous capacities" of citizens (Wynne 2005, 68).

Discussing GMO's, the "dominant discursive constructions" of the "scientific experts" has

"become (probably unwittingly) accomplices to the systematic patronization of the public".

In contrast, "public judgment" is a sophisticated "ethical-intellectual" attempt to highlight

limits to knowledge and relations of trust (Wynne 2001, 447). Section 4 thus analyzes this

contrasting argumentative strategy, before turning back in Section 5 to a discussion of

competing reform agendas and their relation to models of the human actor.

2.5 Three models of the human actor

Though it does seem Garfinkel presupposed a general theory of a reflexive actor, Lynch was correct that Garfinkel asked how one does it when he/she makes out the actor as a cultural dope (Garfinkel 1967, 68). Yet why restrict the question to cultural dopes? How are active and reflexive actors made out *as* active and reflexive? I suggest Wynne establishes his model of the actor via a contrast with competing models. The accounting procedure begins with a general account of empirical findings from the field of public understanding of science. Thus

> . . . public experiences of risk, risk communications or any other scientific information is never, and can never be, a purely intellectual process, about reception of knowledge *per se*. People experience these in the form of material social relationships, interactions and interests, and thus they logically define and judge the risk, the risk information, or the scientific knowledge as part and parcel of that 'social package'. A corollary of this is that people do not simply not understand science when they are seen to disregard it; they do not recognize it, or identify with it, morally speaking (Wynne 1992b, 281-82).

We then move to a picture of the actor, as we can see below in Wynne's study of apprentice workers at the Sellafield nuclear fuels reprocessing plant in Cumbria in northern England. Having found, to his surprise, the workers vigorously defending their ignorance of radioactivity, Wynne nevertheless concluded

> ... they were ... intuitively competent sociologists. [They were busy maintaining a] ... necessary social fabric of interdependency. . . . They were vigilant and active seekers of knowledge; but the relevant environment for them to monitor, and the information to gather, discuss among their peers, evaluate and interpret was mainly social knowledge pertaining to the trustworthiness of the rest of the organization on which they knew they were unavoidably dependent. They were actively, if tacitly and intuitively, positioning themselves, using their knowledge of their social relationships and

institutions, and the extent and basis of social trust and dependency (Wynne 1992c, 39).

The resonance with the ethnomethodological model of the actor as an "endlessly reflexive monitor of action" is clear.

According to Wynne, the reasoning skills and understanding of the lay public is "better" and "more elaborate" than what survey research indicates; public ignorance is actually "actively constructed"; individuals offer "rich and reflective" views on science and their social position; technical ignorance could be "a function of social intelligence". Moreover, "the lay public in this case [radiation workers at Sellafield nuclear plant] exhibited an elaborated reflexive capacity for problematizing and 'negotiating' their relationship with science; in so doing they also problematized 'science' itself." Wynne infers from self-reflexive identity formation processes in specific cases to "[t]his could be regarded as a generalized account of the point that science can never be experienced free of imputed interests" (Wynne 1993, 327-28). The inherent "social packaging" of science is thus partly generated by what *the lay public* exhibits as a character trait (reflexive capacities). The generative mechanism for these character traits resides in a series of contrasts between competing models of the actor (see Figure 1).
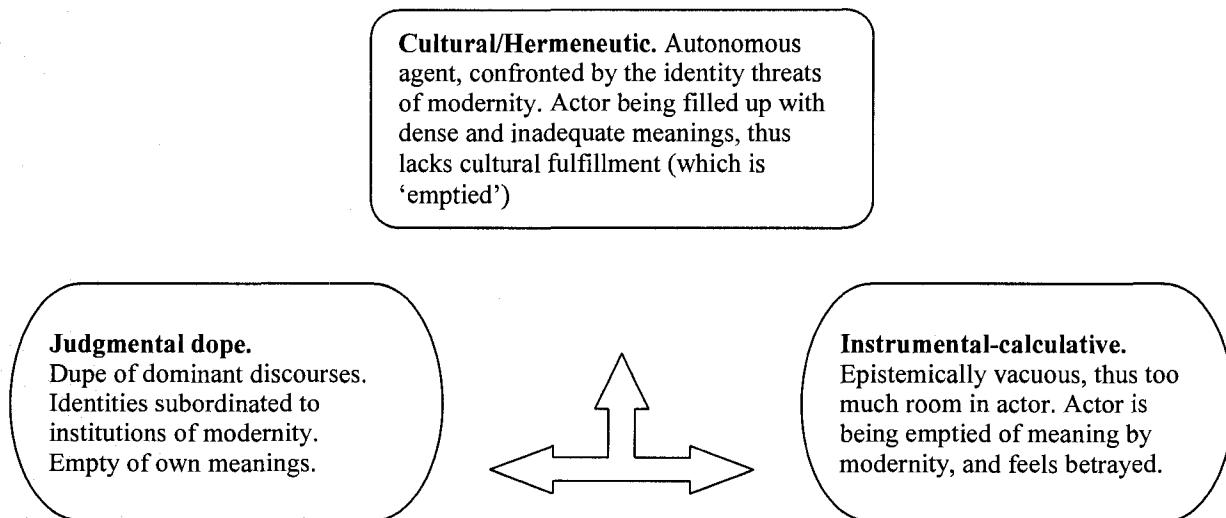
Figure 1 Wynne's modeling activity

The model of the instrumental-calculative (IC) actor is attributed to Beck and Giddens, based upon four assumptions Wynne feels Beck and Giddens make (Wynne 1996a). The first two are that risks are epistemologically real and that publics rationally inquire as to whether modern institutions are protecting the public. The third is that public feelings of betrayal follow from a negative answer to the protection question, indicating Beck and Giddens hold a rational social-contract theory of society. The fourth is that Beck and Giddens presume science is meaning-free or meaning-neutral, and thus busily emptying the public of meaning (to the extent the public adopts scientific rationality).

The judgmental dope (JD) model remains a shadowy figure, never being directly linked to any particular theorist. Nevertheless it acts as a foil to Wynne's positive thesis about the autonomy of the actor. Thus, we should *not* conclude that Sellafield apprentices were "uncritical slaves suborning their identities to the organization" (Wynne 1992c, 39). Instead their ignorance was social intelligence, and they possessed elaborated reflexive

capabilities. Similarly Wynne is skeptical of analyses that "sometimes imply the *automatic power of elite discourses*", but recommends analyses that stress "the autonomy of dominated groups". Wynne recommends Adrian Desmond as an example of the latter analysis. Desmond's study of artisans and evolution in Britain developed a picture (in Desmond's words) of "artisan-craftsmen not as passive recipients of bourgeois wisdom, but as active makers of their own intellectual worlds, their own really useful knowledge" (Wynne 1996a, 49-50). Wynne's cultural/hermeneutic (CH) model of the actor is generated via the contrast with these competing, but "inadequate", models of the actor.

Rather than assume science is meaning-neutral (the IC model), Wynne argues science is "dripping with impoverished and expropriated meanings, and ones in which there is no longer ordinary participation and access" (Wynne 1996a, 60). Science seeks to impose prescriptive models of the social order, relations and identities on the public, yet the public finds these models alienating and inadequate. Science intervenes in public lives along cultural dimensions, not just cognitive dimensions. The public responds in kind, along cultural dimensions, focusing on institutional body language. The IC model thus misdiagnoses both the intervention and the response: though acknowledging lay public reflexivity, the IC model conceives of it along intimate and interpersonal lines, as implicitly calculative. Wynne finds such a view of lay public reflexivity "inadequate" (46). The conception of "reflexive processes . . . as thoroughly calculative, under the autonomous authorship of an individual subject" makes clear the extent to which culture is often "described in terms of its subjects' calculative faculties, implying a deliberative constitution" (fn. 1, 78). For Wynne, this questionable description is (regrettably) central to some forms of science studies (Wynne 1996b).

For Wynne, many debates about analytic neutrality presuppose a "decisionist model of society: that is, of social relations composed only of choice, actively strategizing actors and instrumental reason (even if based on social interests), to the exclusion of routinized practices, hermeneutics and culture" (Wynne 1996b: 359). Wynne thus criticized the Beck-Giddens IC model of the actor for not capturing public judgments of institutional body language which, rather than being instrumental-calculative, reflect a "process of apprehension and response [that] is *more immediate*, engaged and *less deliberative* than this, more captured by describing it as *partly an emotional process* of identification or otherwise with those organizations and the kinds of human relations and identities which they appear to reflect, uphold or deny" (Wynne 1996a, fn. 4, 79; emphasis added). While this appears to flirt with a judgmental dope (JD) model of the human agent, in fact an ambiguity has arisen instead.

The ambiguity concerns which level is fundamental to theorizing the public uptake of science. Critiquing Beck and Giddens, Wynne cites a number of case studies, which are taken to show

> ... how ambivalent public relationships with expertise are, and how deeply *dependency relationships* are enculturated into social habits and identities (Wynne 1996a, 51; emphasis added).

In contrast to our previous finding (Section 2.3), where Wynne had claimed "social identity [is] the more fundamental concept for explaining responses to science and risks" (Wynne, 1992b: 300), I suggest the mechanism driving this enculturation is *not* social identity negotiation. For instance, Wynne considers several systems of knowledge along a spectrum of complexity, alienation and impenetrability: a coal company, a dam, biotechnology and

information revolutions, and American GI's in the Vietnam War, who naturalized the

confusion of war into a "technological spectre". The closeness and pervasiveness of these

"systems" requires people, according to Wynne, to construct "working rationalizations" of

them. Combinations of physical and social realities are thus codified into spectres, which

exist as metaphors for the social relations "controlling" people's fate (Wynne 1996a, 53-55).

> This kind of enculturation process *normalizes and consolidates* whatever
> dependency and lack of agency is thought to exist. It obscures the alienation
> and ambivalence or worse which people may feel in relation to elites and
> expert institutions (55; emphasis in original).

No doubt there is identity negotiation at work here, and the risk to social identity remains the

fundamental dimension of public *response* to experts and expertise. Yet this identity

negotiation rests upon a *social relation of dependency* and *social process of enculturation,*

not upon social identity *per se*. My suggestion is that Wynne recognizes this ambiguity, but

wants the theoretical apparatus to point toward social identity instead of social relations. In

other words, I am not claiming that Wynne either definitively holds an essentialist model of

the actor (as intrinsically and ontologically reflexive) or that Wynne definitely distinguishes

between social identity and social relations. Rather, I am claiming three things. One, such

readings are made possible by the oscillation between models of the actor and ambiguity

about what is the operative level (social identity or social relations) of explanation for

analytic purposes. Two, that an appropriate repair mechanism (as discussed below) is to more

diligently emphasize how reflexivity is a function of socio-political relations (burying the

'law of reflexivity' in footnotes obscures this fundamentally contingent relationship). Three,

the normative proclivities of the analysts remain relevant, for choices about what to

problematize were structured by the project of preserving the autonomy of the actor in the

face of controlling social relations.

2.6 Role playing: public & expert

In this section I bring Wynne's theorizing back into contact with a very different sensibility

in regard to expert/public relations. Debates about how to theorize public engagement have

recently taken place in the form of the 'Third Wave' disputes. Although competing models of

the actor inform these disputes, the relevant models have not been made explicit. This section

further discusses the position of Collins and Evans (2002, 2007), showing how a challenge is

presented to Wynne's position, and how illuminating the different models of the actor at

work can assist in making clear what is at stake in such disputes.

Collins and Evans (2002, 235-36) asked the question: "should the political

legitimacy of technical decisions in the public domain be maximized by referring them to the

widest democratic processes, or should such decisions be based on the best expert advice?"

They answered that there can be too much as well as too little public participation. The

problem, they argued, was that having established the legitimacy of broader public input,

STS/PUS had not theorized where the limits of public participation reside (the "problem of

extension" (237)). A normative theory of expertise was their answer to theorizing such limits.

Initially Collins and Evans (2002) proposed a hierarchy of types of expertise (no expertise,

interactional expertise, and contributory expertise), with referred expertise added as

especially relevant, for instance, where managerial roles were salient. Significantly, this

hierarchy meant experience-based knowledge became the salient criterion for selecting

experts, rather than credentials, and thus the category of expert was expanded to potentially include publics with experience-based knowledge. Various kinds of abilities were also deemed relevant (translation and discrimination), while esoteric and controversial science itself was divided into different types of science (Normal, Golem, Historical, Reflexive Historical). In each type the relationship between technical (propositional questions) and political (questions about values, preferences, priorities, meanings, rights, and so on) phases (implying their potential overlap, rather than a defined temporal sequence) could be different, for instance as uncertainties and ignorance increased or the need for political action exceeded the speed of scientific consensus formation. The overall point was that the STS analyst was well placed to make boundaries between science and politics, and also that drawing such boundaries was compatible with a normative commitment to Western science as a component of culture and not just another resource within democratic debate.

As noted briefly in Section 2.1, Wynne's response (2003) has been to argue that Collins and Evans help themselves to the boundary between science and politics, remain complacent about science's de facto role in modern society as the agent of public meaning, and neglect the way public issues are framed and given meaning. More specifically, not only do expert institutions neglect public meaning, and thus contribute to their own legitimation crisis, but also they unreflexively prescribe and impose meanings upon public issues. Wynne argues that Collins and Evans, by approaching expertise within a democracy as a matter of finding what capacities citizens may or may not have for engaging technical issues, confuses what the object is that is in dispute. The object is not research science *per se*, but expertise as it is deployed as public authority. *This* object carries with it normative prescriptions about how ordinary citizens should behave, while also tacitly imposing a conception that research

science is apolitical entirely. For instance, expert institutions can attempt to reduce social contest about public policy involving technical claims to narrow questions of risks (treated as consequences of action), where the public might argue such questions are inseparable from questions about the human purposes driving research in the first place (Wynne 2001, 2002, 2005). Given that Wynne operates with an expanded notion of what the object is that figures in policy-related disputes about expert claims, especially in the sense that the object is simultaneously research science plus implicit and tacit politics, Wynne argues *this* object ought to be subject to broad-based review: "the proper participants are in principle every democratic citizen" (Wynne 2003, 411). For Collins and Evans, this conclusion runs the risk of being applied "by design or accident of rhetoric" to "every discussion" (Collins and Evans 2003, 439).

The mechanism by which Collins and Evans would prevent such a conclusion being applied to every discussion is to use their categories of experts, abilities, sciences and phases of debate to figure out when it is best to open the forum of participation widely and when it is best to defer matters to experts. Collins and Evans acknowledge that it remains a salient problem to prevent experts from colonizing public meaning (Collins and Evans 2003, 439-40). Nevertheless this does not mean that, where technical issues are at stake, we should not prefer the judgments of "those who know what they are talking about" (Collins and Evans 2007, 2). Collins and Evans have thus continued to develop their framework into a periodic table of expertise (Collins and Evans 2007, 13-44, 45-76).[5] The main point here for Collins

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[5] From top to bottom: ubiquitous expertises (what ordinary members of society have by virtue of living in one); personal dispositions; specialist expertises (ubiquitous tacit knowledge (beer-mat knowledge, popular understanding, primary source knowledge) to specialist tacit knowledge (interactional and contributory expertise)); meta-expertises (transmuted expertises (ubiquitous and local discrimination) to non-transmuted expertises (technical connoisseurship, referred expertise)); and meta-criteria (credentials, experience, track record). See Collins and Evans (2007, 14).

and Evans is to demarcate science from politics without presupposing that science is value-neutral or that experts can only interpret data in one unique way. In effect, their task is to outline how to prevent expertise collapsing into politics, how it might be justifiable to defer to expert judgment, and how these demarcation exercises can nevertheless conceptually preserve a sense of legitimacy for public involvement in policy decisions involving technical matters (Collins and Evans 2007, 134-42).

In their debate with Wynne, Collins and Evans thus accuse Wynne of misreading routine aspects of culture as islands of specialist knowledge. Such islands of specialist knowledge do exist in lay public culture, but Wynne posits too many islands according to Collins and Evans. The resulting over-population renders insuperable the problem how far participation should extend. If expertise is the basis of participation in technical decision-making, and expertise is everywhere, then there is no limit to participation. This concern is not difficult to fathom. Much work in PUS contains boiler-plate lines such as "laypeople have minds that are chock-full of intellectual strategies for dealing with the problems of everyday life . . . the public [are] experts to varying degrees and in a variety of ways in their own sphere" (Gregory and Miller 2001, 65). This seeming contradiction, the possession of specialist knowledge about the mundane, was discussed by Wynne in the context of grocery shopping. Rather than assuming the shopper is simply attempting to check all items on their list for the least cost, Wynne argued "the shopper is trying at the same time to juggle several other situationally specific objectives" (Wynne 1993, 325). From a specific instance of the reflexive monitoring of action, Wynne generalizes the point. As with the "multi-dimensional variability and open-endedness" of grocery shopping, so too "for most real-world problems

to which people apply their reasoning skills, even if they express the 'ideology of routine' to describe these mundane occasions" (Wynne 1993, 326).

Here is where I thus wish to connect the discussion back to my points about models of the actor. The ideology of routine endangers the autonomy of Wynne's lay actors, for it embodies a view of the lay public as "unreflexive cultural dupes who are tradition-bound and incapable of critical reflection" (Wynne 1993, 325). Yet note that Bloor also used a grocery shopping example in defending a (Left) Wittgensteinian position: the shopper does many things automatically, as part of a language game in which such and such just is what is done, and it is this habitual action that provides the very grounds for meaning (Bloor 2004, 597). The question that arises at this point is the following: if there is an ideology of routine, why not an ideology of reflexivity? If an ideology of routine is a means to manage complex and ambivalent relations of social solidarity (Wynne's line of theorizing), then why not conceive of an ideology of reflexivity as a language game mediating social solidarity toward a different end. That is, choices concerning tasks one devotes social time to, and an inter-penetrating language game of preserving one's social identity as a 'concerned member of society.' I suggest the reluctance to theorize the ideology of reflexivity is synonymous with the reluctance to theorize just how broader aspects of social structure get down into the social actor. Ironically (or not so?) this was always one of the basic critiques of Bloor and Barnes' strong programme (how do social influences 'get into' the actor; cf. Bohman 1991, 40-53), which Wynne otherwise defends (Wynne 1996b, 358).

Wynne's theorizing has been critiqued along such social-structural lines before. Michael (1998, 314-15) feared Wynne-kind of work might romanticize the lay local, making it a place both devoid of internal conflicts (homogenized) and separated from wider cultural

dynamics (hermeticized). Michael argued Wynne's sheep farmers' high regard for their local knowledge could rest in their sense of consumer choice, with notions of self and citizenship shaped by "a dispersed set of cultural and social . . . networks and flows" (Michael 1998, 315). Similar to Michael, Collins and Evans re-interpreted the sheep farmers' expertise: they were not lay experts, but had contributory, experience-based expertise that was continuous with that of Government scientists (Collins and Evans, 2002, 255-56, 261-63, and 271-72). In their distinction between ubiquitous trust in general (we all have it, via socialization) and local discrimination (locally acquired, via direct experience) (2002, 259-61, 277-78), Collins and Evans in effect posited something akin to a distinction between routine behaviour and the reflexive monitoring of action.

Collins and Evans referred to Wynne's case-study in which radiation workers spoke of having no need to contribute to their own safety by understanding the science of radioactivity. Wynne had explained this by arguing their social understanding grounded their trust in their employer. In response, Collins and Evans invoked an analogy with banking: are we intuitive knowledge seekers, reflecting on our social relations, when we deposit a cheque? Is our ignorance of economics a social intelligence? "Yes", they say, but to talk in such terms is to talk

> ...of the relations of trust in general that pertain throughout any smoothly
> functioning human society, rather than a specific locally acquired
> discriminatory ability . . . [Here we are talking about] . . . *the capabilities of
> humans in general, in virtue of their 'socialness'* (Collins and Evans 2002,
> 277-78; emphasis added).

At this point we see that different models of the actor are maintained and defended in the face of similar social processes.

For Wynne, the lack of overt dissent points to awareness of dependency and lack of agency. To argue that no opposition implies trust is, for Wynne, to lapse into a cultural dope model (Wynne 1996a, 50). To avoid such a conceptualization, the lay actor is conceived of as "deeply imbued with reflexivity even though no public dissent or contestation is apparent" (Wynne 1996a: 50). For Collins and Evans, the lack of overt dissent points to human actors *as* socialized beings. Previously, Collins had defined socialness as: "Socialness is the capacity to attain social fluency in one or more cultures" (Collins 1998, 497). Collins recommends celebrating socialness. Contra the fear that conservatism will flow from any kind of cultural dope model of the actor, an "oversocialized" conception of the actor, Collins argues that sociology falls into an "undersocialized" conception of society and its members if socialness is not embraced (Collins 1998). So here again we see models of the actor informing theorizing about the public uptake of science, and calls for institutional reform.

2.7 Discussion

We have seen that competing models of the actor are built into different solutions to the problem of the legitimacy of science. Wynne has his own *prescriptive* model of the public as (unfulfilled) reflexive agents, drawn in explicit contrast to a cultural dope (who is slave to routine and tradition) and a strategic calculator (an instrumental entity rationally responding to real threats). Beck and Giddens rely on the innate reflexivity of the scientific community to provide an exemplar for broader institutions to model themselves upon. Collins and Evans enact a structural version of a wise guidance policy, largely leaving scientific institutions alone but also theorizing how to cast the participation net wide enough to solve contentious

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technical and political problems. Nevertheless, for Collins and Evans, this net ought not to be cast so wide and so often that democratic society subsumes expertise under the umbrella of 'just another point of view'. Wynne suggests reformulating the institutions of science via external input into problem framings themselves, though he also recommends reform must go beyond administrative redesign. New kinds of political and epistemological understandings must be forged, which go beyond realist notions and their denial of uncertainity and ambiguity and their focus on consequences. For Wynne, we "continue to await the social invention of a democratic reflexive politics of innovation that might render technology humanly and environmentally sustaining" (Wynne 2002, 473).

Models of the human are central to such reform agendas, but remain largely implicit in debates. Just as conceptual problems arise when implicit models of the human are prescriptively deployed by scientists, so too a conceptual problem arises from Wynne's own implicit model of the human. Ultimately Wynne's theorizing remains accidentally asymmetric with regard to its diagnosis of the problems of expert behaviour and public participation. Wynne's proposed "institutional reform of [sciences] modes of organization, control and social relations" (Wynne 1992b, 297) is directed *at* scientists and scientific institutions, which are the source of the problem, because of the "lack of reflexivity on the part of scientific institutions and actors" (Wynne 1993, 325). Wynne introduces the "dimensions of power and social relations" at this point, in order to account for how any scientific reflexivity is in fact "bounded within common ideological confines" (Wynne 1993, 325). To bring the asymmetry into view, perform a few substitutions. Substitute "rationality" for reflexivity and make the story about the public and not the scientists: the public lacks

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rationality, with the social dimension and ideological thinking restricting the ability to act/think rationally.

I say accidentally asymmetric because Wynne buried a symmetrical view of the problem in a footnote, as previously indicated:

> It is the social-institutional position of different actors which influences their propensity to be reflexive. In general, it is tempting to propose the simple law of reflexivity – reflexivity is inversely proportional to power (Wynne 1993, fn. 45, 337).

The immediate dilemma posed by this formulation is that specialization itself is a social-institutional position or role. As such, the question arises as to whether specialization and its accompanying efficiency may be deeply incompatible with a reflexive attitude.

Several arguments have posited a distinct incompatibility. Collins and Yearley argued against reflexivity: compartmentalization is necessary for any kind of positive theorizing (Collins and Yearley 1992a, 1992b). Barnes argued that reaping the benefits of expertise, albeit tragically, commits society to alienating powers to those specialists (Barnes 2001). Turner argued that we would lose the advantages of specialization if all is political (some facts need to be taken for granted for political discussion to ensue) (Turner 2001). If institutional reflexivity is incompatible with the maintenance of legitimacy and efficacy, then reformist programs that seek to bring the institution of science into line with a normative conception of a reflexive lay public actor may face insurmountable difficulties. I suggest much of the accusations directed at Wynne, that the PUS style he founded tends to romanticize the lay public, (aside from the oscillations between models of the actor and ambiguity about levels of explanation discussed above) are related to concerns about

structural relations. For instance, Kerr (cf. 2003, 22; 2004), who cautions against romanticizing the public, grounds this caution in a concern about whether it is naive to think public representation in decision-making will alter professional power. I am not convinced such criticisms engage Wynne's argument. Not only does Wynne caution that public engagement efforts may simply reinvent the deficit model by focusing on 'downstream' risks (cf. Wynne 2002, 472), but Wynne has routinely cited Cooke and Kothari's (2001) argument to the effect that participation can be a "new tyranny" to the extent dominant institutions retain control over how issues are framed (cf. Wynne 2005, 68). Nevertheless greater caution about how social identities are mobilized in accounts of expert/public disputes is sorely warranted. The danger in not doing so is in fact the mirror-twin of the creeping realism claimed by each side to plague the other side in the game of epistemological chicken (Collins and Yearley 1992a, 1992b; Callon and Latour 1992). Possibly PUS may fall into a creeping reflexivity, imputing demons to scientists in order to exorcise them and imputing halo's to the lay public in order to admire them. Is not the effort to find something special in the lay public, in order to validate their involvement, analogous to the claim that we should trust scientists because of their special access to the truth?

In conclusion, it is now said that PUS has become PES (public engagement with science). Bringing science and society closer together is said to depend upon the creation of "scientific citizens" (Irwin 2001) and "scientific communities" (Elam and Bertilsson 2003), and that the test of the "democratic turn" will be how engagement programs are framed (Irwin 2001, 15; Elam and Bertilsson 2003, 240; Wynne 2005: 68). The continuing political value of Wynne's theorizing just may be its complete lack of ambiguity in regard to the direction of movement required to bring science and society closer together: institutionalized

scientific actors need to become more like ordinary folk, who are constructed as reflexive

and autonomous. In the chapters that follow, I show that public critics of the disposal concept

did just what Wynne's theorizing suggests they do if they wish to defend public meanings:

they refused to accept artificial distinctions between science and politics. The issue was not

expertise *per se*, but the lack of separation between the institutional interests of disposal

concept proponents (in nuclear expansion) and safety assessments. Moreover, public critics

perceived an implicit politics at work when disposal concept supporters treated the concept

as inadequate in the present but viable (in principle) in the future. The implicit politics at

work was one that treated decisions about waste disposal as unrelated to any other decision

(such as expanding nuclear power). Science/politics demarcation (as Collins and Evans

deploy, for instance) too easily runs the risk of obscuring such politics within narrow

conceptions of the issue or object in dispute. Though I do not follow Wynne in theorizing

social identities, I do follow Wynne in analyzing structural relations of power and how

reflexive processes are thereby affected. I thus connect Wynne closely to traditions that focus

more on accountability relations than representation *per se* (cf. Jasanoff 2003a, 2003b, 2005;

Turner 2001; Fuller 2007). By focusing on what the salient issue *is*, and on the fact that the

object in dispute is often ambiguous (research science as it slips into science as public

authority), I demonstrate that public critics challenged implicit politics. Moreover, public

critics of the disposal concept challenged the kind of process Wynne is at pains to illuminate,

whereby:

> ... politics is defined as science, and citizens are prohibited from engaging
> with this 'science'-protected politics. There is no evidence of deliberate
> scheming here, just of culturally-sedimented, presumptive and in-effect
> dictatorial habit (Wynne 2007, 103).

Chapter 3

Nuclear Culture, 1946-96

3.1 Introduction: Misjudging the political context

This chapter outlines a political-economy of nuclear projects in Canada during the period 1946 to 1996. It provides a context within which to understand the actions and beliefs of both deep geological disposal proponents, and their critics, during the various stages of waste management discussions. This chapter demonstrates that the boundaries and continuities drawn by participants in such discussions performed ontological and hermeneutic work, constructing accounts of the objects available for social action and of the various ways of understanding those objects and their inter-relations. I thus follow Wynne (2002, 2005) in treating public disputes *involving* esoteric knowledge as not solely *about* that esoteric knowledge. When research science is enacted as public authority, and presented in public as entirely separate from the political dimension, the very deletion of that politics means expertise carries with it implicit normative commitments. The result is that many disputes between accredited experts and public critics are about the normative commitments and different meanings in play themselves; indeed disputes are often about what the salient issues, concerns, questions and knowledges *are*. Nevertheless Wynne's explanation of these clashes of public and expert tends to oscillate between attributions of the degree of reflexive capacities of the actors involved and an analysis of the respective situational power and socio-political conditions. I draw upon the (analytically more fruitful) *latter* explanatory method in Wynne. I argue that the rejection of the deep geological disposal

concept had its origins prior to the public inquiry commencing. Nuclear elites misjudged the political context, failing to appreciate both their own diminished ability to set the terms of debate and the strength of expectations that decision-making should be democratically accountable.

This chapter thus focuses on the changes in situational power and socio-political conditions that structured the outcomes of interactions between pro-nuclear technical and policy elites and their public critics. I draw upon Barnes' (1995, Chap 5 & 6) analysis of the difference between status groups and social movements, which involves different kinds of collective action (status groups pursue strategies of exclusion, social movements strategies of inclusion). I show that prior to the 1970s pro-nuclear elites could act profitably as a status group. That is, they were in a strong enough position relative to others that exclusion without prohibitive costs was possible. Those not members of the (nuclear) status group were deemed not significant enough to make productive alliance preferable to exclusion. This early history is the history of nuclear power, with nuclear power proponents in a strong position due to close Government-industry cooperation. Disposal proponents presumed support for nuclear power would carry over into approval for waste disposal. In the 1970s deep geological disposal was thus approached as a problem within the ongoing project of ensuring the viability of nuclear power. Critics were excluded because they were constructed as irrational and politically weak. Beginning in the late 1970s, and certainly by the late 1980s, the ability of pro-nuclear elites to implement profitable exclusion strategies declined. Political support for nuclear power waned, Governments became less inclined to make energy policy unilaterally, and public audiences for assessing nuclear projects became a democratic norm. The layers of issues originally connected to deep geological disposal were progressively peeled back, moving from a continuous series of issues to a series of boundaries as socio-political conditions changed.

During siting assessments in 1978-81 waste disposal was part of protecting nuclear power. Yet that field-work was halted in 1981. The public had mobilized in opposition, in part because they distrusted the *lack* of a boundary between nuclear projects and waste disposal. Ontario politics had also cooled noticeably from its previously unwavering support for nuclear projects. A boundary was thus drawn between a deep geological disposal *concept*, and any consideration of a specific site. The former had to be approved before the latter could be investigated. By the time the public inquiry terms of reference were released in 1989, further boundaries had been drawn. The inquiry mandate limited discussions to consideration of a waste disposal *concept*, thereby explicitly separating the concept from discussions of a site, the future of nuclear power, energy policy in general, and any possible implementing agency. Although critics correctly saw that these boundaries obscured implicit normative commitments, involving efforts to expand nuclear power, the boundaries themselves also resulted from the inability of nuclear elites to control the terms of political debate and technical assessment. The newly elected (federal) Progressive Conservatives of 1984 and newly elected (Ontario) Liberals of 1985 both decreased their support for nuclear projects, and both refused to intervene directly in the market via energy policy. Institutionalized power *and* loss of power were implicated in the boundaries that came to define the nuclear waste disposal debate.

Pro-nuclear elites failed to identify this shift in socio-political conditions. Disposal proponents' misjudgment explains why they acted like a status group at the public inquiry. They relied too much on their own expert judgment to prove their case and implicitly ignored the public aspects of the review process (see Chapter's 4-6). Put simply, status groups exclude when they think they can. This also suggests why disposal proponents failed to have the waste disposal concept approved at the public inquiry. Consistent with Wynne's inverse law of reflexivity - that

reflexivity is inversely proportional to power – waste disposal proponents and their bureaucratic allies entered the public inquiry having neglected to adequately comprehend how the implicit assumptions and commitments shaping their claims to public authority were going to be received. Moreover, the appropriate terms of debate had changed, and public critics successfully constructed democratic shortcomings in the strategy and proposals of waste disposal proponents (see Chapter 5 and 6). Public concerns had to be more seriously addressed, but it would take defeat at the 1996-97 public inquiry for the nuclear industry to appreciate the import of their misjudgment. I discuss the results of this re-evaluation in Chapter 7 and 8. The Nuclear Waste Management Organization (NWMO), formed in 2002 to investigate waste management options, has sought to reinvent the face of nuclear projects by acting like a social movement (seeking to increase the capacity for collective action by strategies of recruitment; that is, inclusion, rather than exclusion). Given that the NWMO's success is partly due to its shift to inclusive collective action, this chapter can be read as contextualizing the pragmatic origins of this shift. I suggest that a focus on the different kinds of collective action *utilized* by groups reveals their perceptions of political context, and their perceptions of the merits and strengths of their opponents. Moreover, a focus on the kinds of collective action *available* to groups illuminates what can structure the success or failure of implicit normative commitments.

3.2 The Canadian Nuclear Establishment (1946-57)

Mehta's recent analysis of nuclear power and public protest in Canada describes Canadian nuclear decision making as "even more concentrated, bureaucratic and inaccessible than most" (Mehta 2005, 43). Indeed critics of Canada's commercial nuclear power industry (cf. Knelman

1974, Babin 1985), along with commentators on nuclear politics elsewhere (cf. Surry and

Huggett 1976, Welsh 2000), have characterized the history of nuclear policy making as having

been conducted by an 'iron triangle'. That is, an inter-locking structure of Government,

bureaucratic agency or organization, and private industry. Critics contend that nuclear iron

triangles strategically minimize public involvement in decision-making. Such attributions of

'establishment politics' are versions of neo-pluralist political critique, which gained prominence

in the early 1960s, and which posits multiple elites ruling particular policy areas as a separate

mini-elite (Mawhinney 2001, 200-202). In effect, attributions of establishment politics constitute

a normatively critical interpretation of status group collective action. Yet suitably used, which

means inter-relating exogenous socio-political conditions over time to the strategic actions mini-

elites engage in to control conflict (McCool 1998), conceiving of Canadian nuclear policy-

making as establishment politics is descriptively accurate regardless of particular normative

orientations.

The 'establishment' in question in this chapter begins with the fact that the federal

Government is the central organ of nuclear policy making. The Government accomplishes this

through a federal department responsible for promoting nuclear power (currently Natural

Resources Canada (NRCan), but Energy, Mines, and Resources (EMR) for much of the period

under consideration here),[1] and a federal regulator traditionally supportive of nuclear projects

(currently the Canadian Nuclear Safety Commission (CNSC), but the Atomic Energy control

Board (AECB) for all of the period discussed here).[2] The federal Government carries out its

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[1] There has also been minimal variation in the locale of federal responsibility: the Privy Council Committee for the Ministry of Science and Industry (1946-1965), the Department of Mines and Technical Surveys (1965), and the Department of Energy, Mines and Resources (EMR; 1966-1993). EMR was renamed NRCan in 1993.
[2] The AECB was renamed the Canadian Nuclear Safety Commission (CNSC) on 31 May 2000, following the coming into force of the *Nuclear Safety and Control Act* (which replaced the *Atomic Energy Control Act* of 1946). I retain the original name here because of the time period under discussion.

nuclear business primarily through the federal crown (Government owned) corporation mandated to research and develop nuclear reactors, Atomic Energy Canada Limited (AECL). Ontario Hydro,[3] the publicly owned electrical utility in Ontario, has been the most significant reactor designer and customer (owning 20 of 22 total reactors built during the period under discussion here). The federal Government has always retained sovereign control over nuclear regulations and policies in Canada, though the Ontario provincial Government has been a prominent political-economic actor due to its support for commercial nuclear power. Private industry has enjoyed unique access to policy makers because Ontario Hydro and AECL are their two biggest customers (Schrecker 1987, 28). As Barnes (1995, 169-70) notes, actions reflect opportunities. Prior to the public hearings AECL and Ontario Hydro had become accustomed to an opportunity structure in which bureaucratic support meant political approval and public involvement in nuclear decisions was minimal.

Close industry-bureaucracy-Government relations, and minimal public involvement, was initially defended as normatively appropriate because Canada's reactor program was a spin-off from the Manhattan project of World War II (cf. Eggleston 1965; Bothwell 1984, Chap. 5; Sims 1981, 5-31; Babin 1985, 29-53). Exclusionary collective action complimented secrecy and compartmentalization, and it was considered appropriate to manage a transition to commercial nuclear power in a similar fashion. Thus the Mackenzie King Liberal Government had secretly commenced buying up shares in Eldorado Gold Mines in 1942, with a view to controlling uranium prospecting, extraction, and production in Canada. The company became the first nuclear crown corporation in January 1944, and was renamed Eldorado Nuclear Limited (ENL)[4]

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[3] Ontario Hydro was split into transmission (Hydro One) and generation components (Ontario Power Generation (OPG)) in April 1999. I retain the original name here because of the time period under discussion.
[4] ENL was privatized in 1988 and amalgamated with the Saskatchewan Mining Development Corporation, forming the Canadian Mining and Energy Company (CAMECO).

(Bothwell 1984). The fact crown corporations and public utilities were chosen as the means to control nuclear developments implies the origins of future nuclear status group action lay in Canada's industrial past as well as the wartime practices. Government control and minimal public consultation were not abnormal patterns of Canadian industrial development. Indeed the status group action of early nuclear supporters made them *conventional* political-economic actors.

In Canada crown corporations have been relatively coercive but otherwise typical policy instruments for maintaining monopoly situations and reconciling conflicting policy objectives (Doern and Wilson 1974, Prichard and Trebilcock 1983). By the post-war period Canada's electrical utilities industry were dominated by monopolistic enterprises that made it very difficult for "civic populists" to exert democratic control (Armstrong and Nelles 1986). Nuclear developments *continued* this tradition. C. D. Howe (a powerful (Liberal) Cabinet Minister during most of his time in office (1935-57)) would set the tone for the future by controlling most aspects of nuclear policy making. Howe had overseen the creation of dozens of crown corporations during the war and, as draft legislation to control the atom circulated in August 1945, it was taken for granted that only Howe and the Prime Minister would make atomic policy. This was demonstrated when Howe summarily announced to the House of Commons, in December 1945, that Canada was not interested in atomic bombs. Howe continued to exert such control until he lost office in 1957 (Bothwell 1984, 168-197), and has been described as the "architect of modern industrial Canada" (Babin 1985, 41) and as having maintained "mastery of the atomic field in Canada" (Bothwell 1984, 178). The status group behaviour of AECL and Ontario Hydro thus grew out of an industrial history in which such exclusionary action was politics as normal.

Such exclusive politics was enabled by mutually reinforcing institutions. The *Atomic Energy Control Act* (AECA) of October 1946 utilized federal prerogative to assume control over a resource area where it is deemed in the national interest, and established the AECB as *both* regulator and developer of nuclear power in Canada. Until 1975 over 80% of AECB resources were allocated to basic research rather than regulatory activities (Babin 1985, 57). The first AECB President, C. J. MacKenzie, was hand-chosen by Howe. At the time Mackenzie was acting President of the National Research Council (NRC), which was developing nuclear projects at Chalk River. Howe ensured the AECB would not interfere with the commercial profit mandate of ENL by limiting it to technical functions and preventing it from exercising power without the approval of the NRC or Howe himself (Bothwell 1984, 172, 181-183, 240). Combined with a small operating staff until the late 1960s (Sims 1981, 60-70), and the fact the AECB was forced to recruit directly from former industry workers and managers (OAG 2000, Chap. 27), this early lack of independence meant the AECB was "largely symbolic" and a "ratifying authority for decisions taken elsewhere" well into the 1970s (Bothwell 1988, 77). Critics have claimed the AECB was thus unable to act as an "honest arbitrator" (Johannson and Thomas 1981, 442) and developed a pro-industry "siege mentality" in response to public criticism (Mehta 2005, 49).

AECL was created in 1952, taking over from the NRC at Chalk River and alleviating the obvious conflict in the AECB's mandate, but as with the AECB also reporting directly to Howe. AECL was given the role of promoting and developing nuclear power, initially via the domestic reactor market (Bothwell 1988) but over time shifting toward a focus on international reactor sales as well (Finch 1986; Sierra Club of Canada 2001, 28-48; Doern, Dorman and Morrison 2001c, Bratt 2006). W. J. Bennett personified nuclear policy making at the time: he became

AECL's first President, having passed through ENL and the AECB. Howe regarded amendments to the *AECA* in 1954 (to accommodate AECL's creation) as expanding the promotional aspect of nuclear power operations at the expense of the regulatory aspects, which Howe considered potentially unnecessary (Sims 1981, 42). Inter-locking AECB/AECL board members remained common into the 1970s (Doern 1977; Sims 1981, 24-34, 60-69). As Barnes (1995) noted, what status groups and social movements have in common is a restricted context of social intercourse, which sustains communication and interaction patterns that constitute a conception of the collective good. Favouring promotion over regulation did not mean safety was neglected; instead it meant those two communities had a common purpose. AECL was a vehicle to pursue "power piles". This collective good had been formulated as early as 1946, when W. B. Lewis proposed that commercial nuclear power was possible, potentially cheaper than coal, and more portable than hydroelectric (Bothwell 1988, 172-176, 182-189). J. Lorne Gray (AECL President 1958-74) described Lewis as the most significant contributor to nuclear power development in Canada (Gray 1987). Howe and Bennett also initiated secret discussions in early 1952 with the Ontario Premier (Leslie Frost, Progressive Conservative), and Ontario Hydro, about a joint AECL/Ontario Hydro nuclear power scheme for Ontario (McKay 1983, 34-52; Bothwell 1988, 189-208; Freeman 1996; Swift and Stewart 2004).

Nuclear power as a collective good was also wrapped in a discourse of "nation-accentuating" motivations, including national independence, energy diversification, technical prestige, the economic sense of using cheap uranium to produce cheap electricity, and competition with the USA and UK. National significance was taken to imply centralized control, with Howe considering unified top command good governance (Bothwell 1988, 69-82, 144). As Barnes (1995) noted, status groups develop because of opportunities, and industry-Government

commitment to nuclear power as a common good meant that (as Gray recalled) "it was possible to operate with little, if any, friction" (Gray 1987). For critics that lack of friction inhibited democratic accountability; an uncontested technocratic mind-set pushed nuclear projects (Knelman 1974, 7-16; Babin 1985, 23-24; Mehta 2005, 45). Nevertheless degree of political clout alone is insufficient to explain political success *per se*. Underlying socio-political conditions facilitate some strategies for achieving success and militate against others. Parallel (and over-lapping) traditions of mini-elite decision structures, and the pursuit of mega-projects, facilitated the exclusionary collective action of nuclear elites.

Howe was a typical figure in the age of the "mandarins" (1935-1965). The role of public discussion and the parliament in the policy process was at a low point in this period. Single-party dominance stifled both inter and intra party debate. Only those pressure groups that retained close connections to policy structures and avoided appealing to broader constituencies were successful (Pross 1985, 244-246). Support for nuclear projects would indeed be at its highest in periods of greatest political continuity. The federal Liberals were in power 1935-1984 (interrupted relatively briefly by the Progressive Conservative Governments of John Diefenbaker 1957-63 and Joe Clark 1979-80), and the Ontario Progressive Conservatives were in power 1943-85. Support for nuclear power would slip during political discontinuity in the 1980s. Technical mega-projects were also familiar by the time the nuclear industry was being established. From 1830 to 1930 giant utility monopolies had challenged attempts at civic populism (Armstrong and Nelles 1986). The use of public enterprises to build individual provinces and promote national unity had made *laissez faire* in Canada neither folk myth to embrace nor *bête noire* to avoid (Musolf 1956, 421). The mandarins and the mega-projects fused in the post-war nuclear undertaking, influenced by the legacy of the Manhattan project. The

burgeoning nuclear elites could afford to practice exclusionary collective action because they were already continuing traditions conducive to both minimal public input and technology-driven expansion.

"Atomic power piles" also provided federal and provincial Governments with a new and relatively portable means to intervene in resource politics, especially in (what at the time was) the tricky problem of hydroelectricity and coal in Central Canada (Ontario and Quebec). Indeed large hydro projects had been, and nuclear projects would become, the important exception to Governments facilitating economic growth by supporting private industry exploitation of resources (Helliwell 1979, Chandler 1986). Howe's 1944-1947 efforts to develop nuclear power occurred prior to the discovery of major oil and gas reserves in Alberta in 1947, and for Howe coal dependency in Central Canada was the pressing concern. In the 1940s and 1950s Central Canada depended upon the importation of coal and petroleum for its fuels (used for industrial heating, for instance), but otherwise most of its industrial motive power needs were met by hydroelectric (and it supplied 75 percent of Canada's hydroelectric power). Federal and provincial Governments prevented exporting power to the US to encourage movement of industry to Central Canada, while the federal Government was always concerned to keep electricity and fuel prices uniform in Ontario and Quebec (Dales 1953). Hydroelectric was the trickier problem, with federal-provincial political squabbles regarding jurisdiction over hydroelectric power remaining prominent into the 1940s (Armstrong 1981).[5] Government use of

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[5] Ontario Hydro had been publicly owned since 1904 (McKay 1983). In Quebec there was a mix of the publicly owned Hydro Quebec (since 1944) and private utilities, which would not be nationalized until the 1960s (Doern and Gattinger 2003, 27-28; Bothwell 1988, 332-333).

electrical utilities for economic development purposes created issues of unity, equity, ownership, and Government conflicts of interest.[6]

Nuclear reactors constituted a way to intervene directly in the hydroelectricity and coal problems. Nuclear could replace hydroelectricity and supplement coal. Indeed coal-fired thermal generation as a share of Canada's electricity mix would not rise above 7% until the 1960s (Coal Industry Advisory Board 1995, 49). In Ontario it was not until 1951 that "the first of six coal-fired generating stations locked into the grid, marking an end to the unchallenged reign of hydro-electric energy" (McKay 1983, 33). By the early 1950s Ontario's residential and commercial sector was rapidly expanding, and it was thought hydroelectric generation might not meet demand. Cheap natural gas from western Canada, arriving in the mid-1950s, threatened the water heating and cooking ranges market controlled by hydroelectric power. Ontario Hydro launched an aggressive marketing campaign to shift user patterns toward electricity dominant activities and practices, fuelling a 600% increase in electricity consumption between 1957 and 1974 (McKay 1983, 320-352). With harmonious resource politics a central concern of federal/ provincial Governments throughout the 1950s and 1960s, and because electricity was seen as a natural monopoly (Jaccard 1995) involving significant economies of scale and pressures for Government ownership (Doern and Gattinger 2003, 28), nuclear reactors were suitable tools of economic development. Underlying socio-political conditions thus presented nuclear interests with the opportunities and position of relative strength that, according to Barnes' (1995) account of why groups choose exclusionary collective action, is central to explaining such a choice.

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[6] Hydroelectric power would decline from 90% of Canada's installed electrical capacity 1920-1950, to 80% in 1960, 60% by the mid-1970s, and 60% thereafter (EMR & CEA 1992; Canadian Electricity Association 2006, 5).

3.3 Reactor construction to waste disposal (1958 and beyond)

By 1957 three experimental reactors at Chalk River had been completed and plans were already underway for two demonstration reactors.[7] The transition from research to industry would be mediated by the need for Canada's nuclear interests to report to a Minister other than Howe. The relative smoothness of this transition indicates the strength that accrued technological, economic and bureaucratic commitments could bestow.

John Diefenbaker's Progressive Conservatives (1957-63) defeated the Liberals in the federal election of 1957. AECL had commenced the transition from research to industry under Howe, who had approved of Bennett's (AECL President 1953-58) plans to merge research at Chalk River with Ontario Hydro's interest in commercial-scale reactors. Bennett took the opportunity of an expanding reactor program and a new Government to request (late 1957 and early 1958) increased funding from the Diefenbaker Government. Bennett convinced Gordon Churchill, the new responsible Minister (of Trade and Commerce), that taking a broad view meant seeing the nuclear option as offering both a solution to Ontario coal dependency on the US and potential uranium-export sales (Bothwell 1988, 235-43). Opportunities created by political trouble for Diefenbaker would allow AECL (with Bennett's hand-picked successor, J. Lorne Gray, as President 1958-74) to situate nuclear projects as integral to good Government. Diefenbaker was forced to cancel the high-tech, skills-based Avro Arrow project (a supersonic jet fighter) in February 1959 and, combined with vacillation over nuclear weapons policy (from support for acquiring them in 1959 to opposition by 1963) the Diefenbaker Government came to be viewed as indecisive and hesitant (Lentner 1976). Nevertheless substantial federal research

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[7] Experimental reactors: ZEEP (September 1945), NRX (July 1947), and NRU (1957). Demonstration reactors: 22 MW NPD at Rolphton, Ontario (construction commenced 1958; completed October 1962); 220 MW Douglas Point (Ontario) reactor (construction commenced February 1960; completed September 1968).

and development funds were committed to AECL and Ontario Hydro nuclear projects. This reflected Churchill's reliance on Gray's judgment, a perceived need to demonstrate Government commitment to technical projects and industrial growth, and a response to Ontario's industrial expansion and projected electricity demand (Bothwell 1988, 238-53). While Diefenbaker regarded his shift on nuclear weapons policy as reflecting public disquiet with nuclear weapons (Simpson 1998, 27-30), Diefenbaker did not regard public opposition to commercial nuclear power as strong enough to warrant *not* supporting the nuclear *industry*. Nuclear interests could thus exclude opponents on the grounds that commercial nuclear power was industrial policy 'in the national interest'.

Successive federal Liberal Governments (Pearson 1963-68, Trudeau 1968-79 and 1980-84) would pursue energy self-sufficiency and regional development policies that would also help transform nuclear research into an industry. Although Gray initially refused to join the Canadian Nuclear Association (CNA), an industry lobby group formed in 1959-60, on the grounds that no identifiable industry existed (Weller 1990, 9), this judgment soon proved premature. AECL and Ontario Hydro (in 1963-64) took advantage of the Pearson Liberals' policies, and Ontario's projected electricity demand, to urge that its reactor design and construction team could best be used if immediately authorized to work on reactors (Bothwell 1988, 300-305). Construction on five reactors would commence June 1966 to May 1968. All came on-line July 1971 to June 1973.[8] The Ontario Progressive Conservatives, led by John Robarts (1961-71), spent the decade granting Ontario Hydro whatever the organization wished (Solomon 1984, Swift and Stewart 2004). Indeed Canada's nuclear expansion was defined by the extent to which nuclear supporters were *not* required to engage in aggressive lobbying in the face of intense opposition. Robarts himself was more interested in educational policy than reactors (Bothwell 1988, 302), while

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[8] All reactor schedule dates, here and below, from Sierra Club of Canada (2001, 29). Confirmed via AECL website.

federal oil and gas policy was more politically contentious than nuclear policy through the 1960s and 1970s (Doern and Gattinger 2003, 27-31).

The early success of this expansion program created a policy culture in which nuclear proponents could *expect* to receive federal and provincial policy support. By the 1970s, when reactor proponents also became waste disposal proponents, the waste issue was synonymous with protecting and advancing commercial nuclear power. Nuclear development was paramount in the early 1970s: five reactors came on-line and construction of eight reactors commenced December 1970 to October 1975 (they would come on-line September 1977 to February 1984). In the latter part of the decade four reactors came on-line and construction of six reactors commenced March 1976 to August 1979 (they would come on-line September 1984 to May 1987). By the siting assessments of 1978-81, planners could not avoid recruiting the future in their thinking about nuclear waste. Ten reactors were due to come on-line in the 1980s (they would come on-line February 1983 to May 1987). Nuclear expansion had occurred minus public involvement in decision-making (not even indirectly, as nuclear power itself had never become a serious electoral issue). Hence throughout the 1970s waste disposal proponents approached waste disposal as a puzzle to be solved *within* the problem of ensuring the ongoing viability of commercial nuclear power. Given the past, it was not an unreasonable expectation that waste disposal proposals would be afforded the same kind of protective policy treatment that commercial nuclear power projects had been receiving.

The institutional strength of nuclear power proponents, indeed the culture of commercial nuclear power, was also tied up with the culture of electrical utilities. Utilities derived their influence from being a monopoly over generation and transmission facilities, their exemption from federal income tax, and provincially guaranteed loans. Public utilities thus possessed

distinct advantages over private enterprises. They could borrow cheaply, increasing their ability

to compete for scarce capital and engage in more risky and lower-return projects (Jenkins 1985).

The public utilities functioned as arms of province-growing efforts, and benefited from a distinct

Government rationale for intervention in the electricity market: electricity is both a warranted

natural monopoly and a public good (Jaccard 1995). Ontario Hydro saw nuclear power as the

future of electricity generation. An early organizational history predicted its future would depend

upon nuclear power, and championed its success (to 1960) as predicated upon its commitment to

"the people" (Denison 1960, 274 and 277). Yet many ordinary citizens and parliamentarians

came to regard Ontario Hydro's nuclear expansion program as implying it had gone "out of

control" (Solomon 1984). McKay (1983, 36-58) noted that Ontario Hydro increased its

generating capacity four-fold between 1960 and 1975. Rather than an idealized notion of

independent public demand for electricity driving supply, Ontario Hydro itself contributed to

creating demand (electricity campaigns, entering the electrical space heating market, and

neglecting changing consumption patters and capital availability). Yet ambitious nuclear

expansion programs similar to that of Ontario Hydro also took place in Western Europe

(Romerio 1998, Soderholm 1998) and the U.S (Joppke 1992-93).

For critics, the choice of nuclear reactors as a means to generate electricity was unwise

because of the security and accident risks of reactors, the poor economics of nuclear power, and

the lack of broad democratic accountability surrounding nuclear decision-making. Reactors have

been equated with unstable and potentially destructive technology, and with war rather than

peace. Economically speaking, commentators of diverse normative stripes have concluded that

Ontario Hydro's load forecasters were incorrect in their 1960s prediction of a 7% growth rate in

electrical demand to the year 2000, a mistake they compounded by over-investing in nuclear

generating capacity (McKay 1983, 208; Solomon 1984, 74-78; Jaccard 1995, 586; Daniels and Trebilcock 1996, 6; Martin 2000, 23-24; Doern and Gattinger 2003, 31-37). Critics routinely convert abstract aspects of economic debate to more concrete levels of social experience. Thus when Ontario Hydro's share of provincial Government capital spending increased from 17% to 70% between the mid-1960s and late 1970s, and by 1975 the provincial Treasury borrowings from public bond markets had climbed to $1.86 billion (80% of which was borrowed in Ontario Hydro's name), critics connected this to cuts in spending on schools, hospitals, roads and public buildings (McKay 1983, 163-75). It has also been claimed that investing $12 billion in Darlington created 300 jobs, but the same investment would have created 57,000 jobs via one Bell Canada or 176,000 jobs via four GM Canada's. Every job created in the nuclear electricity sector has been claimed to eliminate six or seven in other areas, while Ontario Hydro itself was perceived to be a bloated bureaucracy (Solomon 1984, chap. 4 and 5).

The democratic accountability problem is closely linked to such economic critiques. Ontario Hydro has been charged with pursuing expensive and environmentally costly nuclear capacity, despite awareness of the undeveloped and likely cheaper (to build and operate) hydro-electric capacity available, *because* it was not subject to close scrutiny (McKay 1983, 207-220). Ontario Hydro is claimed to have acted as an unregulated monopoly, thwarting any attempted governance oversight (Solomon 1984). Classic Canadian anti-nuclear polemics have taken as their theme the dangers wrought by a technocratic ideology that rendered expertise irretrievably biased and democratic politics non-existent (Knelman 1974, Babin 1985). This accountability problem could be considered a structural problem with nuclear power, for the federal (and Ontario) Government were (and remain) involved in several conflicts of interest. Reduced electricity demand (and tighter proliferation safeguards) means fewer sales of domestic and

foreign CANDU reactors respectively: "The Canadian federal Government, its Crown corporations, and its regulatory agencies, probably have a deeper involvement in, and commitment to, nuclear power than does the national Government of any other country" (Helliwell 1979, 214). This perception of a vested interest would plague waste disposal discussions, especially because it would undermine the standard 1970s strategy for dealing with nuclear critics. Nuclear power proponents had sought to combat critics by adopting risk-benefit analysis (Mazur 1980), in which risks were minimized by equating them with everyday happenings and benefits maximized by trading them off against bads (Mazur 1985). A repository was, though, explicitly about the distribution of bads rather than goods. Something more than ensuring the viability of nuclear power, or the presumption that an irrational public could be bypassed because political elites would ensure acceptance of deep geological disposal, would be needed for nuclear elites to achieve their goals. This 'something more' would have to await three successive defeats of the plans of deep geological disposal proponents: the first in the 1978-81 siting assessments, the second in setting the terms of reference for the public inquiry in 1989, and the third at the actual public inquiry in 1996-97.

3.4 When burying waste meant building reactors (1969-81)

AECL had been considering the problem of storing or disposing of high-level nuclear waste since the 1950s (OAG 1995, Chap. 3). Initially it was thought uranium was scarce, so early research focused on reprocessing and subsequently recycling the useful fraction of used fuel, with a view to encasing the remainder in glass blocks (AECL 1954, 1958a, 1958b). By the late 1960s uranium was considered abundant in Canada, and research shifted to storage or disposal.

Only in 1969 did AECL formally take charge of such research, with the AECB citing its lack of technical expertise as reason to grant AECL the lead (Sims 1981). AECL joined with other existing nuclear fuel owners at the time, the two provincial electrical utilities, Ontario Hydro and Hydro Quebec, to form a committee of waste owners. The committee initially advocated monitored, retrievable storage (MRS). Permanent disposal was considered unproven, while MRS allowed greater flexibility, including retrieval and recycling (AECL 1972a, 1972b, 1974a).

AECL and the NWMO later wrote this MRS advocacy *out* of the story, emphasizing how early reports "suggested" permanent disposal (AECL 1994a, 3; NWMO 2003f, 17). This retroactive enhancement of the public policy pedigree of deep geological disposal deleted from view the way public policy, in aid of nuclear power, had helped bring closure to open technical questions. Deep geological disposal was first endorsed as the method of choice in a late 1974 joint statement by the federal/Ontario Governments. This statement followed the Indian atomic bomb explosion of 18 May 1974, which had been enabled by AECL's transfer of a Canadian research reactor to India in 1956 (from which plutonium had been produced). Subsequently AECL supplied both heavy water and technical assistance to the Indian nuclear program. Canada's unintentional role in the bomb test caused a domestic political crisis, fueled by public disquiet about the possibility of diverting spent fuel waste to military uses and the efficacy of non-proliferation policies (Bratt 2006, 87-97, 117-28). Critics interpreted the bomb test as evidence that one cannot unambiguously separate civilian from military uses of nuclear power (Knelman 1974, 164; Babin 1985, 145-47; Mehta 2005, 38-41). Such concerns remain evident in contemporary debates about the dangers posed by the nuclear programs in North Korea, Iran, Pakistan and India (Pembina Institute 2006, 5). The possible military implication of commercial nuclear power had undermined the ideological encoding of CANDU reactors, which since

Howe's 1949 pronouncement that Canada would pursue only the peaceful uses of nuclear energy

(Eayrs 1972, 317; Bothwell 1988, 69-82) had situated reactors as socially benevolent. MRS thus

became a political liability for commercial nuclear power, while permanent disposal lent support

by removing waste from possible military uses. The means to manage spent nuclear fuel were

selected according to what best suited the ongoing viability of commercial nuclear power. Waste

disposal plans now eschewed reprocessing and recycling (AECL 1974b), and the declared

objective of deep geological disposal was to "...isolate and contain the radioactive material so

that no long term surveillance by future generations will be required" (AECL 1975).

Coupling the solving of the nuclear waste disposal problem to the fate of nuclear power

was given definitive form in November 1977. EMR commissioned (in April 1977) a study group

to provide Government and the public with a 'Green Paper' on nuclear waste disposal. Known as

the Hare Report (after its Chair, F. K. Hare), it was released in November 1977 (Aiken 1977).

The group members included a former AECL Director (Aiken)[9] and former Assistant Deputy

Minister of EMR (Harrison). Their acknowledged sources of information were industry research

groups (Aiken 1977, Chap. 5). The report asserted that good prospects existed to successfully

isolate waste permanently in a deep geological repository. Policies to make this happen were

required because of how important nuclear power was to Canada's energy supply and because of

public concerns about nuclear safety (1). The report noted the group could see no reason why the

disposal problem should delay Canada's nuclear power program (6), and that two sites should be

selected by 1983 with one of those sites (recommended to be in northern Ontario) ready to

receive wastes by 1990 (46). Industry groups and Government bodies were talking to themselves

at this point, and deep geological disposal appeared to be a *fait accompli*. Policy makers

effectively endorsed whatever plan AECL sent to them via EMR. Thus AECL had already

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[9] Aiken was also the author of (AECL 1954), an early report on waste disposal.

outlined deep geological disposal (AECL 1976), which the Hare report rubber-stamped in November 1977. *In the very same month* AECL released a detailed exposition of the concept, specifying that nuclear waste would be placed 500 to 1000 meters underground in the secure plutonic rock formations contained in the Canadian Shield, a crystalline rock formation that stretches across most of Ontario, Quebec, Manitoba and the Northwest Territories (AECL 1977). A June 1978 federal/Ontario joint policy statement, citing the Hare report, officially instructed AECL to develop disposal technology and Ontario Hydro to develop storage technology;[10] site selection was required by 1983 and an operating repository by 2000 (EMR & OEM 1978). AECL's confidence that it enjoyed all the support necessary was evident in its report of October 1978, which suggested that all aspects of a disposal project (concept verification, site selection, constructing a demonstration facility, immobilizing waste, facility design and engineering, and safety and environmental assessment) should commence simultaneously and proceed concurrently (AECL 1978, 60). In effect, Government, bureaucratic agencies and industry had decided waste disposal should go ahead. Repository planning was premised on the understanding that decisions taken within this closed circle would limit public involvement to the role of acceptance.

Yet site assessments (mostly) in Northern Ontario, conducted 1978-81, raised intense public opposition. Petitions against repository proposals garnered tens of thousands of signatures and, along with declining parliamentary support in Ontario, site assessment was scuttled in 1981. Support for nuclear power had not translated into support for site assessment practices. Canadian anti-nuclear groups that had formed by the late 1970s (cf. Mehta 2005) of course opposed all nuclear projects. Yet the nuclear industry also created problems for itself by adopting an adversarial stance in response to public challenge. The industry was behaving like a status group,

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[10] This was the official beginning of the Canadian Nuclear Fuel Waste Management Program.

excluding outsiders on the presumption that productive exchange was unwarranted. CNA public

relations demonstrate the point. In 1971 the CNA President (Bill Chessman) called public

opposition nothing more than an anti-science backlash (quoted in Weller 1990, 10). Glossy

public relations brochures followed, emotively trumpeting the virtues of nuclear power (CNA

1973) and thus implicitly prescribing opposition *as* emotional. Further booklets argued that

knowing the facts would comfort a public gripped by misunderstandings (CNA 1975). CNA-

commissioned studies of public attitudes (Greer-Wooten and Mitson 1976), and those of elites

(Ornstein 1976), reported that *both* technical experts and lay citizens were thought *essential* to

either general policy-making or local site decisions. Because of the mixture of issues involved,

though, the balance (in decision making roles) was thought best tipped toward experts. The CNA

interpreted experts receiving the highest vote of confidence as a public preference for deferring

all decisions to the experts, as if all issues turned on making discrete decisions based upon risk

factors. This interpretation informed an information booklet, advertised as based upon the public

consultation exercises, which associated opposition to reactors and repositories with irrational

NIMBYism whereas good citizenship was associated with deferring to experts (CNA 1976a). A

CNA conference for industry spokespersons in November 1976 captured much of the mood of

the nuclear industry. Speakers routinely invoked risk-benefit analysis to proclaim nuclear power

a good deal. Anti-nuclear groups were dismissed as doomed to fade away once broader society

began to appreciate the real facts, as nothing more than professional malcontents living off the

productive efforts of industry (but complaining nonetheless), and as more threatening than

terrorists (CNA 1976b; esp. Douglin, 39-75; Wyatt, 77-102; and Cohen, 103-12).

It was this adversarial attitude that informed the Hare report's claim that where "familiar

cries" of NIMBY might arise they ought to be considered "self-defeating", as the "paramount

consideration must be to pick a site that will not fail" (Aiken 1977, 29). The presumption embedded in this attitude is that opposition in the absence of authorized facts was self-defeating because, without those facts, there would be no other legitimate basis upon which to object. Yet (as discussed below) public groups brought their *own* meanings to bear on the deep geological disposal issue, including differences about the meaning and legitimacy of authorized knowledge. These objections became salient because space for environmental and social concerns opened up in Ontario politics. Although the (Ontario) Progressive Conservative party of William Davis (1971-85) remained pro-nuclear (and continuing the Progressive Conservative dynasty of 1943-1985), in 1975-81 Davis oversaw a minority Government (holding 51 seats 1975-77, and 58 seats 1977-81, in a 125 seat parliament). The Liberals and New Democrats formed an alliance, loosely based on shared environmental concerns, and creating grounds for extensive contacts between environmental groups and the legislative opposition. Questions of resource development, environmental regulation, and the clientele relationships between Ontario legislative bodies and waste producers received increased scrutiny during this period (Winfield 1994, 134-41). The minority Government saw a relaxation of secrecy and high-handedness, an increase in the ability of diverse interest groups to articulate their interests in the legislature, and an excessive caution due to concern about public reaction to policies (Lyon 1984, 696-70). This was not a conducive political environment for an energy option that had thrived on political confidence, rather than caution, and the limiting or ignoring of dissident voices.

Nuclear elites' perception of institutionalized strength, as shown by the confident CNA forecast that there would be between 180 and 213 CANDU units in existence by 2000 (CNA 1975, 1 and 28), encouraged them to overlook or proactively counter burgeoning opposition to their plans. Thus the minority Government responded to a poor credit review (due mostly to

Ontario Hydro's capital borrowing and planned expenditure on nuclear projects) by forcing

Ontario Hydro to trim by 13% its projected 10-year, $40 billion capital expenditures program.

Ontario Hydro responded by merely stretching out its spending, introducing delays into reactor

construction programs but preserving the faith in nuclear expansion to meet electricity demand

(McKay 1983, 164-171). Parliamentary skepticism would have more effect via the Royal

Commission on Electric Power Planning (chaired by Arthur Porter, and held 1975-79, in

response to Ontario Hydro's expansive nuclear program and habit of dismissing democratic

scrutiny). Hearing from both invited and uninvited participants, and responsible to a fractured

parliament and thus a diverse constituency (unlike the EMR-sponsored Hare report), the

Commission's Interim Report (titled *A Race against Time* (Porter 1978)) argued the waste

disposal problem was "appreciably less tractable than was originally thought" (95) and currently

lacked "an adequate scientific basis" (101). It was recommended that an independent panel of

experts be established, with the task of reporting to the AECB regarding progress on waste

disposal research and demonstration, and that a moratorium on nuclear development should be

imposed if that panel concluded solutions were not available by 1985 (xiii and 95). Porter

recommended slashing nuclear power funding (xvii), while also stating that both nuclear power

and repository siting efforts lacked democratic credibility because of the behaviour of their

proponents (xv).

The Porter report is noteworthy for having recommended a panel of *independent* experts,

seeking to enlarge the decision making pool as well as the basis upon which decisions would be

made. Porter also treated public involvement as essential rather than perfunctory, and decisions

as inherently political (Porter 1978, xv-xviii). Porter's report was highly placed enough that

parliamentarian were made aware of widespread public dissatisfaction. Combined with increased

international attention to nuclear safety issues (after the March 1979 Three Mile Island accident

in the US), and increased access to parliament enabled by the minority Government situation,

local dissatisfaction with site assessment practices reached the level of parliamentary debate. The

excluded public was making the most of *its* opportunities. A parliamentary inquiry was

conducted into nuclear waste and the affairs of Ontario Hydro in 1979-80. The subsequent July

1980 Ontario parliamentary report (Select Committee on Ontario Hydro Affairs 1980) concluded

that AECL had marched into communities in both southern Ontario (including Madoc), and

northern Ontario (including Atikokan, Thunder Bay, and White Lake), armed mostly with

information extolling nuclear power. It was a sign of the decline of the efficacy of nuclear elites'

exclusionary collective action that such information was deemed irrelevant to nuclear waste

disposal.

The committee noted that "in the light of so much vagueness on the matters that are most

important to the public, the committee is not surprised that the public is not reassured by AECL's

information program" (30). Moreover, the committee argued, "one of the major problems AECL

must overcome is the public's perception that its entire program – from basic research to public

information – is biased by its commitment to nuclear power and consequent desire to show that

waste disposal is not an insuperable problem. The Committee's view is that AECL compounded

its credibility problem by its one-sided, overly positive and broadly pro-nuclear presentation of

information."(26) The committee was also highly critical of the lack of assessment criteria for

the waste disposal proposal (i.e.: about possible uncertainties, assessment criteria, proposed

schedule, probable implementing bodies, and provisions for local involvement in decisions). The

committee quoted a hearings witness, who had claimed "developing a proposal without criteria is

like drawing the target around a dart after it has been thrown."(33) Nuclear elites were being

told they would have to include others in determining what would make their plans acceptable. This was made formal policy in August 1981, with a federal-provincial policy announcement that AECL and Ontario Hydro would require approval for a *concept* before siting assessments could begin (EMR & OEM 1981).

3.5 Toward a public inquiry (1982-1996)

The 1981 policy separated a waste disposal concept from a site, but not from the fate of nuclear power. A 1982 EMR report (EMR 1982) thus referred to the Porter Commission's moratorium recommendation as highlighting public concern with not burdening future generations with today's waste and with making passive disposal systems work. Public acceptance was said to be potentially difficult due to inadequate understanding of modeling techniques and lack of agreement on what constituted acceptable repository performance. For EMR, convincing the public of the safety and acceptability of nuclear waste disposal would remove the major obstacle to further nuclear expansion: "Despite repeated assurances that nuclear waste disposal presents no insoluble scientific, engineering, or environmental problems, the issue remains in the mind of the public and some members of the scientific community as a serious unresolved issue associated with the development of nuclear energy. In several countries (Sweden, Germany, and the United States) public concern over long term waste disposal has become a major factor cited in opposition to nuclear power" (EMR 1982, 1).

What would occur during the 1980s was the decoupling of waste disposal from the fate of nuclear power, which appeared the equivalent of debating automobiles in the absence of discussing roads and drivers (see Chapter 5). The decoupling was symbolized by the inquiry

mandate, which was truncated to discussion of a concept only, and not energy policy or an implementing agency (CEAA 1998, Appendix A (84-85)). An official position arose regarding the cause of this decoupling: the independent importance of waste disposal and Government-level decision (AECL 1994a, 2-3, 307, 336; NRCan 1998, 3; NWMO 2003f, 17-18). Critics have represented the decoupling as a strategic move by the nuclear industry. Eliminating discussions of the future of nuclear power pressured critics to participate in solutions to a contemporary problem, the volume of nuclear waste presently accruing, while denying to them their preferred solution ('reduction at source'; that is, nuclear phase out). While disposal proponents were disingenuous (see Chapter 7 and 8), critics too quickly assume decoupling meant the industry remained "in charge" of nuclear policy-making (cf. Edwards 2005, ii). *All* over-estimate the clarity and direction provided by Government and under-estimate the role that *indecision* played in the policy field. AECL and Ontario Hydro had certainly attempted to exclude the public, pushing for narrow technical hearings, but the restrictive mandate did not owe to AECL and Ontario Hydro influence *per se*. Rather, it owed to *caution* within the federal and provincial political market about energy policy itself, and to the *failure* of nuclear advocates to sustain (historical levels of) parliamentary political support in the period 1984-90. This changed political landscape helps explain why the disposal concept was rejected at the public inquiry.

Murphy and Kuhn's (2001) account of the setting of the inquiry terms of reference showed that federal and provincial bureaucracy conducted internal negotiations about the mandate up until 1988. AECL pushed for a technical assessment alone. The switch to a broad environmental assessment came *against AECL's wishes*. It resulted from having to balance federal-provincial environmental process differences (Ontario wished to include discussion of alternative methods), AECL's preference for a narrow technical review (partially accommodated

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by establishing a Scientific Review Group), and the wish of EMR to circumscribe discussion of

energy policy (tempered by the public forum setup). Federal bureaucrats in charge of

environmental assessments had cautioned the Minister of EMR (Jake Epp, who had replaced

Marcel Masse in early 1989) that a wider scope would trigger a Royal Commission on nuclear

power. EMR responded (when releasing the inquiry terms of reference on 4 October 1989) by

promising a caucus of Non-Governmental Organizations (NGOs) that a parallel inquiry into

energy policy would be held. When this parallel inquiry failed to materialize, inquiry participants

considered it a betrayal of trust (CEAA 1998, 80; and see Chapter 5). However, rather than

simple betrayal, the broken promise reflected federal ambiguity about the nuclear option and

reluctance to intervene directly in a resource politics issue.

Why the ambiguity and reluctance? The Minister of the Environment (Lucien Bouchard)

had rejected EMR's proposed terms of reference (Epp inherited the draft terms of reference from

Masse). Rather than consent to the forbidding of discussion of alternatives to nuclear power,

Bouchard requested consideration of 'reduction at source' (Murphy and Kuhn 2001, 260-62;

Edwards 2005, 20). Yet Bouchard was a relative newcomer to Government in the middle of

using Environment Canada to establish himself as a force within Cabinet (Brown 1992). The

promise of a parallel review was a political compromise, reflecting EMR's support for further

developing nuclear power but Bouchard's concern to interrogate energy supply options for their

environmental protection virtues (Stevenson 1991, 643-44). Yet more broadly Bouchard (who

was using the environment portfolio to further his own Government career) appears to have

accepted the compromise because *not* initiating a broad energy review was consistent with the

non-interventionist governance style of Brian Mulroney's (federal) Progressive Conservatives

(1984-93). Some history of energy policy makes the significance of this change clear. Energy

squabbles themselves are nothing new, with clashes between 'national policy' oriented

supporters of Government intervention and advocates of free trade regardless of provincial or

national boundary being common since Canadian federation (McDougall 1982, Armstrong and

Nelles 1986). Nevertheless the substance of these squabbles shifted over time. Prior to the 1970s

federal and provincial Governments had used energy policy as a tool to grow the economy.

Disputes over natural resource jurisdiction were infrequent, with Governments using tax

incentives, subsidies and infrastructure support to facilitate private exploitation of crown

resources (Doern and Toner 1985, Chap. 3-5). Yet in the late 1960's federal-provincial disputes

about revenue streams and decision-making power intensified and resource policy became

extremely contentious (Helliwell 1979, Doern and Gattinger 2003, 21-70). The wealth

accumulating in the Western provinces, due to the resources boom in oil and gas, created

conflicts: between producers wishing to maximize revenue and consumers (Central Canadian

industry) wishing to curtail prices, between federal-provincial Government over control and

management of resources, and between Government and industry over the extent of regulation of

industry (Chandler 1986, 105-110; Duquette 1995).

The centralization of energy policy, and pursuit of energy self-sufficiency, would

become the hallmark of the federal Liberals (under Pierre Trudeau 1968-79 and 1980-84) and the

source of resource policy disputes. The Liberals established themselves as an entrepreneur, via

pricing policies and subsidization of mega-projects (Duquette 1995, 235). They sought to both

stabilize energy supply (after the oil crisis of 1973 (and later repeat in 1979)) and centralize

decisions over pricing as a means to manage energy policy conflicts (Chandler 1986, 108). Yet

federal energy policies became distinct electoral issues because the West interpreted federal

policies as responding to the needs of Central Canadian consumers (McDougall 1982, 158).

Following a brief Progressive Conservative party interlude (1979-80 under Joe Clark) the

returning Trudeau Liberals enacted a National Energy Program (NEP). The NEP centralized

resource policy making at the federal level, further consolidated Canadian ownership in the oil

and gas sectors (nuclear was already Canadian owned), diverted exploration to federally owned

lands, and appropriated revenues from industry and the provinces to the federal Government

(Desveaux, Lindquist and Toner 1994, 502-505, 512-514; Duquette 1995, 237-241; Doern and

Gattinger 2003, 21-39). Yet the NEP was roundly criticized and abandoned by 1983, because of

both a growing budget deficit and because the NEP seemed like internal colonialism by the

federal Government (James and Michelin 1989). The NEP left a bitter taste of how *not* to do

energy policy (Duquette 1995, 239-240, 248-249), and this would have deep implications for

nuclear projects (for instance, by straining the federal-Ontario partnership (Doern and Gattinger

2003, 35)). Moreover, as the Liberals stumbled toward electoral defeat, the political fallout from

the NEP surfaced when Trudeau's Deputy Minister of Finance penned a stinging critique of the

privileged relationships among Governments and the utilities. Jenkins (1985) argued that

supporting such monopolies encouraged over-consumption of electricity, led to electricity rates

below the cost of production, facilitated unwise investment in capital-intensive technology like

nuclear reactors, and created substantial economic losses (he estimated as much as 1% of

Canada's Gross Domestic Product, or more than a billion dollars, by 1981). For Jenkins, nuclear

reactors were a symbol of the lost opportunity costs resulting from centralized monopolies

(Jenkins 1985, 497).

Mulroney's Progressive Conservatives had swept to power in 1984 on the back of

deregulation and decentralization policies, and they inherited a nuclear industry in trouble. The

over-investment and surplus capacity problems with the nuclear option in Canada symbolized a

declining acceptance of the argument that electrical utilities ought to be a natural monopoly

(Jaccard 1995, 581-586). The industry had not seen a new domestic reactor order since 1974 and

it was in the middle of a barren period in foreign export sales too, with the only foreign sale

1977-89 being to Romania in 1978 (Bratt 2006, 169-70). The nationalism, centralism and

interventionism of Trudeau were replaced by Mulroney's provincialism, continentalism, and

laissez-faire economics (Milne 1986). If "the Liberal policy, particular the National Energy

Program (NEP), was divisive, bureaucratic, and interventionist; by contrast, Conservative policy

was cooperative, mostly unregulated, and non-interventionist" (Nemeth 2001, 59). Allowing

market forces to create jobs, especially in the growth areas of the oil and gas sectors (Nemeth

2001, 60-64), was more important to Mulroney than subsidizing nuclear projects. In 1985

Mulroney thus announced that nuclear R&D subsidies would be gradually reduced over a five-

year period. Between 1984 and 1990 federal funding of nuclear R&D to AECL fell from 90 per

cent to 50 per cent (Bratt 2006, 171; Martin 2003, 3). For Mulroney, energy security meant

energy supply, and supply could only be achieved via a competitive market rather than

Government intervention (Chastko 2004, 197-230). Nuclear power lacked the right fiscal

credentials for Mulroney's fiscally responsible (conservative) Government. Nevertheless, beyond

this implicit curtailing of the influence of AECL and EMR, the exclusion of energy policy from

the public inquiry mandate mostly reflected Mulroney's non-interventionist style. NRCan

representatives at the 1996-97 public inquiry confirmed that a task force, established (in 1987) to

consider a parallel review, had concluded a review was politically unpalatable because of intense

objections to federal intrusions in provincial jurisdictions.[11]

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[11] Peter Brown (NRCan), 11 March 1996, *HT* [Vol. 1], 22-23 & 38-39, in CEAA (1997).

With the umbrella of overt federal parliamentary support receding, advocates of nuclear projects experienced diminished control of the criteria of assessment used to comprehend their proposals. Historically this had been accomplished via an industry-supportive AECB. Doern's (1977, 33) characterization of the AECB as professionally open (high levels of trust existed between networked elites) but democratically closed (little provision for public participation) has never been seriously challenged. Cross-cutting Government commitments, such as commercial and regulatory activities (Johannson and Thomas 1981), and the AECB's reliance on industry-trained staff (OAG 2000, Chap. 27; OAG 2005, Chap. 6), have led critics to regard the AECB as "a 'lapdog, not the watchdog' of the nuclear industry" (Mehta 2005, 106). For instance, reactor-licensing hearings at Point Lepreau in 1975 are widely considered to have been symbolic rituals of public education rather than genuine public participation (Salter and Slaco 1981).[12] The AECB was thus a consistent regulator, historically speaking, by releasing guidelines (AECB 1985, 1987) that identified permanent isolation as the preferable waste management method and the consideration of social values *after* concept approval as the preferred concept assessment procedure (see Chapter 4). Yet even if the 1989 mandate excluded energy policy, less Government intervention nevertheless involved a broadening of the terms of debate itself.

The inquiry mandate included the injunction to consider social values pertinent to *setting* criteria by which safety and acceptability would be assessed, and the Seaborn report ultimately rejected the AECL/AECB practice of using numerical risk factors in assessments (CEAA 1998, Appendix A & P). In fact the long-held claim that risk-benefit analysis itself lacked democratic accountability gained increased prominence in the absence of overt Government privileging of nuclear power. Risk-benefit analysis works by trading off risks for benefits, where the latter are said to be arrived at by society agreeing on what is good and bad and maximizing the net profit

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[12] The same conclusion was reached about Pickering licensing hearings in 1992-94 (Mehta 2005, Chap. 5 and 6).

of goods-minus-bads (Mazur 1985). In nuclear policy discussions this conception of social good

had always been *imposed*. The national interest had been constructed as energy self-sufficiency

via nuclear power and the virtues of mega-projects. Alternative conceptions of the common good

were ignored (such as conservation measures and smaller scale industrial organization). Refusing

to deploy federal power in this regard meant the more plural processes of the market and political

debate, disrupting a *common* conception of social good, had an opportunity to enlarge the

framing of assessment criteria. This became evident at the Ontario Nuclear Safety Review of

1986-88 (called in response to the Chernobyl disaster of 28 April 1986). Public participants

routinely challenged the democratic credibility of risk-benefit analysis (cf. Burtch and Tomalty

1988, Schrecker 1988). A prominent parliamentary report of 1988 also criticized unaccountable

nuclear elites, calling for a broad debate about nuclear projects, and recommended a moratorium

on nuclear power in the absence of a solution to the waste disposal problem (Brisco 1988).

Bureaucratic supporters were no longer setting the terms of debate or securing

unqualified parliamentary approval. This applied even to EMR, even though it remained

committed to nuclear power. Thus the Government response to Brisco (1988) reiterated that

nuclear power still had a place in Canada's energy mix and that waste disposal was part of

ensuring that future (EMR 1988a, 15). Nevertheless, federal views on any nuclear expansion

plans were balanced by reluctance to intervene in energy policy. EMR (1988a, 15) thus cited the

onerous energy policy implications of any possible moratorium on nuclear power (as Brisco

(1988, 37) had suggested) by citing provincial dominion over energy sources, and the fact that

moratoriums on energy options pending public acceptance of clean-up practices would shut-

down most waste producing activities. AECL's own lobbying of EMR, asking EMR to pressure

the Government to increase funds, also resulted in a 1988 paper extolling the virtues of the

nuclear industry. Nevertheless even this overt bureaucratic support took the following form: "while Canada could, in theory, do without the CANDU, it is much better off in practice to retain this option" (EMR 1988b, 4). If Mulroney's 1985 policy appeared to accept the loss of the domestic nuclear industry, then a 1990 increase in nuclear R&D funding signaled a reversal in thinking (Bratt 2006, 169-73). Yet this policy reversal again indicates the extent to which the nuclear industry was no longer setting the terms of debate. The policy reversal was part of the Government's commitment to sustainable development, adopted as official policy in 1988,[13] while also being an initiative *within* the federal 'Green Plan' of 1990. This plan prioritized funding for high-tech, low-pollution projects amenable to being described within a discourse of business-environmentalism (Desveaux, Lindquist and Toner 1994). At its best, for the plan is often considered a failure, it was an attempt to instill new norms of environmental conduct (Darier 1996). Senior energy advisors within the Mulroney Government, for instance, were busy advocating renewable energy sources and conservation measures as good fiscal planning (Rowlands 2007, 203). Nuclear power proponents adopted the new terms of debate, but at the cost of changing the balance of their public relations: now there would be less assertions of low risk and high benefit and more pronouncements about the green credentials of reactors (cf. Weller 1990, 16).[14] Nuclear waste became part of this green packaging, for a 'closed nuclear fuel cycle' could be represented as containing (literally) environmental impacts. Moreover, nuclear power was an option amongst others, not the crown jewel as it had once been.

At the Ontario provincial level the diminished control over the terms of debate and assessment criteria was even more pronounced than at the federal level. The minority

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[13] The Brundtland Commission report, *Our Common Future,* had been released in April 1987. It had defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland 1987, 43).
[14] As Chapter 7 and 8 discuss, environmental groups have vigorously rejected the 'clean nuclear' claim (cf. Sierra Legal 2006, Pembina Institute 2006).

Government of 1975-81 had seen a bipartisan opposition coalition serve as an avenue for

environmental and social concerns to halt siting assessments of 1978-81. This coalition would

become more forceful when the pro-nuclear Progressive Conservative Government of William

Davis lost power in 1985. The (Ontario) Liberals (led by David Peterson), first as a minority

Government (1985-1987; with support from the New Democratic Party) and then a majority

Government (1987-1990), inherited the over-expanded and debt-ridden Ontario Hydro

(Trebilcock and Hrab 2005). A Liberal-initiated energy review would recommend, by 1989, a

shift to alternative energy sources and the purchasing of power from private producers (Winfield

1994, 140; Swift and Stewart 2004). While the minority Government reproduced the

environmental activism of 1975-81, as a majority Government the Liberals sought to contain

tensions within their own party about how to pursue the goals of economic development and

environmental protection (Winfield 1994, 148-41). It was these divisions within the Ontario

Cabinet, over energy policy, that explains Murphy and Kuhn's (2001, 260) finding that Ontario's

concern in the setting of the inquiry mandate focused on discussing options and alternatives in a

broad context. After the public inquiry terms of reference were released 4 October 1989, the

mood surrounding nuclear projects in Ontario soured noticeably. The newly elected (Ontario)

New Democratic Party (under Bob Rae, 1990-95) imposed a moratorium on further nuclear

development in 1990 and cancelled Ontario Hydro's 25-year plan to build more reactors

(Winfield 1994, 134-41).[15]

    As the 1990s began the scene was thus: nuclear projects were officially on hold in

Ontario and recovering from reduced federal subsidies, but forced to coexist with renewable

energy options, environmental considerations, and market competition. The Seaborn panel held

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[15] Continuing a trend of provincial New Democratic Parties intervening in the market (Chandler 1986, 110).

'open house' discussions May-June 1990, and scoping sessions October-November 1990, to

discuss the details of the environmental assessment. Despite the wide geographic span (sixteen

separate communities across five provinces), analysis of these early scoping sessions showed

that critique of the narrow mandate was common (Kuhn 1997). It seemed a perception had

grown that a federal review of nuclear energy would see nuclear power halted for good. This

perception was reinforced when Ontario Hydro's incoming CEO of 1992, Maurice Strong, told a

Senate inquiry that a moratorium on nuclear power was advisable (Standing Committee on

Government Agencies 1992). The four 881 MW reactors at the Darlington nuclear generating

station had also come on-line during this period (October 1990 to June 1993). To critics

Darlington's massive cost-overruns, plus construction and start-up delays, made Darlington a

good example of the nuclear option: high cost, excess power, and technological unreliability

(Adams 2000, 9; Martin 2003, 16-17; Pembina Institute 2004, 108-113; Trebilcock and Hrab

2005, 124). Indeed when Darlington finally came on line, accompanied by 30% rate increases in

electricity, its capacity was already surplus to Ontario's needs (Doern and Gattinger 2003, 36).

Nevertheless opportunity structures often follow electoral cycles. The federal Liberals,

led by Jean Chretien (in power 1993-2003, followed by Paul Martin 2003-2006), increased

nuclear R&D subsidies upon their return to power in 1993 (Martin 2003). Chretien continued his

long-standing support for nuclear power by supporting the developments of nuclear projects both

domestically and abroad (Doern, Dorman and Morrison 2001b, 20; Bratt 2006, 5). Critics have

argued Chretien's reputation as 'the CANDU man' reversed AECL's decade-long lapse in power

by renewing the basis upon which AECL's early power had rested: "behind closed doors" policy

making in "Ottawa's corridors of power" (Martin 2003, 7). Indeed there appears much truth to

this accusation. The federal Government initiated an internal (Government agency and nuclear

industry only) review of nuclear waste policy from March 1995 to February 1996 (see Chapter

6). The resulting policy framework was federally approved 10 July 1996, but many public

interest groups had neither had an opportunity to participate nor were even aware of the policy

framework itself. At the 1996-97 public inquiry environmental NGOs, reflecting on these

developments within the context of their historical experience with the nuclear industry,

proclaimed it a sign that the *public* inquiry was a temporary aberration and that nuclear policy

making remained a *non-public* affair. Northwatch declared the policy framework denied the

public a "reasonable and fair chance" to participate in decision making,[16] while Energy Probe

cynically asked "how much radioactive waste do we have to acquire to become stake-holders?"[17]

3.6 Discussion

A suggestive analogy is that, as the balance in the broader political scene began to favour

devolved political direction of the energy sector, the strength of the nuclear option in Canada

began to match the pattern revealed by Soderholm's (1998, 216-17) analysis: opposition to

nuclear projects has been more successful in those countries with substantial devolutions of

authority and/or weak central Government control. In Canada this pattern manifested as

decreased support for nuclear power, beginning in the late 1970s, though it must be emphasized

this decrease has to be measured against the extraordinarily high levels of support provided for

nuclear projects up to that point. This decrease was evident at the federal level 1984-93 and the

Ontario level 1985-95.

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[16] Brennain Lloyd (Northwatch), 21 November 1996, *HT* [Vol. 30], 251, in CEAA (1997).
[17] Norm Rubin (Energy Probe), 21 November 1996, *HT* [Vol. 30], 272, in CEAA (1997).

The ambiguity and reluctance surrounding energy policy, and indeed an unwillingness to endorse nuclear expansion as energy policy, denied to repository proponents what had been their primary means of advocating deep geological disposal up until 1981. AECL and Ontario Hydro had explicitly approached waste disposal as solving a puzzle in the nuclear power problem. After 1981 waste disposal was divorced from consideration of a site, and after 1989 from the fate of nuclear power and energy policy in general. This decoupling resulted from decentralization trends and federal-provincial caution about energy policy in general, rather than successful industry machinations *per se*. Viewing this decoupling as a *departure* from initial industry actions helps explain why the exclusionary collective action of AECL and Ontario Hydro would prove *ineffective* at the public inquiry. If one presumes the decoupling directly reflected institutionalized power, then the explanation for the public inquiry rejection of the disposal concept (CEAA 1998) would involve hypothesizing a sudden drop in power 1990-98 and factors peculiar to the inquiry itself. That is, if nuclear interests are conceived of as having successfully determined the terms of debate and assessment in 1989, then *not* succeeding on those terms by 1998 ought to be explained by factors *post*-1989. What this chapter has instead shown is that nuclear interests slowly lost control over the setting of the terms of debate and assessment itself, so that the rejection of the AECL waste disposal concept at the public inquiry has its origins in these historical trends and changes.

This loss of control was never so great as to force AECL and Ontario Hydro to adopt more inclusive collective action, yet nor was it so unclear that nuclear supporters could avoid considering how to better manage external relations. The nuclear industry thus misjudged whether it needed to seek productive exchanges with its critics. Thus it is known the industry conducted an appraisal of Canadian anti-nuclear movements in 1985, concluding they constituted

a threat (Bratt 2006, 84-86). The industry adjudged this threat not significant enough to discontinue a combative and dismissive response. Thus in 1987 an industry spokesman declared that opposition to nuclear projects stemmed from a "bison mentality", meaning that – just like prehistoric bison (apparently) - fear, dread and irrationality were being used to drive society to extinction (Siddall 1987). The explanation for why AECL and Ontario Hydro practiced exclusionary collective action thus lay in their history of doing so and perception that nothing had changed enough for them to do anything different. The minimal efficacy of this strategy lay in AECL and Ontario Hydro misjudging the political context, especially regarding what would pass as appropriate assessment criteria and what kinds of audiences it would be required to convince. Similarly, critics were successful at the inquiry because, despite claiming nuclear elites were immune to democratic rebuke, the political context had changed sufficiently that those elites would not be spared the demands of democratic accountability.

Chapter 4

Presenting an EIS

4.1 Introduction: Hitting the Stage

Chapter 4 analyzes AECL's Environmental Impact Statement (EIS) regarding a nuclear

fuel waste disposal concept AECL (1994a), which the Seaborn panel released for public

review on 26 October 1994. I draw upon Hilgartner's dramaturgical perspective, in which

science advice is analyzed as "a form of drama, examining how it is produced,

performed, and subjected to critique" (Hilgartner 2000, 6). Both those who produce

advisory or technical reports, and those who critique them, are thus treated as performers

– artful presentations and stylized productions are all part of the theatrical contests we

know of as public disputes involving esoteric knowledge and expert judgments about

technological applications. I thus analyze the AECL EIS as a public performance to gain

credibility, showing that in order to secure credibility the EIS was written in a unifying

narrative style infused with rhetorical appeals to expert judgment. I also show that an

implicit politics informed the construction of the EIS. AECL's organizational experience

of operating within an insular policy environment, despite changes in the broader

political scene suggesting the insularity had broken down, nevertheless remained

formative. AECL remained committed to a narrowly conceived technical evaluation of

the disposal concept. This was shown by the way AECL's EIS conformed, not to the

Panel guidelines, but to AECB regulations on deep geological disposal (primarily

Regulatory Document R-71 (AECB 1985), but also R-104 (AECB 1987)). In effect,

AECL's EIS addresses itself more to the AECB than the Seaborn panel (and thus the

public).

If AECL's EIS was an attempt to inform public policy, then of course counter-

performances are also involved in similar attempts. I thus analyze the critiques of the EIS

made prior to the public inquiry. On 18 March 1992 the Seaborn Panel had released

guidelines (CEAA 1992) for AECL to follow in preparing its EIS, which included

directions to make the EIS accessible to a broad audience, to make clear the basis of

support for the concept, and to include discussion of differences of opinion within the

field. Once the EIS was released in 1994, comments were sought on whether the EIS was

adequate, complete, and in conformity with the guidelines. There were two main sources

of comment. One was an open-invite exercise to gather public comments, which resulted

in 65 written submissions to the Seaborn panel (received 8 November 1994 to 8 August

1995) regarding the adequacy and completeness of the AECL EIS (CEAA 1995).[1] The

second source was the invited submissions of the Scientific Review Group (SRG), which

reported to the Panel as an independent body of scientific advice.[2] The relevant SRG

documents are the original report (SRG 1995a), presented to the Seaborn panel in

October 1995, plus the transcript of proceedings when the SRG appeared before the

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[1] This chapter draws upon the 65 public comments submitted to the Seaborn panel, regarding the adequacy and completeness of the AECL EIS (AECL 1994a). To facilitate the identification of author and/or group affiliation, and source of evidence, I use footnotes of the following form. Quotes from the public comments, as found in the compendium of public comments (CEAA 1995), are cited as: author and/or group, *Public Comments* (abbreviated as *PC*), Publication number (abbreviated as Pub. XXX), page number(s). Individual citizens, Non-Government Organizations (NGO), public interest groups, First Nations, government, industry, and technical specialists all reviewed the EIS and sent comments to the Panel.
[2] The Scientific Review Group was appointed by the Seaborn panel on 15 August 1990.

Seaborn panel (prior to the public hearings) in November 1995 (SRG 1995b).[3] I

demonstrate that, despite divergent opinions about the adequacy of the EIS, extensive

overlap existed between technical groups, government agencies, and public critics.

Shared critiques included disputing the expert judgment of AECL, chastising the lack of

peer review, and accusations of unreliability, while general deficiencies in the EIS were

attributed to narrow terms of reference and poor institutional culture.

I draw upon such shared critiques to make several points about what is at issue in

Canada's nuclear waste management debates. These general points bear upon recent

disputes about the various roles and capacities of experts and publics in public policy

disputes involving technical knowledge and expert judgment. As discussed in Chapter 1

and 2, Collins and Evans (2002, 2007), and Wynne (1996a, 2003, 2005, 2007) and

Jasanoff (2003a, 2003b, 2005), outline two divergent approaches for tackling such

questions. All agree that such disputes involve a mixture of propositional questions and

more diffuse questions of public meanings, and that often the lines between such

questions can be ambiguous. All agree that politics is intrinsic to science but such lack of

value-neutrality does not automatically undermine science as a knowledge-making

institution. All agree that it is important to expand the notion of expertise beyond

credentials to cover experienced-based contributions and the importance of interactional

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[3] In this chapter I use in-text referencing for the original, October 1995, report of the SRG (SRG 1995a). To
facilitate identification of individual SRG members, in terms of what they said during the November 1995
testimony before the Seaborn Panel (regarding the adequacy and completeness of the AECL EIS), I use
footnotes of the following form. Direct verbal testimony, as found in the transcript of the November 1995
proceedings (SRG 1995b), is cited as: Name (SRG), *November Testimony* (abbreviated as *NT*), page
number(s). There was also an addendum to the SRG (1995a) report of October 1995, submitted to the
Seaborn panel in September 1996 (SRG 1996). As discussed in Chapter 6, AECL submitted a new
reference case further documenting their claims about the disposal concept (AECL 1996), causing the
Phase 2 hearings of the public inquiry to be reconvened in November 1996 (after the originally scheduled
ending of Phase 2 hearings in June 1996). The SRG Addendum was discussing that additional
documentation, and is thus not referred to until Chapter 6.

competence and familiarity. Yet Collins and Evans represent the sensibility that

participation in technical debates ought to be limited to those "who know what they are

talking about" (2007, 2, 113). Boundaries are thus drawn around *public* participation in

technical matters. This partial exclusion is premised on the notion that the formative

intention (public and collective, rather than private and individual) of scientists is to reach

evidence-based truths in the (inevitable) presence of small-p community politics but not

big-P extrinsic politics (such as broad public opinion) (Collins and Evans 2002, 244-46).

By contrast Wynne and Jasanoff represent the sensibility that in technical debates various

publics know more than they are given credit for, and in cases of public meanings know

better than relatively unreflexive experts. Boundaries are thus drawn around the role of

science and expertise in democratic culture. This partial exclusion is premised on the

notion that every citizen has the capacity to negotiate public meanings, but that science

presumptively makes itself the agent of public meanings by elevating its claims above

politics, dictating what the salient issues and concerns are, and implicitly prescribing (and

de-legitimating) alternative meanings as *just* political.

The fact that many public groups arrived at similar criticisms as did technically-

oriented groups supports Collins and Evans' point that 'expertise' needs to be expanded

beyond credentials: experienced-based and interactional experts existed within the

public.[4] Yet the sensibility exemplified by Collins and Evans, laudable though it is in its

insistence on valuing an evidence-based form of life in which scientists "want to be right"

(Collins and Evans 2007, 125), obscures the basis upon which publics routinely diverge

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[4] NGOs, for instance, either have technically-trained members or utilize technical consultants (experience-based expertise). Many public critics have developed interactional expertise, especially because of 'local discrimination' abilities, from years of engagement with AECL, Ontario Hydro and the AECB, They are thus familiar with the terms of debate, various regulations, and the institutional history and behaviour of dominant groups in the policy process.

from research experts. This much can be gleaned from the sensibility represented by Wynne and Jasanoff, for they both claim publics diverge from experts on the grounds of different meanings and different salient issues rather than truth-claims alone. Yet I suggest the sensibility represented by Collins and Evans obscures something deeper still. It obscures a substantive part of contemporary expert culture as it is deployed as public authority. I suggest that what mostly animates the likes of Wynne and Jasanoff is their implicit denial that Collins and Evans have done what they have said they have done: adequately capture the formative intentions of contemporary expert culture. What is mostly missing from Collins and Evans' picture of the scientific form-of-life is more critical acknowledgement that science as public authority has come to exaggerate its levels of control and prediction, to minimize uncertainties and ignorance, and to actively delete public meanings and concerns as either strictly invalid (i.e.: misunderstandings) or as too variegated to inform policy.

The issue of whether or not science and politics should be separated is largely a red herring in such a dispute. What appears to be the nub of concern is, as Wynne says, the *slippage* from science as research to science as agent of public meaning (Wynne 1996a, 2003). Or, as Jasanoff says, that undermining public participation undermines civic epistemology (the criteria society uses to evaluate public knowledge) (Jasanoff 2003a, 2005: 247-71). These questions about the formative intentions of expert culture, and the threat of slippage from research science to agent of public meaning and its accompanying undermining of civic epistemology, bear directly upon the major finding of this chapter. I show that, despite a good deal of shared critique of AECL's EIS (by technical and public groups), judgments of its adequacy were ultimately quite polarized.

That is, despite much agreement about deficiencies in AECL's documentation and argument, and that it was neither complete nor in conformity with the Seaborn panel guidelines, technical and government groups deemed the EIS adequate whereas public groups deemed the EIS inadequate. This signaled a divergence structured by differences about the salience of trust issues, perceptions of how quickly AECL was moving, and the extents to which broader issues (such as waste disposal being used to support nuclear expansion) were deemed relevant. Yet more deeply, distrust of AECL, unease about the pace of intended research application, and a desire to decide energy policy before deciding what to do with nuclear waste, were implicitly deemed irrelevant criteria to assessing adequacy. These public meanings were subordinated to the framing deployed by technical groups: because AECL claimed it wanted to get deep geological disposal right and might do so in the future, it was acceptable to move forward. Note here that it was deemed acceptable to publicly appeal to what research science could do in the future to define what should be the public policy meaning of the EIS (it was an adequate basis upon which to move forward, given future expectations). This was a form-of-life embodying the slippage Wynne and Jasanoff are critical of, but which Collins and Evans downplay.

4.2 Front Stage: The Identity and Narrative of the EIS

To convey AECL's form-of-life, as on display in the EIS, Section 4.2 and 4.3 analyze that EIS as a dramatic performance. Hilgartner's metaphor of the 'stage' builds upon standard emphasis upon the metaphor of the 'text'. The metaphor of the text draws

attention to the rhetoric and narrative of a performance, such as the mobilization of allies,

or the boundary work engaged in to distinguish science and politics. For Hilgartner the

metaphor of the stage focuses attention upon "the dialectic of self-revelation and

concealment through which advisors present themselves" (2000, 11). Modes of

information control, in which some things are deliberately displayed – the front stage –

and some things actively concealed – the backstage – are central to the success of any

performance. As a dramatic act, I thus begin with an analysis of how the EIS was

performed both as narrative and rhetoric.

The title of the EIS is informative, for it relays the set of information that is being

brought to your attention:

Environmental Impact Statement on the
Concept for Disposal of Canada's Nuclear
Fuel Waste

Also on the title page you are informed who paid for this work and who did the research:

This Environmental Impact Statement is based on work that
was funded jointly by AECL and Ontario Hydro

This work thus forms part of a specialized genre – the environmental impact statement –

and was produced by organizations central to Canada's nuclear industry.

As Hilgartner suggests, public identity is an ambiguous entity: (theoretically) it

can be either a stable artifact deployed in interactions with audiences, or a construct

formed by the perceptions and understandings of an actor's audience(s). Given such

ambiguities, Hilgartner cautions that an actor's public identity is best conceived of as

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both situated and formed in the interactions between actors and audiences. Nevertheless AECL and Ontario Hydro embody the technical expertise promoting and developing nuclear power in Canada. The EIS represented authoritative scientific testimony (rather than fictional writing) *because* it emanated from these organizations: it represented what technical elites within Canada's nuclear industry regarded as an accurate, reliable, scientific appraisal of the concept of deep geological disposal of nuclear waste. Yet the EIS was more than a technical report. The public identity of AECL and Ontario Hydro, as policy actors, established the EIS as a contribution to policy-making.

The narrative of the EIS does not allow the reader to settle in one place. First, the EIS is a very large document. In fact the EIS is not a single document, but one accompanied by allied documents. Apart from an obligatory (policy) summary, the EIS is backed by nine "primary references", each several hundred pages in themselves.[5] The effect is to force the reader, if he/she wishes to pursue claims, to go deeper and deeper into supporting documentation. Second, the EIS refers to thousands of semiotic characters, or characters that may exchange signifying roles (Latour 1987, 53). These semiotic characters range from "CANDU reactors" to "owners of used fuel," from "host communities" to "radionuclides," and from "salt water salinity" to "hydrogeologist." In effect AECL was able to distribute agency across nature and the experienced judgment of AECL scientists, as the reader was constantly confronted by differing sources of authority (nature speaks, but so do nuclear experts).

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[5] There is the R-Public, which will be discussed in this chapter, and then eight other primary references: Site Screening and Site Evaluation Technology (R-Siting), Engineered Barriers Alternatives (R-Barriers), Engineering for a Disposal Facility (R-Facility), Preclosure Assessment of a Conceptual System (R-Preclosure), Postclosure Assessment of a Reference System (R-Postclosure), The Vault Model for Postclosure Assessment (R-Vault), The Geosphere Model for Postclosure Asessment (R-Geosphere), and The Biosphere Model, BIOTRAC, for Postclosure Assessment (R-Biosphere).

Following the suggestion of Latour and Bastide (1986) to use dialogues to bring out the persuasive force of scientific reports, and the concrete exemplar of Hilgartner's analysis of the American National Academy of Science report *Diet, Nutrition, and Cancer* (2000, 46-48), what follows is a dialogue between an imaginary skeptic, who constantly raises questions, and answers from the EIS itself (with verbatim quotations). I will provide in-text referencing for the EIS quotes. All from AECL (1994a):

SKEPTIC: So who performed this study? Technology-boosters?

EIS: "In 1978, the governments of Canada and Ontario established the Nuclear Fuel Waste Management Program 'to assure the safe and permanent disposal' of nuclear fuel waste. Responsibility for research and development on 'disposal in a deep underground repository in intrusive igneous rock' was allocated to Atomic Energy of Canada Limited (AECL)." (i)

SKEPTIC: Yes, I have heard of AECL. They are a large organization, but could they do this whole thing on their own?

EIS: Ontario Hydro has also been involved to "provide technical assistance in its area of expertise to assist AECL in research and development" (i).

SKEPTIC: What was their role, precisely?

EIS: AECL itself is "the proponent of the disposal concept, and it was AECL that had to "provide information requested by the [Seaborn] Panel" (ii).

SKEPTIC: So, again, what did Ontario Hydro do?

EIS: Ontario Hydro was responsible for "studies on interim storage and transportation of used fuel" (4), along with "technical assistance" (i).

SKEPTIC: AECL has its head on the chopping block, when all is said and done, right? So what was the goal of AECL?

EIS: We [AECL] have prepared this [EIS] to provide information requested by the Panel in the guidelines, to present AECL's case for the acceptability of the disposal concept, and to establish that implementation of this concept would represent a means by which Canada could safely dispose of its nuclear fuel waste (ii-iii).

SKEPTIC: So you claim to have presented an acceptable disposal concept, one that would be safe to implement. Why should I trust you?

EIS: We have "consulted broadly with members of Canadian society" (ii).

SKEPTIC: Society is a big place! How can I be sure you talked to the right people, or enough people, or people knowledgeable enough about this stuff?

EIS: A number of other organizations have contributed to the Nuclear Fuel Waste Management Program (NFWMP): "Natural Resources Canada, Environment Canada, universities, private sector consultants" (i).

SKEPTIC: I thought you talked to 'members of society'? Do these 'organizations' represent society in some way? Yes, all places of learning I am sure, but 'society'? How?

EIS: We also spoke to "government departments and agencies, scientists, engineers, sociologists, ethicists, and other members of the public" (ii).

SKEPTIC: OK then, seems broad enough. But how do I know you were not just being told what you wanted to hear, or indeed that you listened to these sources?

EIS: There was also an independent Technical Advisory Committee (ii).

SKEPTIC: It seems you are now just deluging me with the fact that you spoke to a lot of people, rather than telling me how you sorted the information. Where did these

"independent" experts come from? How do I know I can trust them to have Canada's best interests at heart?

EIS: The members of this body are "nominated by Canadian scientific and engineering societies" (ii).

SKEPTIC: So you did not pick them yourself, which is good. Though I note the experts seem to be someone you want to tell me about in detail, whereas you referred just vaguely to 'the public'. Maybe these experts are overlooking something, by the way.

EIS: Many scientific disciplines were involved, such as "geological and environmental sciences, physics, chemistry, mathematics, metallurgy, engineering, and social sciences" (7).

SKEPTIC: You're drowning me in science, with social tacked onto the end. But I can play that game too: are Canadian conditions being accounted for?

EIS: Staff members from Canadian government bodies of expertise were drawn upon. For expertise on earth sciences, branches of Energy, Mines and Resources were utilized, such as "the Geological Survey of Canada, the Earth Physics Branch, and the Canada Centre for Mineral and Energy Technology" (7). For expertise on hydrogeology, staff from a branch of Environment Canada was utilized: "the National Hydrology Research Institute" (7).

SKEPTIC: Were all these experts more or less important than Ontario Hydro? They at least have experience with reactors. Did they just help out with interim storage and transportation issues?

EIS: The work of Ontario Hydro is, in fact, "reflected in this document" (9).

SKEPTIC: Reflected is pretty vague. Can you give me something more concrete?

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EIS: "From 1978 to 1992, AECL's research and development on disposal has cost about $413 million" (8), and our researchers have "produced more than 2,400 publications." (59)

SKEPTIC: Lots of resources being put to work. Are you sure all this expertise did not end up confusing the matter?

EIS: "Many groups in Canada have had opportunities to comment on the disposal concept and on the NFWMP (Section 3.1)" (9).

SKEPTIC: Hold on there! Don't go sending me off to some other section yet.

EIS: We just mean, as we indicated earlier on (ii), that "AECL has consulted broadly with the members of Canadian society to help insure that the concept and the way in which it would be implemented are technically sound and together represent a generally acceptable disposal strategy" (9).

SKEPTIC: Fair enough. But if Chernobyl taught us anything, it is that nuclear matters are bigger than just Canadians.

EIS: We have collaborated with as many people and organizations in Canada as possible. This collaboration also goes beyond national borders. The NFWMP has been "developed in parallel" with international efforts on disposal in plutonic rock, and has "monitored" those efforts (11).

SKEPTIC: Developed in parallel with work on *what* kind of rock?

EIS: Plutonic. You can learn more about plutonic rock if you go to Chapter 4.

SKEPTIC: But don't send me off hunting stuff about rocks just yet. Just tell me, which international programs?

EIS: Information has been exchanged with "the United States, Sweden, Finland, Japan, the Republic of Korea, and the Commission of European Communities" (11).

SKEPTIC: This is like some kind of informal thing?

EIS: AECL has "representatives on international working committees of the International Atomic Energy Agency of the United Nations (IAEA/UN) and the Nuclear Energy Agency of the Organization for Economic Co-Operation and Development (NEA/OECD)." (11)

SKEPTIC: But you are just exchanging?

EIS: "Canada participated in international research on seabed disposal (Section 8.4.3) and in the International Stripa Project, a program of underground experiments and development research on disposal conducted in an abandoned mine in Sweden" (11).

SKEPTIC: Look, I actually read Latour, so I know the deal when you send me off to other sections. Let us stick with the fact that you have consulted experts and disciplines at home and abroad, and utilized independent review.

EIS: Yes; please keep in mind AECL is responding, not to a narrow set of guidelines reached by isolated technical or policy elites, but to six years of Panel activities (scoping sessions, surveys, written submissions, conferences, workshops) to develop an acceptable set of technical-social issues that ought to be addressed (11-12).

SKEPTIC: So what are you asking of us; those who might be affected by all this?

EIS: "to confirm that the general requirements for the disposal concept (Section 1.4.1) and the technical objectives regarding safety and feasibility (Section 1.5.1) are appropriate" (12)

SKEPTIC: So I guess I will, after all, have to run off to those sections to know if your concept is appropriate. Is there anything else you would like from me?

EIS: "to concur with the conclusion (Section 9.9) that the disposal concept proposed by AECL satisfies these requirements and that the technical objectives have been met" (12)

SKEPTIC: Latour was right, it starts getting convincing the more resources you mobilize on me - on the spot. This section, that section; is that all?

EIS: Not yet. We would like you "to support the recommendations made in Section 9.10" (12)

SKEPTIC: I skipped to the four recommendations (pp. 344-46), which have lots of references back to this and that section. This is going to take some time and effort to digest these claims. I do see, though, that you recommend "disposal in plutonic rock of the Canadian Shield" (344), that those who "own used fuel" be responsible for "implementing the disposal concept" (EIS, 344-345). You also say that those responsible for implementing the disposal concept should be "committed to the principles of safety and environmental protection, voluntarism, shared decision making, openness, and fairness" (345), and that we should move to "siting" (346). But I've skipped about 300 pages, so how do I know that you did the right things to get from your story about who you are and whom you spoke to, all the way to these recommendations? Besides, recommendation four suggests moving to siting. Is that premature?

EIS: "In accordance with the 1981 Joint Statement of the governments of Canada and Ontario, no disposal site selection will be undertaken until after the concept has been accepted." (12)

SKEPTIC: So it is some government Act that defines what you are doing? Still, without an actual site, how do I know this concept, if approved, will fit any chosen site?

EIS: "AECL and Ontario Hydro have specified and assessed hypothetical disposal systems." (12)

SKEPTIC: Hypothetical? What is the relation between your hypothetical systems and actual reality? Surely you need to be able to make a judgment about similarity to justify the recommendation to begin siting?

EIS: "Although they are hypothetical, they are based on information derived from extensive laboratory and field research." (12)

SKEPTIC: But what is the relation between the lab and the field; and between the field you did look at and potential sites in the future? Maybe you have been too optimistic or confident?

EIS: "Many of the assumptions made are pessimistic; that is, they tend to overestimate adverse effects." (12)

SKEPTIC: How do you know if all this is hypothetical?

EIS: "The technology specified is either available or judged by AECL or Ontario Hydro to be readily achievable" (12).

SKEPTIC: So you're relying on technology?

EIS: As we indicated at the beginning, "a permanent method of management [of wastes] . . . uses techniques and designs that do not rely for their success on long-term institutional control." (i)

SKEPTIC: But how can I be sure that you used the appropriate criteria for arriving at your recommended disposal concept, if it is all hypothetical?

EIS: "In this EIS, we describe two case studies of hypothetical disposal systems . . . a preclosure assessment . . . [and a] . . . postclosure assessment." (12-13)

SKEPTIC: Before and after, hypothetically?!

EIS: We admit "this application of the Environmental Assessment Review Process is somewhat unusual in that (1) a concept is being proposed, rather than a site and site-specific design; and (2) assessment case studies of hypothetical disposal systems were performed rather than assessments of proposed systems." (13)

SKEPTIC: So I have to trust your judgment? I presume this means you intend to be the implementing agency?

EIS: "This review is also unusual in that the proponent of the disposal concept does not have a mandate to implement it if it is accepted . . . [Thus, we] . . . indicate how AECL would propose that the concept be implemented." (13)

SKEPTIC: Is that really your decision? Is implementation a political decision?

EIS: "We assume that those who have responsibility for the safe management of used fuel . . . also have responsibility for implementing the disposal concept." (13)

SKEPTIC: Sure, the polluter pays, but why should the polluter decide how to implement as well?

EIS: "The implementing organization would share decision making with the host community . . . other communities that could be affected . . . [and] provincial governments" (13-14).

SKEPTIC: Whose interests would be driving decisions, though? You are probably more powerful than, say, host communities.

EIS: "Nothing would be more important than safety . . . adverse effects [social, economic, environmental, health, occupational] . . . [would be kept] . . . as low as reasonably achievable." (15)

SKEPTIC: Yes, but how is safety defined, and by whom?

Clearly the act of skepticism is, in principle, open-ended. Nevertheless one notices that, if the skeptic can be read as attempting to engage the EIS to determine the meaning of the EIS, similarly the EIS carves out an identity for AECL. This identity is also part of an attempt to structure public meanings, in this case seeking to increase the legitimacy of technical claims by situating them in as broad a public context as possible. Read as a credibility contest, what might structure the degree of success of acts of skepticism?

Hilgartner suggests using 'concept maps' to represent the structure of narratives (Hilgartner 2000, 49),[6] thus providing a visual impression of the scope and complexity of any challenge. Figure 2 presents chains of associations, and is designed to visually depict what would be required in order to dispute the EIS. We can note from Figure 2 that any skeptic would have to challenge a good deal of people and things. The skeptic would have to challenge the whole Nuclear Fuel Waste Management Program (NFWMP), a joint endeavour by AECL and Ontario Hydro, and thus the research program, research scientists, and indeed the organizations themselves.

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[6] On concept maps, see Novak and Gowin (1984).
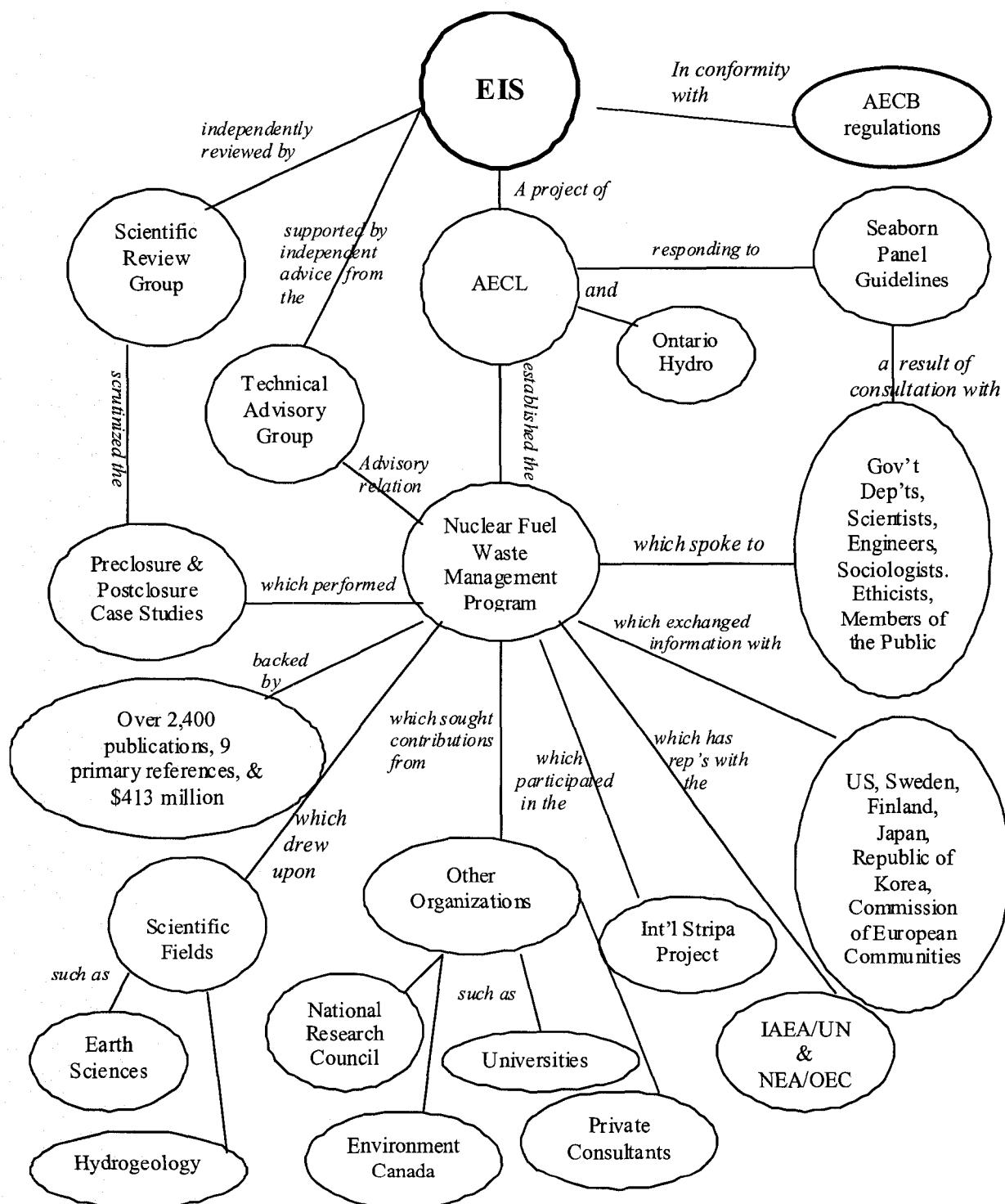
Figure 2   This map presents the conceptual structure of the narrative-style arguments the EIS makes to warrant its authority. Reading through the nodes (circles) and links (lines, with accompanying text) of the map produces statements that summarize aspects of the EIS narrative. See Glossary of Acronyms, Associations & Terms.

Figure 2 suggests AECL members should not be thought of in individualistic terms.

Rather they are *representatives* of domains of technical expertise, or "delegates from the

disciplines or other social and cognitive institutions which form their background"

(Collins 1985, 148). Delegates speak *for*, rather than simply *of*, domains of knowledge.

Similarly the EIS is a delegate, speaking for a broader constituency. Of course a

condition of representation is negotiation of the relation between the group represented

and the delegate doing the representing. Delegates give voice to groups, simultaneously

drawing upon their collective power in the act of creating that collective via

representation. Yet it is always available to combatants to attempt to dissociate the

delegate from the collective, reducing their symbolic power. Our skeptic would thus be

faced by the many chains of associations that link AECL to other organizations,

institutions, projects of research, and individuals of special merit.

Challenging the credibility of the EIS involves questioning the collective

resources of specific scientific fields, other contributing organizations, the experience

gained from participation in international research projects, the connections made by

representatives on international agencies dealing with nuclear regulation, the value

gained from exchanging information with other countries, the perspective gained by

speaking to a broad constituency of interested parties and groups, and AECB regulatory

competence. As a text, the EIS established a formidable defense against challenge by

constructing a web of associations. The entities in that web carried mixtures of different

kinds of prestige: technical, political, social. The EIS derived a little bit of authority from

each link to a reputable organization, known scientific specialty, and example of broad

consultation. The EIS also used several props to bolster its authority, such as the evidence mobilized (2,400 publications) and the funds spent ($413 million).

Yet pieces of the web can be criticized without undoing all of the associations, for webs provide both a defense against challenge and an opportunity to tinker with its parts. The strength of the web is thus related, not simply to the number of nodal points and the connections between them, but also to the strategic opportunities afforded by allowing local criticisms that do not thereby have global repercussions (throughout the web). Figure 2 can thus also be read as a map of how science can be implicated in politics. A dispersed web of associations, to the extent technical actors maximize their autonomy by retaining discretion over the extent to which local weaknesses impact upon the whole, confers tremendous political bargaining capacities. Weaknesses and deficiencies can be trade-off against strengths elsewhere, while criticisms can be absorbed without significant loss of control. Indeed, in Chapter 7 and 8 we will see just this kind of implicit politics characterizing the work of the NWMO.

4.3 Front Stage: The Rhetoric of Expert Judgment

Aside from the structure of the narrative, Hilgartner notes that advisory and technical reports use discursive devices to build authority and credibility. Drawing upon the work of Gilbert and Mulkay on discourse analysis, Hilgartner suggests many advisory and technical reports

> weave together rhetorics that enhance their authority in one of two ways:
> either by letting scientific evidence simply speak for itself or by displaying

interpretive conclusions reached by qualified experts through judicious,
rational deliberation (Hilgartner 2000, 51).

Gilbert and Mulkay previously described two repertoires for establishing the character of
scientific actions and beliefs.

In the empiricist repertoire actions and beliefs must be seen to be universal and
impersonal, so that the author's actions are irrelevant to the content of knowledge claims
– 'nature has spoken'. In the contingent repertoire, actions and beliefs are related to the
vagaries of time and place, or the judgments of specific individuals within particular
social spaces (Gilbert and Mulkay 1984, Chap. 3). Hilgartner situates the rhetoric of
expert judgment in between these two repertoires: while not presenting knowledge claims
as mirrors of nature, they are nevertheless the product of careful deliberation by
experienced practitioners. The EIS utilizes the empiricist repertoire, but its rhetoric of
expert judgment was apparent to both supporters and critics of the EIS. Yet praising or
questioning this judgment did not align neatly with supporter and critic. Rather, the
pitfalls of expert judgment were a resource for both critics and supporters alike.

Two tasks the EIS had to accomplish concerned environmental safety and
justifying the choice of plutonic rock for the repository. The disposal concept itself was
defined as a multi-barrier system (meaning engineered and geophysical barriers) in which
"the containers of waste would be emplaced in rooms in a disposal vault or in boreholes
drilled from the rooms" (AECL 1994a, 82). Long term environmental safety predictions
about this concept appealed to local familiarity: "Our expectations are based on an
understanding developed during more than 15 years of field and laboratory research
conducted in Canada and internationally" (82). The suitability of plutonic rock hinged on

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what "we judge to be important," (95) and also upon "our investigations at field research areas" (106) in regards to the Canadian Shield characteristics and plutonic rock.[7] This combination of experience-based claims and competent judgment was a consistent feature of the EIS. Thus in discussing the disposal vault and disposal containers AECL both appeals to its own scientists and their "laboratory experiments to study the behaviour of glass and glass-ceramic waste forms in groundwaters," (143) while also reaching out across its web of associations to recruit the "extensive experience in mining and construction" of other trusted bodies of expertise (111). Where limitations to knowledge arose, such as monitoring in disposal rooms, discrimination between options was firmly rooted in expert judgment: "we believe the limitation . . . would be better addressed [via some kind of fault tree analysis]" (180).

Public and government concern extended to transporting waste as well. AECL's strategy here involved simultaneous appeal to the experience and competence of parts of its web of support, Ontario Hydro's experience with transporting waste, and the assurance of quantification: 22,000 shipments, 4 million kilometers, 3 accidents, no fatalities (189-90); an accident rate of 0.01%. What about local socio-economic effects? Again experience is the key: local residents near New Brunswick's Point Lepreau reactor, and the Saskatchewan uranium mines, and the waste treatment facility at Swan Hills in Alberta, had all experienced employment benefits (198). Any danger to workers at such places was minimized by the experience of Ontario Hydro and Transport Canada (247).

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[7] An Underground Research Laboratory (URL) had been established in 1982, 130km north of the Manitoba provincial capital, Winnipeg, near the town Lac du Bonnet. Research was also conducted at AECL's Whiteshell Laboratories, which since 1963 had been located close to the nearby town of Pinnawa. AECL also conducted research at the Intrusive Underground Structure (IRUS) at Chalk River, Ontario. See Torgerson (1990).

Even if employment stops because of decommissioning, experience with and knowledge about "stringent criteria, guidelines and standards" would ensure safety (251).

AECL's post-closure assessment study showed clearly this oscillation between AECL's experience and its consistency with the experience of other chains in the web of associations. Thus assuming the disposal vault would be immediately saturated upon closure was presented as a conservative assumption "consistent with assumptions made in other countries" (268).[8] It is confirmed, in fact, by "experience at the underground research laboratory" in Whiteshell, Manitoba (270). Moreover AECL's "confidence in the performance of containers . . . is shared by . . . other countries" (271). Sometimes confidence might be difficult because of the indeterminacy of the problem, such as identifying potential and significant scenarios (anywhere from earthquakes to glaciation and human intrusion). Nevertheless AECL reminded the reader "expert judgment played a major role" (278). AECL's expert judgment was that identifying worst-case scenarios was nothing more than "highly subjective" speculation that was likely to lead to "very unlikely situations" dominating the analysis (317). AECL thus drew a boundary around what their expert judgment could show and what subjective judgment could fabricate unnecessarily. The nodes where very unlikely events were considered also signaled the distance between expert judgment and public opinion. The EIS thus concluded confidently, moving from a statement that disposal is "needed" to the justification that "current storage practice is a safe interim measure, but not a permanent solution" (336). The EIS narrative thus sounded distinctly like a story in which a crisis is presented, options for securing protection from harm are outlined, and the impression of choice is thus given. However that choice quickly dissipated, as AECL made clear storage could

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[8] Though the Americans opted for 'dry is good'. See Macfarlane (2003, 794-96).

not be relied upon. Passive disposal remained the only safe option. In the next section, we will see what different groups had to say about this story.

4.4 Front Stage: Who Said What?

Table 2 codifies the 65 submissions to the Seaborn panel regarding the adequacy and completeness of the EIS (judged by the guidelines issued March 1992 (CEAA 1992)).

Table 2   Respondents to the EIS, and Kinds of Responses

AFFILIATION	EIS not addressed, but approves concept	Ritual citation	EIS adequate; justification &/or options; next stage	EIS adequate; minor probs; next stage	EIS adequate, but more work needed	EIS adequate, but major revisions needed	EIS not addressed, but opposed to concept	EIS inadequate, but deficiencies only minor	EIS inadequate, and deficiencies significant	Unclear position	Total
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	
NGO's			1						12		13
Public Interest				2	1		1		3		7
Private Citizens				3					7	1	11
Utilities/Industry		6	1								7
Government				4	1	1				2	8
Technical Society			1	5	1	1				1	9
First Nations				1					9		10
Total	0	6	3	15	3	2	1	0	31	4	65
		9%	5%	23%	5%	3%	2%		48%	6%	

Source: Compendium of Public Comments (CEAA 1995)

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To aid in interpretation, let me explain the criteria behind some of the determinations.

Non-Governmental Organizations (NGO's) were identified either because of prior

familiarity, or because of indications of recruitment efforts, broader organizational

features, or large-scale concerns. Public interest groups and private citizens were

categorized by self-identification in many cases, with public interest groups often being

distinguished from NGO's because of either single interest focus or obvious signs of

being formed as ad hoc responses to single issues. Most other groups self-identified, or

were previously known (examples: utility/industry (Canadian Nuclear Association);

technical society (Canadian Geotechnical Society); government (Transport Canada,

AECB)). Of the 65 submissions, 20% were NGO's, 11% were public interest groups,

17% were private citizens, 11% were from the nuclear industry or utilities, 12% were

government agencies, 14% technical societies and associations, and 15% were First

Nations groups or their representatives. As a measure of 'interested parties', 63% were

drawn from public groups or individuals, and 37% from industry, government, or

technical organizations. Many submissions still commented upon the merits and opinions

of the EIS, but here I focus on the comments requested per the panel guidelines

(completeness, adequacy, and conformity with guidelines).

The horizontally-arranged spectrum of Table 2 can be read as moving left to right,

following degrees of approval across to different degrees of disapproval, culminating in

very strong disapproval.

Position #1 (EIS not addressed, but approval for concept) has no inhabitants, but

was placed in the chart because of position #7 (EIS not addressed, but opposed to

concept), which has one inhabitant. In this latter case, the respondent was violently anti-

nuclear and extremely emotional, making for a contrast in which no respondent thought it appropriate to be rabidly pro-nuclear.

In regards to position #2 (ritual citation), 9% of respondents, all of them affiliated with the nuclear industry in some fashion (e.g.: uranium mining, lobby groups) or a nuclear utility, submitted very brief submissions. I call them 'ritual citations' because they merely praise the "thorough documentation" and "credible work" of AECL before strongly recommending progress to siting or public hearings.

Position #3 (EIS adequate; justification &/or options; next stage) approved of the EIS, but unlike the ritual citations either discussed plausible options on some technical point or gave some other kind of justification for their support, before recommending siting or hearings. Only one NGO took position #3 (The National Council of Woman of Canada).

Regarding position #4 (EIS adequate; minor problems; next stage), numbering 23% of respondents (60% of whom were government or technical bodies), the criterion here meant groups recommended siting or hearings, approved of the EIS, but believed there were a few minor omissions or minor technical errors/problems that needed to be addressed. These minor deficiencies ranged from AECL being too cautious and too safety conscious, to disagreements over some modeling techniques or risk estimates. One First Nations group, the Meadow Like Tribal Council, took this position (in contrast to 9 other First Nations groups who were strongly opposed), essentially giving the green light to serious dialogue with AECL about siting a repository on their tribal lands.

Position #5 (EIS adequate, but more work needed) is the closest this debate gets

to 'neutral'. In this case 3% of respondents argued for more information in order to make

a full recommendation, though they had a positive response in general.

Position #6 (EIS adequate, but major revisions needed) was held by the Scientific

Review Group (SRG) and Environment Canada. The SRG argued that AECL's case for

the generic concept of waste disposal was fundamentally flawed. The problem was not

the concept itself, nor the need for waste disposal, nor the premises of reducing burden on

future generations or the unreliability of institutional controls. Rather, the SRG opposed

the way in which AECL based its case for the disposal concept on its own post-closure

reference study. In the EIS there are two case studies presented, one by Ontario Hydro

(pre-closure; hypothetical generic facility) and one by AECL (post-closure; site specific,

with use of modeling programs). The SRG was ambiguous about the Ontario Hydro pre-

closure study (see below), but generally found it to be sufficiently like other nuclear

projects, such as building a nuclear power plant, to be acceptable (SRG 1995a, 4 & 16).

However, the SRG found the AECL post-closure study "unreliable", "narrow", and

dependent upon questionable modeling and unknown expertise (4 & 16-17). Both the

SRG and Environment Canada advanced major criticisms of the EIS, but endorsed it as

adequate nevertheless.

Position #8 (EIS is inadequate, but deficiencies only minor) is again an empty set,

yet its emptiness is instructive. If we combine positions #4 (23%) and #6 (3%), and

possibly add the (almost) neutral position #5 (3%), we have approximately one third of

respondents indicating either minor or major deficiencies with the EIS, but who refuse to

label it inadequate. An instructive contrast here is a private citizen taking position #4 (J.

A. L. Robertson, a long-time AECL employee and well-known 'nuclear warrior' in

Canada), who emphasizes that

> The major point I wish to make in this submission is that none of the
> omissions need delay public hearings on the EIS.[9]

In contrast, a private citizen taking position #9 (EIS inadequate, and deficiencies

significant) emphasizes that

> Any serious attempt to patch up this "environmental impact statement"
> would be equivalent to trying to cure cancer by applying a bandaid.[10]

An NGO taking position #9 quotes the EIS to the effect that progressing towards disposal

would increase public confidence in Canada's ability to manage waste safely, and

responds to this emphasis on haste as such

> Surely the point is to develop and implement a safe plan for waste
> management, not merely to act quickly in hopes of minimizing public
> concerns about a process which, in fact, should be of great concern to the
> public.[11]

Of the 65 submissions, 48% adopted position #9, finding the EIS inadequate and riddled

with serious deficiencies. Of that 48%, no utility/industry group, government agency or

technical society adopted position #9.

Finally, there was also position #10 (unclear position), which included

respondents who made some criticisms of the EIS but did not make a clear case either

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[9] J. A. L. Robertson, *PC*, Pub. 005, 1.
[10] Phyllis Robbins, *PC*, Pub. 010, 8.
[11] Concerned Citizens of Manitoba, *PC*, Pub. 034, 2-3. Quoting AECL (1994a, 77).

way (adequate or inadequate). The low number in this set (4, or 6%) is consistent with general impressions that, in this particular debate, few parties remain non-partisan or dispassionate.

One interpretation of the lack of overlap in position #9 is that technically-oriented sectors of the interested parties 'know enough' to know the EIS is adequate. If the locus of legitimate interpretation were solely toward credentialed experts, this would be the end of the matter. However comparison of the critiques of the SRG, Environment Canada, and several technical societies, reveals a great deal of overlap with many of the NGO critiques (which were typically more detailed than that of private citizens). Representative NGOs in this regard would be Energy Probe, Northwatch, Campaign for Nuclear Phaseout, Nuclear Awareness Project, Saskatchewan Environmental Society, and the Canadian Coalition for Nuclear Responsibility. Their experience-based claims and interactional expertise allowed them to critique what they claimed were hidden values in the technical research (as expected by Collins and Evans 2002, 2007). Yet the overlap itself shows that public divergence from expert groups did not occur over propositional knowledge claims alone. The switch to labeling the EIS inadequate is, on a general level, the switch to anti-nuclear positions regardless of the EIS. On a more specific level, the switch to labeling the EIS inadequate is also a political statement that developments should not continue any further, especially under the aegis of untrustworthy institutions. The solidarity that existed between those with minor or major criticisms and their semi-distant cousins who contributed ritual citations, is matched in polar-fashion by the solidarity between those who felt threatened and/or excluded (the 9 First Nations groups adopting position #9; 14% of respondents overall) and their semi-distant cousins who

believed only a very strong show of disapproval (48% across all groups) would gain the

attention of policy-makers.

Initial coding of the written comments suggest critics of the EIS (as inadequate)

strongly distrust AECL and Ontario Hydro, which could be a reason in itself to label the

EIS inadequate (tainted by the source). Yet difficulties arising from the specificity of

many critiques (limited by Panel directives to discuss the conformity of the EIS with the

guidelines) mean much is implicit in the critiques, rather than explicit. The pace of

development was one issue that featured explicitly in many critiques. Labeling the EIS

inadequate was a response to the perception of genuine deficiencies in the EIS, but the

one third of respondents who perceived deficiencies but did not label the EIS inadequate

indicates perceiving deficiencies alone did not compel the application of 'inadequate'. To

label 'inadequate', the respondent also saw some danger in the nuclear industry wanting

to speed up the time-line to approving disposal. If any confirmation of this perception

was needed, and most long-term anti-nuclear NGOs already regarded themselves as in

possession of such an understanding, then the submission of the Research and Advisory

Panel (RDAP) to the Board of Directors of AECL provided ample confirmation.

> The Panel [RDAP] is frankly disturbed by the extraordinarily prolonged
> character of the decision process. Merely to obtain federal acceptance of
> the concept of deep geological disposal will have taken nineteen years
> since its formulation in 1977. Site screening for a possible repository
> cannot even begin until the basic concept is accepted . . . [RDAP] is
> disturbed at several aspects of the slowness of the proposed action
> [operation of repository between 2025-2065, with closing in 2065].[12]

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[12] Research and Development Advisory Panel to the Board of Directors of AECL, *PC*, Pub. TEC 007, 3-4.

4.5 Backstage: Questioning the Evidence

As we move to consider the backstage, that area of activity the EIS seeks to conceal or control impressions about, we begin first with the very ability to access what goes on backstage.

The Panel guidelines called for the EIS to be written in "the clearest terms possible, and to use language . . . that can be readily understood by the public". AECL was instructed to indicate ". . . important areas of knowledge where differing opinions within the physical community remain unreconciled. . ." (CEAA 1992, 2, 7, and 44). However, many respondents regarded the document as inaccessible. Virtually every respondent mentioned the lack of an index, poor cross-referencing between the EIS and its primary supporting documents, and poor cross-referencing between the Guidelines and the EIS. NGO criticisms ranged from ". . . the organization of the EIS is unnecessarily confusing,"[13] to ". . . the EIS seems at times to be designed to confuse as to enlighten."[14] Sometimes all subtlety was dispensed with: ". . . when you go down in the subsections you start to feel lost in a labyrinth of jargon and jargonized jargon . . . the cornucopia of details is used specifically to lose the reader very soon."[15] The impression of lack of clarity was not expressed by those submissions that argued the EIS as adequate. Technical groups, for instance, despite indicating deficiencies, found that "[i]n general, the Group found the documentation to be well written and presented . . . the EIS . . . weights the presentation in a manner suitable for a broad readership."[16]

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[13] Campaign for Nuclear Phaseout, *PC*, Pub. 027, 3.
[14] Concerned Citizens of Renfrew County, *PC*, Pub. 031, 3.
[15] Ecosystem Approach Group – P. Boldrini, *PC*, Pub. 033, 6.
[16] Report of the OECD Nuclear Energy Agency Review Group, *PC*, Pub. TEC. 001, 19.

More consensus existed regarding the issue of whether AECL had given due consideration to other points of view. This critique took the form of questioning the basis of AECL's expertise and documentation: whether the expertise was sufficiently grounded in relevant experience and fields of knowledge, whether it was in fact credible and trustworthy, and whether the documentation of the EIS was independently peer reviewed. On this topic, critics and supporters alike found the AECL case deficient; though they disagreed about whether this deficiency rendered the EIS inadequate (see above). The EIS documentation thus provides a window into the backstage of AECL activities. An analysis of this documentation reveals that just over 16% of the references require directly contacting the production source. Moreover, the EIS cites just 8 out of 427 (2% overall) AECL-affiliated supporting-documents as having appeared in recognizable and independently peer-reviewed journals. One finds a similar pattern in the 'R-Public' primary reference (AECL 1994b), designed to address social issues and one of the most widely accessed and referred to primary references: just over 14% of the cited sources require directly contacting the production source. Of journals cited (23 overall (9%)), only 1 AECL-affiliated supporting-document was published in a peer-reviewed, independent journal.

Critics of AECL pointed to similar statistics: "126 references out of 263 references [in the R-Public] – that is, 46 percent of the total – are from the nuclear industry, of which 57 are in-house AECL documents."[17] Possibly this can be excused as a symptom of politics forcing research to the public stage, because the "speed of political decision-making is faster than the speed of scientific consensus formation" (Collins and Evans 2002, 269). Yet disposal concept supporters and critics alike found the lack of

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[17] Canadian Coalition for Nuclear Responsibility, *PC*, Pub. 049, 17.

independent peer review a problem (showing the valid part of Collins and Evans' notion

that extrinsic politics is frowned upon in research science). Tables 3 and 4 present

selected examples pertaining to the peer review issue.

Table 3 Disposal supporters attack the EIS for lack of independent peer-review

The Supporters
"We conclude that the AECL documentation of the research that has been done is excellent . . . [However] . . . Some of the material is based on papers in peer-reviewed journals, some of the work done by AECL has been submitted to peer-review, but much is in the grey literature of AECL reports. We recommend that as much material as possible be submitted for peer review . . . [Nevertheless, we recognize that it] . . . is difficult for regulated groups, such as the AECL, or government agencies to carry out fair and impartial studies and to nurture interdisciplinary and peer-reviewed scientific studies for many reasons. Most other countries have a completely separate group to handle waste disposal."[18]
The "presentation of the Impact Statement is glib, in some respects. There is a tone of 'we are right, believe us . . . [I]t was not clear to what extent the research and studies of the proponents have been vetted by independent expertise. In order to have consensus and support of the 'public', it would seem to be important to have independent judgments on important issues, and these expert opinions should be fully documented. When looking through the list of references, it would appear that much of the supporting research and studies are in publications of the proponents or their contractors, and so still matters of interpretation by them."[19]
We "cannot support the EIS in its present form, nor the implementation of the disposal concept based on its documentation in the EIS."[20]

Table 4 Disposal critics attack the EIS for lack of independent peer-review

The Critics
"To an overwhelming degree, the references given consist of internal AECL documents . . . The implications of this are that internal documents and conference submissions are not refereed, and/or have not been subjected to anonymous peer reviews prior to publication. They are subject to internal biases, however innocent and/or sub-conscious they may be."[21]
"The EIS relies exclusively on documents produced by AECL as references. A majority of the documents cited in the EIS are AECL produced. How many of these documents have been submitted to proper peer review – that is, to a scientific assessment conducted by persons who do not derive income from AECL related activities?" The EIS "should include critiques of the concept from independent

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[18] Canadian Geoscience Council, *PC*, Pub. TEC. 002, 28-29.

[19] Royal Society of Canada, *PC*, Pub. TEC. 003, 1.

[20] Environment Canada, *PC*, Pub. GOV. 003, iii. Though Environment Canada recommended moving forward, on the grounds that evidence could be improved.

[21] Phyllis Robbins, *PC*, Pub. 010, 2-3.

[22] Campaign for Nuclear Phaseout, *PC*, Pub. 027, 36.

scientific sources." [22]
" . . . it is inadequate for the proponent to simply cite its own (i.e. AECL) documents on the social and economic impacts of the facility. There is a definite need on its part to do an in-depth review of the independent literature on those subjects." [23]
"AECL is very careful in not presenting the opponents case." [24]
"This method of circular argument and relying on technical and scientific studies which are not subject to peer review does little to inspire confidence in the accuracy of the claims."[25]
"Generally, many of the references reports appear to be published by AECL itself . . . [A revised EIS should include] only peer reviewed reports . . . to substantiate any assumptions or conclusions." [26]
"I detect a certain bias in this EIS, in that any studies that do not support its authors' theory that radioactive and toxic materials will remain safely buried and out of harms way are not cited." [27]
"AECL relies on and uses as references their own in-house documents, which have not been refereed or peer reviewed, or at least there is no distinction between those that have been and those which have not." The supporting documents have a narrow range and serve "more as scientific posture than as sources of a substantive basis for the proposal." [28]
"Throughout the main AECL document and the R-documents, a large percentage of the citations are to internal AECL documents or other industry documents which are not readily available in libraries, and which have not been subjected to the independent scientific review process typically associated with articles published in refereed scientific journals." [29]

What such a shared critique illuminates is that critics and supporters alike were implicitly claiming there was *too much* backstage activity.

As a front stage public performance the narrative of the EIS appeared to bring the backstage activity to light, but in fact the rhetoric of expert judgment served to conceal from view the backstage activity. Yet it was that backstage activity that informed AECL's experience-based judgments, and it was such judgments that constituted the front stage personae. When critics and supporters alike referred to the degree of backstage activity, or the degree of in-house documentation that had not been clearly peer-reviewed by independent sources, they were attacking the boundary that the rhetoric of expert judgment attempted to erect. Who did the studies? How were they done? Were they credible studies? Are they appropriate pieces of information on which to rest policy

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[23] Concerned Citizens of Renfrew County, *PC*, Pub. 031, 3.
[24] Ecosystem Approach Group – P. Boldrini, *PC*, Pub. 033, 2.
[25] Concerned Citizens of Manitoba, *PC,* Pub. 034, 2.
[26] Nuclear Awareness Project, *PC*, Pub. 035, 5-6.
[27] Maisie Shiell, *PC*, Pub. 039, 3.
[28] Northwatch, *PC*, Pub. 046, 3-4.
[29] Canadian Coalition for Nuclear Responsibility, *PC*, Pub. 049, 10.

decisions? Why were so many not brought before the trials of the peer-review system? These are all questions about the conditions of production. Simply critiquing the amount of backstage activity does not directly answer these questions, but it does signal a call to open up the backstage to critical scrutiny. Questioning the narrative of the EIS and its rhetoric of expert judgment thus takes the skeptic back to the conditions of production. For supporters of the EIS, endorsing the EIS backstages the conditions of production. Even if minor or major revisions are called for the implicit answer is that the conditions of production are sufficiently credible to warrant the EIS being labeled adequate. For the critic, being shielded from the backstage conditions of production is grounds for distrust and rejection. For the supporter that same shielding is unfortunate, glib, bad public relations, and possibly even understandable in AECL's situation (as a regulated, or tasked group, lacking unlimited freedom) – but not grounds for labeling the EIS inadequate or incomplete.

The concealed backstage thus became an issue in itself. The more AECL attempted to control information flow, the louder critics called for a transparent process. Respondents took the absence of any display of conflicting judgments as showing that AECL was concealing uncertainties and differences. Left to reconstruct possible backstage activity, criticisms of the EIS focused on the credibility of the expert judgments themselves. Table 5 depicts three 'species' of specific criticisms of the EIS (with representative examples).

Table 5 Species of Criticism

Misrepresentation	Concealment	Unreliability
1. An NGO-critic discussed R-Public claims to the effect that survey data supported the AECL belief that residents close by a proposed repository would be accepting of the repository. The counter-claim was that, upon inspection of the cited documents, the survey data showed just the opposite relation.[30] **2.** A submission representing several large First Nations (FN) groups claimed the EIS literature review regarding FN issues was doubly deficient: while appearing to address FN issues, it in fact treated FN's as obstacles and, because of a lack of direct consultation, passed over the oral culture of FN's. [31]	**1.** A Public Interest Group critic points to an ambiguity in AECL's definition of 'nuclear fuel waste' (NFW) to suggest political options for reprocessing (Rp) spent fuel are being smuggled into the disposal concept. An earlier AECL author is cited to the effect that NFW is fission products from fuel burns, plus small amounts of Pu and U. The EIS definition refers to the fact that Rp is not done or planned in Canada, but if it were then NFW would be solidified. The EIS then defines NFW as either used fuel or solidified waste (that is, *both*). The critic thus claims the definition of NFW leaves room for Rp, and thus conceals political intent.[32]	**1.** The SRG argued the post-closure reference study by AECL was unreliable: it was site specific and thus too narrow to support claims about a generic concept; the geosphere models were based on a potentially unrepresentative area; the BIOTRAC models for the biosphere study were unrealistic; the GEONET model for vault analysis did not factor in likely changes; relevant experts are not identified.[33] **2.** Most NGO critics advanced similar claims, but also made more general unreliability claims: AECL and Ontario Hydro could not be trusted, they were biased; financial incentives rendered their expertise suspicious.

The species of criticism identified as 'unreliability' is a prime example of common ground between critic and supporter of the EIS.

A specific unreliability claim concerned risk analysis and risk characterization found in the EIS. The SRG claimed the EIS risk characterization "does not demonstrate compliance" to AECB guidelines (SRG 1995a, 14). The anti-nuclear group Energy Probe made precisely the same criticism.[34] More significantly, the specific criticism is the same: both the SRG and Energy Probe criticize the SYVAC3-CC3 computer-modeling program used in the risk analysis. Specific shared criticisms were: the model only generates results concerning individual doses and not risk on the basis of total population;

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[30] Canadian Coalition for Nuclear Responsibility, *PC*, Pub. 049, 16.
[31] Andrew J. Orkin, on behalf of Federation of Saskatchewan Indian Nations (FSIN), The Assembly of Manitoba Chiefs, The Assembly of First Nations of Quebec and Labrador, and The Grand Council of the Crees (of Quebec), *PC*, Pub. 044, *passim.*
[32] Ecosystem Approach Group – P. Boldrini, *PC*, Pub. 033, 9.
[33] SRG (1995a).
[34] Energy Probe, *PC*, Pub. 014, 4.

the model data is limited because it is drawn from site specific results (Manitoba); parameter values in the model are arbitrary and inflexible; too much emphasis in the post-closure reference study is placed upon computer modeling.[35]

A second (specific) unreliability claim concerned the modeling work done to understand the geosphere and biosphere. The SRG is explicit in its distaste for the GEONET and BIOTRAC models used by AECL in its post-closure assessment study. In the formal context of its October 1995 Report, the SRG argues that these computer models are flawed because they are site specific, because they assume invariant flow paths (of microorganisms and radioactive contaminants), and because BIOTRAC in particular ignores microbial activity. Moreover, these models under-estimate significant scenarios and do not explore possible human activity and climate change (SRG 1995a, 60-69). In the more informal November 1995 verbal presentations to the Seaborn Panel (prior to the commencement of public hearings), SRG members were more forthright. Here we find the BIOTRAC model labeled a "house that jack built" kind of model,[36] while the use of the inadequate SYVAC model was suggested to be a function of a "managerial decision" to develop SYVAC as a source of revenue for AECL.[37] In similar fashion NGO critics argued that the AECL models failed to use "plausible data",[38] and that "so many camels are being swallowed in one mouthful that the credibility of the entire exercise is called into question."[39] The BIOTRAC model, argued another NGO critic, is deficient for precisely the same reasons offered by the SRG: it ignores microbial

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[35] SRG (1995a, 80-81); Energy Probe, *PC*, Pub. 014, 3-7.
[36] Dr. Stella Swanson (SRG), *NT*, 34.
[37] Dr. Schlomo Neuman (SRG), *NT*, 112-113.
[38] Energy Probe, *PC*, Pub. 014, 8.
[39] Canadian Coalition for Nuclear Responsibility, *PC*, Pub. 049, 40.

activity and human interaction with the biosphere, contains arbitrary assumptions, and is

site specific.[40]

With so much of the backstage absent from view, critics and supporters alike

outlined general unreliability claims as well. Prominent anti-nuclear groups consistently

signaled AECL out as especially untrustworthy and lacking in credibility. As one

succinctly stated:

> One needs only look at the trail of bribery, secret deals, circumvention of
> safeguards, human rights abuses, and other questionable AECL behaviour
> in its export business to question whether its hands are the ones in which
> we want to be placing the safety of Canada's present and future
> generations.[41]

Yet the SRG also found its lack of insight into the backstage of EIS production troubling:

> Expert judgment obviously played a major role in AECL's scenario
> analysis, yet the experts used to develop the initial list of factors and the
> screening arguments were not identified, nor were their qualifications
> given. Moreover, SRG notes that non-expert stakeholders are not
> mentioned as part of the group that initially developed and then screened
> factors (SRG 1995a, 13).

Here the SRG alluded to the same criticism as groups such as Energy Probe and the

Canadian Council for Nuclear Responsibility. Not only was it perceived that the EIS

ignored the panel guidelines to both involve and address a broad set of interested parties,

but one consequence of this omission was that 'publicly dreaded events' were not

seriously discussed.

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[40] Ecosystem Approach Group – P. Boldrini, *PC*, Pub. 033, *passim*.
[41] National Action Committee on the Status of Women – Environment Committee, *PC*, Pub. 026, 18.

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From the SRG perspective, deliberately excluding consideration of the worst possible case was to commit a methodological error: "they have not worked the problem backwards".[42] NGO critics went further, suggesting the omission implied "AECL seems overly fearful of analyzing scenarios in which something really bad goes wrong."[43] Despite common ground in their critique of the EIS handling of significant scenarios, supporter and critic end up in different places. The SRG finding of 'adequate' suggested the intrinsic politics evident in the EIS were not damaging to the whole project, whereas NGOs suggested intrinsic politics undermined both the veracity and the reliability of the EIS claims. The intrinsic politics at issue (discussed more below) centred on whether uncertainty and ignorance at this particular stage in the inquiry process was reason to stall the disposal project. What can help explain the divergence of opinion about that intrinsic politics was that critics were not quite in the same social world as their technical and bureaucratic adversaries, which in this case included the SRG judgment (because it was at variance with theirs on the topic of adequacy). The public felt the EIS was not addressed to *them*, as the Seaborn panel guidelines had partly requested; hence they felt excluded. The EIS clearly addressed technical and bureaucratic groups by conforming to AECB guidelines and outlining an engineering feasibility study. Quite simply, the EIS was adequate by the implicit working standards of the groups it actually addressed, but would have looked inadequate to those both not sharing those standards and expecting other standards to have been operative.

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[42] Dr. David Duquette (SRG), *NT*, 155.
[43] Canadian Coalition for Nuclear Responsibility, *PC*, Pub. 049, 41.

4.6 Backstage: Before the EIS

In Hilgartner's terms, science advice as 'drama' means that a dialectic of concealment and revelation characterizes performative acts. To know the intended audience one also has to go backstage to view the conditions of production, for what goes on backstage influences the front stage performance.

Some general assumptions about the backstage activity that generated the EIS include the fact that differences of opinion, and negotiations about interpreting results, would have been standard. Degrees of differences in interpretation are routine aspects of science across all contexts: from esoteric debates (Collins 1985), to highly controversial and politicized areas (Scott, Richards and Martin 1990), and whether or not informal (Picart 1994) or more formal contexts are involved (Law and Williams 1982). Nevertheless the EIS adopts (reveals) a unified voice and avoids presenting (conceals) dissenting opinions (contrary to Panel guidelines). Such backstage detail is carefully eliminated from the front stage performance. AECL were not alone in this, for the SRG also utilized a univocal voice in the formal context of its Report and subsequent Addendum. Yet that unity dissolved in its informal testimony before the Seaborn Panel (1 November 1995), and in doing so SRG members offered an explanation for AECL's univocal performance. Thus when an SRG member indicated the SRG envisioned a century-long time scale for a disposal operation, a Panel member responded that 'the public' was concerned, not about technology (which could change), but the time-scale.[44] Seaborn later pursued this theme, asking which criticisms the SRG thought AECL could

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[44] Dennis Brown (Seaborn panel), responding to Dr. Ray Price (SRG), *NT*, 100-101.

respond to within a relatively brief period of time. An SRG member responded to the

broader question of consensus opinion by stating that

> I agree that we do not have a well developed consensus within the SRG
> regarding the questions that you have posed. And so when we speak we
> are speaking as individuals and not as a team as we were when we
> presented our report . . . The generic system seems feasible, but the
> postclosure performance assessment is not reliable.[45]

Other SRG members made clear how that unreliability might be linked to AECL's

univocal voice. An SRG member suggested his own experience confirmed that "expert

opinion is sometimes coloured by whom you work for and where you come from," and

thus AECL needed to "completely rethink their uncertainty analysis".[46] The implication

was clearly that an AECL affiliation had skewed the uncertainty analysis. As political

theorists have long noted, "organization is the mobilization of bias" (Schattschneider

1960, 71).

As discussed in Chapter 3, AECL's organizational experience consisted of

operating within an insular policy environment. By the time of the public inquiry

Canadian anti-nuclear groups had come to regard this insularity as resulting in a lack of

accountability to broader citizen goals and environmental integrity, and active hostility to

citizen participation (Mehta 2001, 2003). Indeed AECL had supported a narrowly framed

public inquiry, with energy policy and implementing agency excluded from discussion

(Kuhn 1997, Murphy and Kuhn 2001), even if the broader explanation for that narrow

framing also involved federal-Ontario reluctance to direct intervene in energy policy (see

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[45] Dr. Ray Price (SRG), responding to Blair Seaborn (Panel Chair), *NT*, 105-107.
[46] Dr Shlomo Neuman (SRG), *NT*, 132-35.

Chapter 3). This preference for a narrow review and limited audience meant the EIS was

an *apparatchik*; a formidable technical agent of Canada's politically insular nuclear

policy community. Yet this does not mean that AECL did not seek to address the public

per se. Indeed the front stage performance of the EIS must be seen in light of backstage

acknowledgements that consultation with the public was a political reality. The backstage

is thus not exhausted by technical negotiations, differences of interpretation, or a history

of insular policy making.

The contentious process of setting the terms of reference for the public inquiry

had presented AECL with a number of tensions to resolve. These tensions meant AECL

had to creatively adapt. The tensions involved a public audience demanding broad public

participation and wide-ranging discussion, and a regulatory audience *both* technocratic

(AECB) *and* desiring of discussing alternatives and social issues (Environment Canada,

the Government of Ontario). With its own interest in restricting the scope of discussion,

AECL had to balance these tensions in order to stage a successful EIS performance.

4.7 Backstage: Following Guidelines

AECL resolved these tensions by following the guidelines, not of the Panel, but of the

AECB. NGO critics argued that AECL approached Panel guidelines as obstacles to be

overcome rather than points of serious dialogue, that AECL treated social and ethical

aspects as mere irrationalities, and that AECL displayed indifference to public

involvement. First Nations groups (with the exception of the Meadow Lake Tribal

Council) claimed AECL had ignored their concerns entirely. All respondents argued that

discussion of alternatives to geological disposal was cursory and that documentation

concerning dissenting opinions was absent. Yet the EIS *does* follow the guidelines of the

AECB regulatory policy document on deep geological disposal of nuclear fuel waste,

known as R-71 (AECB 1985).

NGO critics emphasized this relationship in various degrees of specificity. Energy

Probe described the EIS as conforming to the "self-regulatory" approach of the AECB.[47]

The Campaign for Nuclear Phaseout argued that the "current AECL 'EIS' is an

engineering feasibility study [with] origins as an engineering document [R-71]".[48]

Northwatch bluntly argued the "indifference to public aspects of the review" and

"scientific posturing" of the EIS was directly related to its origins as a technical

document (the R-71).[49] What is R-71? Released in January 1985, R-71 addressed the

scope and schedule of a concept assessment phase for disposing of high-level nuclear

waste, and outlined what form a concept assessment document (CAD) should take. In R-

71, geological disposal is indicated to be the preferred option and a thorough public

scrutiny is envisioned. The overview notes the core issues: engineered and natural

barriers to isolate wastes, a generic concept assessment with no mention of a specific site,

and long-term evaluation based upon predictive modeling with only a broad range of

potential site variables provided. Acceptability was defined in the following way:

> If Concept Assessment does demonstrate the likelihood that deep disposal
> in a pluton can satisfy the technical requirements for health, safety,
> security and environmental protection, the AECB will consider this
> concept to be acceptable. The concept of disposal in plutonic rock will be

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[47] Energy Probe, *PC*, Pub. 014, 1.
[48] Campaign for Nuclear Phaseout, *PC*, Pub. 027, 11.
[49] Northwatch, *PC*, Pub. 046, 3.

judged on its own merits without reference to other options (AECB 1985, 6).

AECL's battle to keep "alternatives" out of the concept assessment phase (cf. Murphy and Kuhn 2001) can be seen in the context of the AECB's policy directive that deep geological disposal would be judged in isolation of considering other options.

The AECB criterion concentrates on technical requirements, implying both the secondary nature of social requirements and their unambiguous separation. Critic's contention that social aspects were neglected can thus be traced back to this policy context, and is indicated by the way R-71 addressed social aspects:

> Since the disposal of nuclear fuel waste raises social and economic questions as well as those of a technical nature, the AECB will endeavour to ensure that, concurrently with the technical review, the social and economic issues are also given due consideration (AECB, 1985, 6).

If critics are correct that the AECL EIS derived its form and character from the AECB R-71, one means to test this contention is to explore what 'due consideration' (of social and economic aspects) meant in the context of R-71.

The AECB R-71 outlines two kinds of requirements for a CAD: those that apply to the disposal concept itself (section 2.2), and those that apply to the assessment and documentation of the concept (section 2.3). In section 2.2, the AECB outlines pre-closure and post-closure periods, indicates its preference for predictive modeling assessments of the post-closure study, and emphasizes that a design for the repository should avoid dependence on human intervention or maintenance. The AECB also requested (in section

2.3): a separation of the subject into its constituent parts, an acknowledgement of limitations in data, clear arguments linking models to reality, an establishment of technical feasibility, the provision of dose calculations for members of the public, an analysis of human intrusion scenarios and environmental impacts, a quality assurance program, and an evaluation of both existing and future technology. The penultimate requirement listed "generic issues pertaining to socio-economic impacts," (14) such as public perception of risk, availability of resources to do the job, transportation, the skill base available, job creation, community services and the effect on property values. The final section was the most specific, listing twelve points concerning predictive modeling that ought to be addressed (14-15). R-71 thus emphasized social and economic *impacts*, as opposed to Panel guidelines to explore social and economic issues as *setting* criteria. The R-71 assumes a technical presentation is appropriate, whereas Panel guidelines demand technical presentations be couched in a fashion accessible to a broad audience. The EIS also conforms to the R-71 outline of a CAD. The EIS is divided into pre- and post-closure studies, it relies heavily upon predictive modeling, and it emphasizes technical feasibility as the criterion of success.

The backstage activity that went into the production of the AECL EIS thus included a residual commitment to the notion of a narrow technical review. Critiques of the lack of independent review and the rhetoric of expert judgment were shared by those claiming the EIS was inadequate or adequate, while misrepresentation, concealment, and unreliability claims were also common. A policy origin-point (the AECB R-71) also strongly suggests a technocratic focus structured the front stage performance of the EIS.

4.8 Discussion

This chapter has shown that early assessments of AECL's nuclear waste disposal concept witnessed both critics and supporters finding similar deficiencies but drawing different conclusions about adequacy. This suggests the inadequacy of postulating context-independent strategies for establishing and/or disputing credibility. Rather, how particular dualisms, boundaries, strategies and rhetoric are deployed vary by context. Symbolic resources for making credibility-claims must be seen as available to be discursively drawn upon according to the goals of the particular disputing party. This is not a feature of credibility contests peculiar to Canada's nuclear waste disposal debates, but is evident across a diverse span of public inquiry forums. Thus strategies to attain/undermine credibility have been shown to vary according to the cultural identities of speakers, audiences, and the content of their communication (Downey 1988). Expert uncertainty can be used strategically, according to the social circumstances of organizations (Campbell 1985). The effort to secure impartiality can vary according to the situational success of separating facts and values, and with specific features of the adversarial context itself (Yearley 1992). Even method discourses have been shown to be capable of supporting different uses, according to the specific conclusions of studies (Mercer 2002). This flexibility of cultural resources can be deleted from view if the boundary-crossing and boundary-maintenance of inquiry participants is not kept firmly in view.

The sensibility Wynne and Jasanoff bring to expert-public disputes is skeptical about *analyst* boundaries, such as that between science and politics, not *simply* because participants draw such boundaries whereas the analysts should not engage in the same

kind of social work as those under study. Rather, the sensibility at work is better presented as saying attention to boundary activities reveals where power relations in society get made and unmade. Demarcations between science and politics are one such site but, given the epistemic and sociological advantages that cleave to expert institutions (especially when supported by bureaucratic elites), typical demarcations between science and politics sustain existing hierarchies in which science is often immunized against social critique. Wynne thus notes this hierarchy maintenance is often performed by a policy discourse that constructs the public as only concerned with risk and consequences rather than a plurality of meanings tied up with the purposes of knowledge (Wynne 2002). I suggest *rejection* of such hierarchy maintenance characterized the disposal critics in their initial assessment of the EIS. Maintaining the dominance of expert institutions was implicit in the lenient approach to EIS deficiencies taken by, for instance, the SRG. Even if the SRG used the contingent repertoire to bring into doubt the objectivity of AECL choices (such as regards the use of SYVAC), by and large the SRG critique extended to methodological and professional grounds only. Other technical and government groups stopped at a similar point. Professional and methodological politics was found, in other words, but the politics was considered *intrinsic* to inquiry and thus constructed as not reason to declare inadequacy.

By contrast, note that finding *extrinsic* politics, such as AECL's vested interest in the SYVAC computer model, meant the SRG found that *particular* assessment system inadequate. NGO and other public critics of the EIS, those who held reservations and who found the EIS *inadequate*, questioned the leniency with regard to intrinsic (methodological and professional, in this case) politics. Whereas Collins and Evans'

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(quasi-Mertonian) defense of expertise relies upon a notion of intrinsic politics as relatively harmless, because of its imputed goal of getting it right (Collins and Evans 2002, 244-46 and 286; 2007, 116-17 and 123-26; Evans and Plows 2007, 834-35), critics at this stage found values *other* than epistemic in the assessment process. Note here that Collins and Evans argue one reason the public can be excluded is because they are not playing the same language game as Western science when they make appeals to *extrinsic* politics in technical assessment (Collins and Evans 2003, 439-41). Yet in this case critics did not need recourse to appeals to extrinsic politics to make their point. Nor did critics simply say extrinsic politics was too well represented in technical assessment, that it was an external standard guiding judgment. Again, for Collins and Evans the presence (or appeal to) such extrinsic politics would not challenge their notion of intrinsic politics as harmless, for it would just transform this particular case into a case of 'too much politics' (which they do not endorse, and claim neither does the Western science form-of-life). What critics *did* say was that the intrinsic politics included within it, as part of its very 'internal' constitution, a degree of optimism about the future they found both troubling and misplaced. The issue was not necessarily about whether, in the future, AECL would get it right. The issue was about what to do in the face of uncertainty and ignorance. Critics constructed policy relevant science, not necessarily as infallible and complete,[50] but as requiring higher degrees of solved problems and more thought about alternative solutions than contained in the EIS.

In Wynne and Jasanoff's terms, a slippage between research judgments and public meaning was *enacted* by the political act of finding the EIS adequate. 'Adequacy' superimposed what researchers and bureaucrats thought was feasible over what public

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[50] Indeed, as I note in Chapter 5, critics held diverse 'philosophies' of science.

critics thought should be a broader social decision about how to 'go on' (a civic epistemology). What this initial review of the EIS suggests is that the domain of small-p politics, politics *intrinsic* to expertise, is *larger* than that allowed by either routine demarcations between science and politics (the 'science is value-neutral' claim Collins and Evans rightly reject) or the historically and sociologically informed demarcation Collins and Evans utilize. Collins and Evans tap into a widespread sentiment that it would be a mistake to give up on the normative point that there *should* be a distinction between science and politics and, while they may very well be correct, this does not thereby save an inadequate picture of what that 'lightly political' expertise might actually entail. The initial review of the EIS thus established that, for critics, the issue was not just divergence over perceptions of extrinsic politics – such as commitments to nuclear expansion. Collins and Evans (2007, 123-24) represent such levels of conflict as life-style divergence (nuclear energy *versus* 'soft' energy, for instance). Yet critics were also concerned about the specific commitments they perceived to be inherent to nuclear experts and their bureaucratic supporters. They rejected the 'lightly political' expertise because of the specific commitments they regarded as intrinsic to it and thus inseparable from it. As one critic noted, in referring to AECL documentation, "[t]hey are subject to internal biases, however innocent and/or sub-conscious they may be".[51]   Whether science and politics *should* be separate is a valid question, but here critics wanted independent assessment because they wanted to ensure the accountability of assessment practices to (what Jasanoff would call) a civic epistemology.

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[51] Phyllis Robbins, *PC*, Pub. 010, 2-3.

Chapter 5

Political Matters

5.1. Introduction: Framing Inadequacies

Chapter 5 focuses on Phase 1 of the public inquiry, held 11 March 1996 to 3 May 1996, in five

separate locations across Ontario (eight sessions in Toronto, two each in Pickering and Chalk

River, and one each in Sudbury and Thunder Bay). As Blair Seaborn clarified on the first day of

hearings, Phase 1 focused on

> ...broad societal and ethical issues relating to the long-term management of
> nuclear fuel waste regardless of what system of management may eventually be
> decided upon. It would also focus on the criteria by which safety and
> acceptability should be evaluated.[1]

What would become contentious in Phase 1 was not what was included *within* the mandate of the

inquiry, but what was deemed *outside* the scope of the panel. Excluded from discussion were:

> The energy policies of Canada and the provinces; the role of nuclear energy
> within these policies, including the construction, operation and safety of new
> or existing nuclear power plants; fuel reprocessing as an energy policy; and
> military applications of nuclear technology (CEAA 1998, Appendix A).

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[1] Blair Seaborn (Panel chair), 11 March 1996, *Hearings Transcripts* [Vol. 1], 7. This chapter draws upon verbal testimony to the Seaborn panel. To facilitate the identification of individual identity, group affiliation, and source of evidence, in this chapter I use footnotes of the following form. Direct verbal testimony, as found in the hearings transcripts (CEAA 1997), is cited as: Name (group affiliation), date of testimony, *Hearings Transcripts* (abbreviated as *HT*) [Volume number], page number(s).

In this chapter I argue this restriction on the scope of political deliberation reinforced the pre-existing institutional influence of technical and policy elites and exacerbated already strained relations of trust. I suggest that the Phase 1 discussions revealed contrasting social realities of trust and control. This implies more than the common observation that opposed groups did not trust each other and that some groups were able to exercise more influence than others. In addition to these social realities, I show that invoking the untrustworthiness of 'the other' also constructed and subsequently prescribed the character of that 'other'. These constructed 'others' were carried over into opinions about who would constitute future decision-making communities, and thus historically-based assessments were made about degrees of control that would be available to present 'interested participants'. Different assessments about future involvement in the policy process also influenced what different groups wished to see occur, based upon their judgments of trust. In general terms, established policy actors were more confident of future involvement, and could thus be content with marginalizing specific *arguments* of their critics. By contrast, NGOs and other public critics were less confident of their involvement in future decision-making, and thus were more concerned to marginalize both specific policy and their arguments.

These findings confirm Wynne's general thesis about the causes of public disaffection. Wynne argued that two pernicious 'framing' assumptions can bedevil deliberative practices (Wynne 2005, 66-69). The first is an assumption that public groups are more concerned about downstream risks and impacts rather than upstream issues such as the human purposes driving research and policy. Phase 1 showed that critics distrusted the policy intentions and past

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practices of disposal proponents. Where risk estimates were discussed, critics refused to evaluate the estimates independently of the groups providing them. The second assumption is that public meanings and issue definitions are often considered the domain of authoritative technical and policy institutions, rather than lay citizens. Phase 1 demonstrated this assumption by the way a narrow mandate procedurally weakened what could be deemed the meaning of the concept. Differences over the scope of the panel's mandate created divergent sets of discourses about the public meaning of the disposal concept itself. For Wynne it is a contingent matter how public inquiries will unfold, as they reside somewhere "between politics and administration" (1982, 53). This means public inquiries exhibit a tension between *negotiating* outcomes through a public inquiry and *implementing* already decided outcomes through a public inquiry. The question that arises from this tension is what might structure to which 'side' public inquiries lean?

For Wynne, inquiries lean more toward administration when the two above-mentioned assumptions prevail in inquiry planning and procedures. I extent these general points by suggesting public inquiries lean more toward administration to the extent general disaffection with the difficulties of access to political decision-making is combined with specific disappointment about the possibility of influencing substantive outcomes. I suggest this partly explains how public groups can feel betrayed and co-opted by deliberative mechanisms of governance. Moreover, based upon the Phase 1 disputes, the level of control exerted over discourse itself ought to be taken very seriously when assessing public inquiries. This has general implications beyond the specific case considered here. In discussions of modernity and deliberative democracy, public inquiries are often considered access points. The public is claimed to have high expectations that such access points can facilitate genuine citizen

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involvement in decisions about public policy. Beck's risk society thesis thus includes the

expectation that particular access points will enable the "the soft--orientations, hopes, ideas, and

people's interests" to triumph over the "hard--the organizations, the established, the powerful,

and the armed" (Beck 1992a, 117). Giddens (1990) similarly argues that public inquiries are

places of potential vulnerability for power holders. For Giddens the global and abstract social

relations and systems of modernity act to dis-embed, or remove from local control, techniques

and practices. Public inquiries re-embed (pin down to local conditions of time or place)

techniques and practices, usually via 'facework' (the open management of trust relations), and

thus re-assert local control. Deliberative democracy theorists, following Habermas, provide a

normative grounding for such faith in public inquiries. Thus Habermas insisted "real argument

makes moral insight possible" (1990, 15),[2] while Urbinati claimed that "thanks to deliberation,

the common good can be seen as a cooperative conception of the whole community" (2000,

765).

Nevertheless the disputes of Phase 1 suggest public inquiries can act as vehicles to

disenfranchise the public, to the extent of control over discourses. Habermas himself saw a

possible failure in deliberative democracy to be any practice that involves limiting public

dialogue about democratically sensitive issues through exclusion from discussion or imposition

of interpretation. Habermas referred to such failures as performative contradictions, a concept

pointing to ways of interacting with others that are similar to making promises with your fingers

crossed behind your back (Habermas 1973, 1990). Wynne falls into the same normative tradition

as Habermas. Just as Habermas called for an interrogation of the lifeworld, defined as "a

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[2] On Habermas' commitment to actual deliberation as the cornerstone of deliberative democracy, see Habermas (1990: 15, 66-67, 94, 211; 1996: 147, 151, 450).

storehouse of unquestioned cultural givens" (1990, 135), Wynne calls for "public reflexivity

about received issue-definitions" and the "tacit contextual commitments and assumptions" of the

contemporary "cultural fabric" (Wynne 1998, 339). A focus on power relations *within* access

points is thus suggested by this normative tradition, and here we find those such as Bourdieu

who are more sceptical about public inquiries. Bourdieu (1991) views access points as spatial

projections of the political field, and more broadly as theatricalized representations of social

structure. Discourses thus become instruments of action and power, so that exchanges of

discourse can be viewed as actualizing power relations between groups. Public inquiries can thus

become sites where effective policy change by lay citizens is implicitly curtailed. This chapter

supports this critical normative tradition by showing that control over discourses helped

immunize distinct political-economic interests from detailed scrutiny.

5.2 The Seaborn Panel's Terms of Reference

As noted in Chapter 3, during the 1970s AECL and Ontario Hydro had directly connected the

fate of nuclear power to solving the nuclear waste disposal problem. The EMR-funded Hare

report had made prominent the claim that ensuring the viability of nuclear power meant solving

the waste disposal problem (Aiken 1977, 1). The Porter report (1978, xiii and 95), in

recommending a moratorium on nuclear power pending a solution to the waste disposal problem,

also implicitly connected the two. Nevertheless siting assessments 1978-81 were halted, in part,

because of this connection. Thus an Ontario parliamentary inquiry of 1980 identified this vested

interest as seriously impacting upon AECL and Ontario Hydro's credibility with potential local

hosts of a repository (Select Committee on Ontario Hydro Affairs 1980). The halt to siting

assessments in 1981 separated the disposal concept from a site, but not from the fate of nuclear

power. EMR still connected the two in 1982 (EMR 1982, 1), as did a federal parliamentary

report of 1988 (Brisco 1988). The Government response to Brisco (1988) reiterated that nuclear

power still had a place in Canada's energy mix and that waste disposal was part of ensuring that

future (EMR 1988a, 15). Hence as late as 1988 solutions to waste disposal could still be publicly

advertised as moves in support of nuclear power.

Nevertheless, as discussed in Chapter 3, provincial-federal Government reluctance to

commit to further nuclear expansion and a reluctance to intervene in energy policy contributed to

a narrow mandate. Indeed, EMR (1988a, 15) indicated the onerous energy policy implications of

any possible moratorium on nuclear power (as Brisco (1988, 37) had suggested) by citing

provincial dominion over energy sources, and the fact that moratoriums on energy options

pending public acceptance of clean-up practices would shut-down most waste producing

activities. This was simply too large an energy policy intervention for the federal (Mulroney)

Government to contemplate. Possible solutions to the nuclear waste disposal problem were only

separated from the fate of nuclear power by official act, with the terms of reference of the

Seaborn panel (in October 1989). The October 1989 final terms of reference directed the panel to

review the "safety and acceptability" of AECL's deep geological disposal concept, to examine

"various approaches" to nuclear waste management, the "criteria by which safety and

acceptability . . . should be evaluated", and to consider the "social, economic, and environmental

implications" of a waste management facility (CEAA 1998, 84).[3] AECL had in fact pushed for

this narrow mandate, so it is accurate to say the official act did not clash with their vested

interests. Public dissatisfaction with this narrow mandate was evident immediately, with 1990-91

scoping hearings and workshops witnessing much public outcry about the perceived limited

scope (FEARO 1990a, 1990b; Wiles 1994; Kuhn 1997).

The fact the mandate could be represented as just what AECL wished would haunt the

inquiry, especially because it became clear quite early in proceedings that a promised parallel

inquiry into nuclear power (Murphy and Kuhn 2001, 262) was not going to materialize. While

such boundary drawing and promise-breaking hardly fits the ideals of deliberative democracy, it

remains the case that different actors treat such actions differently: inquiries can represent a

means to hold decision-makers accountable for such acts, or to claim such acts are virtuous. For

some nuclear industry insiders, *violations* of these previously set boundaries on discussion

during the public hearings constituted the true antithesis of democracy. Thus J. A. L. Robertson,

a long-time AECL employee and well-known 'nuclear warrior' in Canada, critiqued the hearings

process for not excluding verbal and written presentations that strayed outside the panel mandate

(Robertson 1998). For most critics, including Gordon Edwards (founder of Canadian Council for

Nuclear Responsibility), the restriction on the scope of the mandate meant there was an

illegitimate stifling of debate about energy options and an implicit endorsement of the continued

production of irradiated nuclear fuel (Edwards 2005, 20). What I show below is that the mandate

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[3] The full mandate included: on-site storage and monitored, retrievable storage; transportation of waste; different geological media being considered by other countries; the general programs of other countries; how to evaluate the safety and acceptability of a disposal concept; comparisons to other forms of wastes and recycling; the ethical question of relieving future generations of the burden of looking after wastes; the social, economic and environmental issues involved with a possible facility; site selection criteria and compensation package guidelines. See CEAA (1998, 84-85).

operated during the hearings as an implicit mechanism to control and discipline the very

citizenry the participatory mechanism of the inquiry was meant to include.

5.3 Public Meanings

Natural Resources Canada (NRCan) opened the inquiry by providing the federal Government's

policy perspective on nuclear waste management, which was that "it is important that we start to

determine preferred positions on implementation issues and look at the implications."[4] One of

the first questioners asked what happened to the promised parallel review and whether NRCan

was considering a nuclear Phase out.[5] The position of NRCan was that provincial objections to

federal intrusions in provincial jurisdiction, and reservations about the usefulness of another

review, led to a 1991 decision to defer such a parallel review.[6]

Half-way through the first day of testimony an NGO delegate summed up the drift of

questioning, citing the abandoned promise and asking whether the mandate ought to be

intentionally broadened to discuss energy options, rather than accidentally so.[7] An effort was

being made to translate access into influence over a seemingly off-the-table discussion-topic.

Seaborn responded:

> . . . insofar as that parallel process, the one that was supposed to deal with the
> energy and the environment, the panel is unhappy as you are that the
> Governments have not seen fit to meet this earlier commitment.[8]

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[4] Dr. Peter Brown (NRCan), 11 March 1996, *HT* [Vol. 1], 30.
[5] Gordon Edwards (Canadian Council for Nuclear Responsibility), 11 March 1996, *HT* [Vol. 1], 36-37.
[6] Dr. Peter Brown (NRCan), 11 March 1996, *HT* [Vol. 1], 38-39.
[7] Brennain Lloyd (Northwatch), 11 March 1996, *HT* [Vol. 1], 225.
[8] Blair Seaborn (Panel Chair), 11 March 1996, *HT* [Vol. 1], 228.

Indeed Senator Lois Wilson, a commissioner on the Seaborn panel, had entered into her diary of the hearings process (on the day before the hearings began) that "...we [the panel] have been struggling with the mandate handed to us by the federal Government" (Wilson 2000, 11). The 'agenda talk' centring on the scope of the mandate, and what it meant, codified the broader public meanings within which many inquiry participants situated the disposal concept.

Dissatisfaction with the narrow mandate thus came to define Phase 1 of the public inquiry. This was exacerbated by NRCan confirming that the federal Government viewed a solution to the nuclear waste disposal problem as a prudent step in improving the fortunes of nuclear power. Although nuclear industry lobby groups and interest groups often made the connection explicit (see below), groups closer to the formal mechanisms of Government (AECL and Ontario Hydro) were far more circumspect. These latter groups largely remained content to sever any link between the disposal concept and discussions of the future of nuclear power, but clearly viewed such surgery as an important resource in combating opposition to *both* projects. Moreover, this attempt to limit what could be spoken of as legitimate connections to the waste disposal concept was simultaneously an attempt to limit the ability of others to bring into question broader public policy questions.

AECL had already established the form of this defence in its R-Public, which accompanied the EIS and addressed public involvement and social aspects (AECL 1994b). Although acknowledging a parallel inquiry into energy policy had been promised to the public, AECL made selective use of political analysis of public views on the nuclear waste disposal issue. AECL claimed opponents of nuclear power used opposition to waste disposal as a means

to Phase out nuclear power. Storage apparently kept radioactive waste a visible political burden.[9]

Nuclear insiders, such as Robertson, had used the written submissions process to inform the

Seaborn panel of their own colloquial versions of the R-Public accusation:

> Some of those opposing the disposal of nuclear wastes may be doing so as a
> tactic to oppose nuclear energy in general so that they can claim 'there is no
> solution to the waste problem.'[10]

For AECL the important point was to maintain the conceptual surgery, which they did by

dividing 'opinions' (the section in the R-Public within which the quote below appears) from

more factual concerns:

> The question of how widely nuclear power is utilized, or how provinces choose to
> generate electricity, is not something that can be answered by the waste disposal
> concept. The concept is designed only to provide a means for the safe disposal of
> the waste that has already been produced, continues to be produced, and may be
> produced in the future (AECL 1994b, 64).

In its EIS proper, AECL had carefully maintained the de-coupling of waste disposal from energy

policy, arguing that a solution to the waste disposal problem was an urgent need regardless of the

future of nuclear energy (AECL 1994a, 2). Ontario Hydro repeated this division in its day one

testimony, claiming nuclear expansion was a separate issue and that they would "live with the

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[9] AECL (1994b, 64) cites Blowers, Lowry and Solomon (1991) to this effect. This strikes me as selective, given that Blowers, Lowry and Solomon are mostly concerned to argue that policy makers "must engender real public participation and trust for nuclear waste disposal to ultimately succeed" (28).
[10] J. A. L. Robertson (Concerned Citizen), *Written Submissions for Phase 1* [Vol. 4], PHPUB.004, 8-9, in CEAA (1996).

outcome of the hearing"; indeed their *only* concern was "to manage the waste that we have in a safe, environmentally, socially acceptable and financially responsible way".[11]

Nevertheless, disposal concept supporters did not universally sustain this division between opinions and facts. Some collapsed the two by assuming opponents' assessments were biased by their opinions. Thus it was said the disposal concept possessed "good technical integrity", meaning those opposing it did so for "political reasons" that might ultimately compromise safety.[12] Others collapsed the two temporally, presupposing a time in which public opinion had given consent to nuclear development, after which only technical questions about implementation remained. Thus the AECB argued society had already made its choice to use nuclear energy, and this meant the present situation was best conceived of as factual inquiry about what to do rather than opinion-based debate about energy options.[13] Still others dispensed with subtle political de-couplings altogether. The Canadian Nuclear Society put a positive interpretation on the relation between nuclear waste and nuclear power:

> ...acceptance of the concept will ensure that there is a safe and technologically sound method of used fuel disposal. This will, in turn, permit Canada to continue to develop and utilize nuclear power as a safe, environmentally friendly, reliable, and cost-effective means of generating electricity, for the benefit of all Canadians.[14]

The Canadian Nuclear Workers Council embraced the vested interests in concept approval, linking its approval of the disposal concept to job creation within the industry and a greater

[11] Ken Nash (Ontario Hydro), 11 March 1996, *HT* [Vol. 1], 56-57.
[12] David Smith (The Canadian Academy of Engineering and the Royal Society of Canada), 25 March 1996, *HT* [Vol. 6], 129-130.
[13] Ken Bragg (AECB), 11 March 1996, *HT* [Vol. 1], 147.
[14] Jerry Cuttler (Canadian Nuclear Society), *WS* [Vol. 1], PHPUB.22, 3.

"confidence that the nuclear option is sustainable and environmentally beneficial."[15] In offering

the claim that "everyone benefits from nuclear energy" as an argument in favour of accepting the

waste disposal concept,[16] any pretense that nuclear energy policy was not being implicitly *made*

was thereby brought into doubt. Indeed, disproving the claims of critics that the nuclear industry

was always dishonest, the Canadian Nuclear Association (CNA) responded with a resounding

"yes" when critics asked if their support of the disposal concept related directly to their support

of the continuation of the nuclear energy option.[17] NRCan also implicitly linked nuclear waste to

nuclear power, claiming it was prudent public policy to plan for concept implementation because

the Government was committed to nuclear power.[18]

Thus while some disposal concept proponents linked solutions to the waste disposal

problem with furthering nuclear power, others sought to decouple them. Disposal concept critics

were far more uniform in always connecting the waste disposal concept to associated public

policy issues. In some cases this agenda talk seemed to toy with the indecision apparent within

disposal concept supporters. Concerns were thus expressed that potential commercial profit may

lead to Canada becoming a repository for foreign nuclear waste (a 'distant dump'). Despite

NRCan denying any plans to import foreign waste,[19] NGOs rather comically rebutted the denial.

A TV interview was cited, in which an AECL Vice President stated AECL regarded the retrieval

of foreign waste as a positive selling point for the export of reactor technology.[20] That critics

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[15] David Shier (President of the Canadian Nuclear Workers Council), 25 March 1996, *HT* [Vol. 6], 153.
[16] J. A. L. Robertson (Concerned Citizen), 2 May 1996, *HT* [Vol. 13], 112.
[17] Ian Wilson (CNA), 29 March 1996, in response to Brennain Lloyd (Northwatch), *HT* [Vol. 10], 60-63.
[18] Dr. Peter Brown (NRCan), 11 March 1996, *HT* [Vol. 1], 38-39.
[19] Dr. Peter Brown (NRCan), 12 March 1996, *HT* [Vol. 2], 9.
[20] Peter Prebble (Saskatchewan Environmental Society), 29 March 1996, *HT* [Vol. 10], 194-196; Dave Plummer and Ann Lindsay (Concerned Citizens of Manitoba), 29 April 1996, *HT* [Vol. 11], 37-41. AECL documents linking the export of reactors to the importation of the subsequent spent fuel were discussed in a *Globe and Mail* piece of 19th

were inclined to aggregate the nuclear industry together with the Government, treating them all as a single actor, was shown by the lack of sympathy shown to a CNA member's defense of the TV *faux pas*. This defense involved saying that sometimes representatives are put on the spot to give an opinion without knowing if that opinion is universally shared.[21] NGO's responded that this actually raised the question of whether bad corporations tainted their members.[22] The trustworthiness of stated intentions was also at issue in the distant dump connection. One participant thus noted the Government had reversed a commitment not to accept "imports" to the hazardous waste facility at Swan Hills (Alberta) after siting.[23]

Yet critics of the disposal concept did more than attempt to reveal hidden political preferences. Claims to have unearthed true motivations were made, but so too were claims that institutional laziness and inertia characterized nuclear public policy-making in general. Thus critics suggested the real meaning of the waste disposal concept was that any decision about a disposal concept might be taken as tacit approval for either the continuation of nuclear power or its expansion. This political framing of the issue was premised on a rejection of the political model implicit in the decoupling of nuclear waste disposal from the future of nuclear energy. The implied model of politics was long-ago derided by Habermas as 'decisionism' (Habermas 1973), which Wynne has defined as "a model in which policy and political processes are conceptualized exclusively as a series of completely unrelated specific decisions, each one of which has no interaction with any other" (Wynne 2003, 410). Here we see utility in observing the slippage

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February 1996. The TV interview appears to be a 15 January 1995 *W5* report by Susan Ormiston, on CTV. Ormiston interviewed David Bock, an AECL Vice President, and Bock argued the sale of reactors and uranium meant AECL had an obligation to take the subsequent waste back. Indeed, this was a positive selling point for the Canadian nuclear export trade.

[21] Ian Wilson (CNA), 29 March 1996, *HT* [Vol. 10], 205.

[22] Norm Rubin (Energy Probe), 29 March 1996, *HT* [Vol. 10], 211-12.

[23] Graham Latonas (Chem-Security Ltd., Alberta), 25 March 1996, *HT* [Vol. 6], 174.

between research science used as a resource and science as the default agent of public meaning. Recall that, for Collins and Evans (2002, 2007), boundaries are drawn around public involvement in decision-making in order to enable a political space within which science can function as a resource. Both Wynne (2003) and Jasanoff (2003a) replied that institutionalized science and the policy makers who draw upon it routinely colonize meanings *beyond* the context of research science. The boundaries Collins and Evans wish to erect, in order to secure a domain within which experts have legitimate authority to interpret the world, are thus routinely used as a resource to extend authority in one domain into authority in another. Clearly there are cases where this kind of slippage is routinely condoned and indeed encouraged (i.e.: 'this waste canister has been shown to crack under X conditions, therefore you should not use it where such conditions pertain'). For Collins and Evans the salient issue *for the institution of expertise* is to create political space within which just experts can be called upon to answer such kinds of questions (i.e.: will the canister crack or not). But for Wynne and Jasanoff the most salient issue *for democracy* is to guard against implicit, presumptive slippage. I suggest critics at the public inquiry were concerned about that very same democratic issue. Critics rejected the procedural conceit that solutions to the waste disposal problem (science as resource) were entirely disconnected from energy policy (nuclear expansion). They endorsed science facilitating social choice, but not science as the default agent of cultural meaning.

5.4 What's the Agenda?

The form of this rejection of implicit slippage was evident on the first day one of testimony, in

the form of 'agenda talk'. One participant pointedly asked whether the agenda was nuclear waste

management or nuclear industry expansion.[24] The issue was writ large as one of democratic

legitimacy and accountability, for critics read the panel mandate as significantly out of touch

with actual political maneuvering:

> Clearly people who are knowledgeable about these issues and are invested, to
> whatever degree, in the nuclear industry are making longer term (and
> different) plans for a proposed high level radioactive waste dump than are
> considered in the mandate for this Panel. If this is the case, then this Panel has
> a responsibility to take on a larger mandate, to consider all aspects of these
> issues, and to report on this to the ministers who are responsible for this
> process.[25]

Here we see a mixture of concerns about the individual intentions of disposal proponents, the

communal (social) purposes driving research and policy, and whether appropriate democratic

mechanisms were in place to subject such choices to scrutiny. This kind of critical posture was

largely imported into the public inquiry itself, rather than being created *de novo* by the review

process. Long-standing apprehension about the strategic action of nuclear elites was common.

Thus at a 1986 conference on nuclear waste management issues, anti-nuclear campaigners had

foreshadowed later critical views. Separating concept assessment from site assessment had been

considered the most likely political strategy for the nuclear industry to adopt, because

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[24] Avro Ranni (Private Citizen), 11 March 1996, *HT* [Vol. 1], 55-56.
[25] Dave Plummer and Ann Lindsay (Concerned Citizens of Manitoba), *WS* [Vol. 4], PHPUB.153, 5.

> [t]he notion is, this way the industry can go ahead and get an approval of a concept. . . . They're going to have a hearing without stirring up too much of a fuss and then they can say, we've got an answer, we can continue producing waste (Poch 1986, 206-207).

Indeed the very idea of nuclear waste disposal simply *meant* nuclear expansion:

> In the late 1970's, politicians and high-level technocrats made up their minds to bury nuclear waste in the granite of the Canadian Shield. There were lots of reasons given for this decision. In my view, the overriding consideration was to keep the nuclear industry alive. A small group of very powerful and wealthy people wanted to protect their vested interests (Robbins 1986, 170).

Prior to the public inquiry many critics had thus already decided what the human purposes driving research were, and the public inquiry represented an opportunity to scrutinize those purposes and social priorities.

Thus for some critics the waste disposal concept had to be seen as part of AECL's efforts to sell more reactors.[26] Critics were often frustrated that such purposes and priorities had to be coaxed out of disposal supporters. One NGO sought to remind the panel that independent parliamentary inquiries had found that AECL assessments were "biased by its commitments to nuclear power".[27] Another showed critics' frustration by using the question-answer format of the inquiry to get the CNA's intentions on record, demanding an answer (which was 'yes') to whether their support for the disposal concept was a function of their support for nuclear

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[26] Peter Prebble (Saskatchewan Environmental Society), 29 March 1996, *HT* [Vol. 10], 35.
[27] Gordan Edwards (Canadian Council for Nuclear Responsibility), 15 March 1996, *HT* [Vol. 5], 50-52.

expansion.[28] Another argued that, to the extent approving the concept was going to be taken as

approval for nuclear expansion, each project had to be discussed.[29] It was this potential for one

mandate to beget another that defined what the disposal concept meant for critics. As discussed

below (and further in Chapter 6), the pregnant potential of concept approval intersected with

distrust of possible implementing organizations (AECL and Ontario Hydro). Assessments of

political disparities between such organizations and local communities was also salient, with one

participant noting a danger that such power disparities would marginalize opposition and co-opt

a community.[30] Moreover, the concern with marginalization also meant that critics foresaw

concept approval as potentially signalling complete loss of influence over the decision-making

process. As one participant summed up the matter:

> We have to do something with this stuff, and yet as soon as we do something
> with it we give the green light to make more.[31]

5.5 The Critics on 'Expertise'

Another indicator that many public groups perceived political slippage to be the salient issue at

the inquiry was the way in which social identities were mobilized. Few public critics drew

directly upon a claimed knowledge or understanding of (what they constructed as) research

science, in order to advance their opinions. This did not mean that their concern with political

slippage meant their *only* concern was of a political kind, and that research science questions

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[28] Brennain Lloyd (Northwatch), 29 March 1996, questioning Ian Wilson (CNA), *HT* [Vol. 10], 60-63.
[29] Irene Koch (Nuclear Awareness Project), 26 March 1996, *HT* [Vol. 7], 141.
[30] Tom Lawson (Concerned Citizen), 27 March 1996, *HT* [Vol. 8], 70.
[31] Glenn Kukkee (Concerned Citizen), 29 April 1996, *HT* [Vol. 11], 84.

were irrelevant. Rather, invoking ignorance of science was part of efforts to manage the boundary between ignorance and knowledge. Indeed, for analysts of public controversies, approaching ignorance in a multifaceted way follows from the symmetry postulate that the same types of causes must be invoked to explain true and false knowledge (Bloor 1976). If ignorance is constructed and negotiated just as much as knowledge, then it is not sufficient to conceive of ignorance simply as neglect, absence, or distortion of socially accepted standards of truth and falsity. Indeed Smithson (1985, 1989) has shown that ignorance is not simply an inversion of knowledge. Some functions of ignorance parallel those of knowledge (such as appealing to uncertainity to legitimate calls to inaction), but others can either serve to depreciate one's social standing (admitted confusion), or in fact enhance one's social standing (acknowledging incomplete information demonstrates intellectual sobriety).

The salience of broader issues other than just whether or not a waste disposal repository could safely isolate wastes was shown by the way a spectrum of positions of participants, in regard to various levels of 'not knowing the science', did not prevent them from articulating positions on the waste disposal issue. Thus some stated the irrelevance of being an actual scientist for appreciating the potential hazards of nuclear waste disposal. One noted that "I don't have to be scientist, you don't have to be a scientist to know what...the effects of this nuclear waste is going to be on the environment or to all living life...".[32] Others noted more general worries that were held despite not knowing the science. Thus one identified herself as from "Port Hope, mom. No knowledge, no brains, no science here, I'm just kind of worried about my

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[32] Malvina Iron (Alberta Indigenous Women Environmental Foundation), 28 March 1996, *HT* [Vol. 9], 165.

kids."[33] This absence of technical knowledge nevertheless pointed to the importance of other

roles in deciding issues, such as responsibilities as a parent. Indeed the absence of technical

understanding on behalf of public critics was often appealed to in order to argue that technical

groups were not performing *their* proper roles. Thus in discussing whether alternative methods of

managing nuclear waste had been thoroughly investigated, one argued "I am not a scientist. Not

being one, I cannot judge the merits of these different transmutation technologies, but AECL was

supposed to in your [Seaborn panel] guidelines, and it didn't."[34] Claims that technical groups

were not 'doing their jobs' were thus common:

> I'm not a scientist and I don't even profess to know very much about the ins and
> outs of disposal of nuclear waste . . . . [but it is] pretty alarming. . . . I don't know
> what the answer would be, but that is up to the people who are qualified and
> should be able to come up with a better answer than burying it.[35]

Science was thus either deemed redundant to common sense or implicitly invoked as a role not

properly being performed. Others drew upon their own experience to offer knowledge advertised

as either complimentary to research science, or even superior, by virtue of being locale-specific.

Thus several First Nations groups drew upon their familiarity with Canadian lands, from having

lived on them for generations and sustained practices of passing such understandings along, to

implicitly challenge disposal proponents' assurances of low risk. Some made rather intuitive

based claims, speaking of Aboriginal elders and the fact "they have this sense we cannot

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[33] Sue Allen (Concerned Citizen), 25 March 1996, *HT* [Vol. 6], 154.
[34] Walter Robbins (CONSUN), 28 March 1996, *HT* [Vol. 9], 96.
[35] Evelyn McNenly (Town of Massey), 30 April 1996, *HT* [Vol. 12], 30-31.

ignore".[36] Others were more specific, arguing that joint land management should be the goal, because Aboriginals had first-hand experience of bays that became murky in the space of a generation: "In terms of science and scientific terminology, that is what they call experimentation over time or study over time."[37] In fact the Seaborn panel would ultimately conclude that the salient issue for First Nations groups was inclusion in decision making (CEAA 1998, Chap. 6). Throughout the inquiry many First Nations groups would claim AECL had not consulted Aboriginal communities, did not respect Treaty Rights, paid no attention to Aboriginal knowledge of the land and, given a lack of trust in Government and AECL due to past and present actions, found proposals to bury waste in the Canadian shield unethical (these communities had not received the benefits of the waste producing industry) and proposed siting practices politically disingenuous (due to imbalances in resources) (Stevenson 2003, 95-108).

Although including First Nations in decision making was the salient frame within which First Nations understood the disposal concept, invoking conceptions of Aboriginal identity and experience was put to use in two different ways. One was as a call for a merging or an incorporation of compatible kinds of knowledge:

> First Nations are in no position to research the impacts, the implications of a
> proposal to bury high level nuclear waste under our communities, under our
> traplines, under our lands, but these are the impacts we must understand fully in a
> manner that incorporates our perspectives, our values, and our traditions. We do
> not have the capacity or resources to undertake such a task and neither is it our
> role. But our people have the knowledge that is required, we know about and have

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[36] Deputy Grand Chief Davey (Nishnawbe-Aski Nation), 11 March 1996, *HT* [Vol. 1], 243.
[37] Vice-Chief Allan Adams (Federation of Saskatchewan Indians), 11 March 1996, *HT* [Vol. 1], 254-61.

an expert understanding of the lands, our relationship to it, of our societies and our economies and our ways of life.[38]

Another way involved a direct challenge to ('Western') institutionalized science:

> ... we know our land better than anybody else in this country. There is
> nothing that any scientists can tell us about what's on our land, or what we
> can do with it, or how it is used – we know it. . . . I think it is time we all
> worked together to get rid of this nuclear waste completely. We cannot
> allow that to come to the Canadian Shield. There is no proof that it is safe.
> . . . Why up here? ... there's not too many people, and there's only
> Indians...[39]

This second quote is actually an example of Collins and Evans' caution regarding science and politics being made indistinguishable. Unlike the first quote, in which Aboriginals and scientists are differentiated but nevertheless said to be capable of contributing to each others projects, the second quote claims scientists have nothing to contribute to Aboriginal knowledge. The two inquiries are constructed as discontinuous.

For Collins and Evans (2002, 280), where participation is predicated on experience-based expertise, then that would be a knowledge base continuous with Western science and thus relevant to decision making. Yet where the contribution to the technical Phase of debates is taken to be premised upon political position within society itself, such contributions would be discontinuous with science-in-general (indeed, each 'standpoint based' science would be discontinuous with another). Standpoint-based claims, in other words, ought to be limited to the political Phase of debates. For the most part, claims about technical matters that were continuous

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[38] Andrew Orken (speaking on behalf of Grand Chief Fontaine, and on behalf of The Quebec and Labrador region of the Assembly of First Nations & The Grand Council of the Crees (of Quebec)), 11 March 1996, *HT* [Vol. 1], 359.
[39] Fred Bianchi & Rita O'Sullivan (Aboriginal Rights Coalition), 29 April 1996, *HT* [Vol. 11], 16-17.

with acknowledged expertise in some fashion were better received than claims offered as

discontinuous entirely. Technical groups explicitly supported experience-based contributions,

from otherwise non-scientific (lacking in credentials) sources, where they were continuous with

their own expertise. Thus a member of the Scientific Review Group discussed risk assessment

work regarding contamination effects of industrial activity on the environment, specifically how

uncertainity is handled, and was at pains to remain inclusive:

> I will have people from in the North say to me, 'We have been here and
> generations of us have been here for many years and we think that we could add
> to your knowledge.' So we need to become a little more inclusive and really
> brainstorm about what we haven't thought about yet.[40]

Most public participants also valued continuity with acknowledged expertise where it could be

found, and in some cases voiced misgivings about standpoint-style knowledge. Thus one

participant criticized a First Nations representative for attempting to insert Aboriginal spiritual

accounts into the environmental evaluation as "factual claims", on the grounds that spiritual

accounts should only be taken as "a basis of values, a basis of understanding of the relationship

that human beings have to the rest of nature."[41]

NGO representatives also tended to emphasize their 'local discrimination', constructing

their contributions as continuous with orthodox technical evaluations rather than discontinuous.

Thus Northwatch spoke of their community experience in northern communities, which had

involved being a "nuclear sacrifice zone" in many ways (economic vulnerability, Elliot Lake

uranium mining, mining companies practicing "flood and flee", poor monitoring of the Blind

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[40] Stella Swanson (Golder Associates), 15 March 1996, *HT* [Vol. 5], 135. Swanson was also an SRG member.
[41] John Davey (Ontario Association for Environmental Ethics), 11 March 1996, *HT* [Vol. 1], 132.

River uranium refining practices). What Northwatch requested was better science, more trustworthy science; one more attuned to local impacts and carried out with greater social responsibility. Their experience could contribute to that project. Nevertheless their experience-based knowledge, derived from familiarity with northern environmental conditions, was combined with distrust of nuclear institutions: "I think that leaves us with a certain cynicism or scepticism with respect to the nuclear industries that perhaps other regions don't have."[42]

Hence the majority of participants invoked no expertise, some kind of experience-based expertise (such as local familiarity with land use), or knowledge of the behaviour of the research organizations, in order to differentiate amongst various roles. Constructions of self that performed distinctions between the individual speaker and science-in-general were means to say that the salient issues were not 'just scientific'. Thus a familiar trope was the introduction of comments with statements like the following: "I'm not a scientist, but I really think that perhaps I am speaking for a few people."[43] Even those who argued that expanding nuclear power is the faustian bargain we pay for our modern life-style, and that taking a position on waste disposal necessitated some technical understanding, were ready to admit that other issues were necessarily at stake: "environmentalism is some combination of a sophisticated value sense and an understanding of science."[44] To the extent the speaker downplayed the status of science, either in terms of relevance to the problem or as characterizing the basis of their own view, this was rarely a matter of levelling scientific *versus* other considerations *per se*. Rather, the differences between scientific and other considerations was discursively reproduced in order to

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[42] Brennain Lloyd (Northwatch), 30 April 1996, *HT* [Vol. 12], 51 and 45-60.
[43] Betsy Carr (Concerned Citizen), 15 March 1996, *HT* [Vol. 15], 66-67.
[44] Dr Robert Paehlke (Trent University (invited speaker)), 29 March 1996, HT [Vol. 10], 122.

emphasize that a broad range of issues was envisioned as relevant to the problem at hand.

Indeed, constructing differences between science and other factors prescribed the necessity of

different roles in decision making. The various articulations of social identities and valued

governance roles thus points to the general applicability of Michael's findings in regard to lay

discourses of science:

> People are not solely disenchanted or disinherited in the face of science; rather,
> they discursively maneuver around science in a variety of trajectories that can, on
> the one hand, sustain the mystique and the status of science and, on the other
> hand, undermine them (Michael 1992, 330).

5.6 Constructing Political Constituencies

If publics manoeuvre around science in a variety of trajectories, then symmetrically speaking

experts and policy makers must also be manoeuvring around the public in a variety of

trajectories. Each constituency must be constructing the other constituency, and thereby

implicitly prescribing the features of that constituency. Wilson's diary entries are suggestive in

this regard, for Wilson noted how it had been explained to the panel that the reasoning behind

discussing a concept in absence of a site was that American repository siting had encountered

public outcry by moving to siting assessments too quickly. Yet Wilson noted that, as the hearings

commenced, it "soon became evident that the public wanted to discuss the entire nuclear fuel

cycle and not just one part of it" (2000, 3). For many public participants this meant the disposal

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concept was intimately connected to what the industry called the nuclear fuel cycle (implying a closed loop) but critics called the nuclear fuel chain (implying a sequence not easily closed off). Wilson's account suggests there was a concern, on behalf of governance groups, with locating the right kind of citizen; a 'reasonable citizen.'

The perceived difficulty of isolating that reasonable citizen was shown by the trajectory of AECB testimony during Phase 1. Initially the AECB admitted that "twenty-five years ago" they made decisions "purely on a technical basis", but now appreciated the need for public consultation. Public consultation meant "you don't get locked into a particular paradigm or a particular view of the system. The more broadly you consult, the more broad the possibilities are, the less likely you are to miss something important." Nevertheless the problem remained of "how to generate confidence"; indeed, "the public also has to have confidence in us, perhaps trust in us".[45] By the end of Phase 1 the AECB was pleading with hearings attendees to dissociate the AECB from the industry. The AECB divided groups into three: the first two either accuse the AECB of defending the industry or gave out "deliberate misinformation" because they have a "goal", while the third was the "genuinely concerned citizen who really wants to find out. Those are the people that we have to talk to, find out what we are not communicating, find out what their concerns are and do our best to address them."[46] The AECB thus implied their harshest critics were not the audience they needed to convince, and nor were such critics seemingly out to represent matters fairly. Other technical groups made similar divisions. The Deep River Low-Level Nuclear Waste Siting Task Force divided up citizens they thought could be satisfied from those that could not, the latter being a "faction" that "mistrust any technology

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[45] Ken Bragg (AECB), 13 March 1996, *HT* [Vol. 3], 26, 15 and 18-19 respectively.
[46] Dr. Mary Measures and Kate Maloney (AECB), 3 May 1996, *HT* [Vol. 14], 59.

or engineering."[47] The Task Force's experience in Deep River was later summarized as bringing

into doubt "the efficacy of involving lay persons in the development of waste management action

plans," leading to the suggestion that the pace of development and review would be enhanced by

limiting the public to reviewing the plans of experts. Where there were technical reports made

available, it was reported that "very few community participants or residents ever looked at these

reports. The media ignored them. Only the opposition lobbies poured through them for

deficiencies, and then generally asked for more studies."[48] Thus the Task Force implicitly

constructed the public as two-fold: either interested but ultimately uninformed factional luddites

or not-interested and not worth consulting in anything other than a review capacity.

Government groups routinely noted the importance of public consultation, but also the

difficulty of the task. Natural Resources Canada noted that implementing policy was now more

difficult because the time has passed "when one simply can have technical experts walk in and

impose a solution of virtually anything on a community".[49] The OECD Nuclear Energy Agency

proclaimed deep geological disposal was a balanced opinion of the public at large and nuclear

specialists but, when asked about the public consultation program, admitted the OECD had relied

on consulting experts. Local groups and the public at large were difficult to consult and largely

rejected proposals coming only from experts.[50] The political constituency that formed the target

of consultation efforts was thus routinely constructed as difficult to access and, in some cases,

relatively fickle and even belligerent. Those who had acted as a liaison between groups in Deep

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[47] Denis Hall (Deep River Low-Level Radioactive Wastes Siting Task Force), 25 March 1996, *HT* [Vol. 6], 64.
[48] Dr Vera Lafferty (Deep River Low-Level Radioactive Wastes Siting Task Force), 27 March 1996, *HT* [Vol. 8], 15-16 and 21.
[49] Robert W. Pollock (Low-level Radioactive Waste Management Office, NRCan), 25 March 1996, *HT* [Vol. 6], 25.
[50] Jean-Pierre Olivier (Organization of Economic Cooperation and Development, Nuclear Energy Agency), 25 March 1996, *HT* [Vol. 6], 77-97. Note the catch-22 involved.

River's low-level waste project also appreciated the difficulties of public involvement, though

they prescribed public opposition as emotive:

> I had the privilege of serving as the Chairman of the Deep River and Area
> Community Liaison Group for a period of just over two years and I can tell you
> that this is not a science project, this is not an engineering project; this is a project
> about dealing with people and dealing with human emotion.[51]

Many comments about public involvement implicitly constructed the public as responding

emotionally to the issue of nuclear waste disposal, with one participant outlining the now-classic

deficit model of public understanding (cf. Wynne 1995 for a critique). It was recommended that

AECL conduct public education campaigns, so that the public would be better informed and thus

support the proposal.[52] This assumed that a deficit in understanding the technical issues was the

cause of rejecting the disposal concept. Some industry insiders were far less diplomatic in their

constructions of the public. The typically acerbic Robertson bluntly divided those opposed to the

disposal concept on the grounds of "false premises and bullshit" from those not explicitly and

publicly outraged and thus actually having no "concern" at all.[53]

NGOs and lay citizens opposed to the disposal concept similarly sought the right kind of

citizen; a 'reasonable' or 'true' scientist in this case. It was acknowledged that scientists could

get it wrong, as in "DDT and Thalidomide," but mostly because of the perversions of "economic

reality."[54] Given expected limits to public knowledge, trustable experts were needed. Academics

invited to discuss the topic of experts and the public recommended that, to be trustable, experts

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[51] Dave Thompson & Donna Oates (Insights & Solutions), 2 May 1996, *HT* [Vol. 13], 69.
[52] Dr Pual Tamblyn (Acton High Scool), 12 March 1996, *HT* [Vol. 2], 137.
[53] J. A. L. Robertson (Concerned Citizen), 2 May 1996, *HT* [Vol. 13], 112-113.
[54] Dennis Baker (Concerned Citizen), 27 March 1996, *HT* [Vol. 8], 89.

would have to be independent, without agendas, and sensitive to how the public understands

risk.[55] Many critics argued "if science is independent of the operator it can be trusted."[56] Ideal

models of independence as expertise freed from money and power were thus common.

Sometimes philosophically general models were deployed, such as notions of a "true scientist"

who practices "repeated verification of any conclusions."[57] Other times a more philosophically

specific notion was used, such as the Popperian conception that science works when "every

researcher is motivated to disprove the concept."[58] Experts *per se* were thus not the problem; it

was their connections with untrustworthy institutions that were mainly at issue. Thus the

vociferously anti-nuclear critic Norm Rubin asked whether Whiteshell Underground Research

Laboratory (Manitoba) personnel, who conducted much of the work relevant to the disposal

concept but "are not associated with AECL," could form an implementing organization.[59]

  All parties involved in the waste disposal debate thus constructed their own versions of

who their opponents were, and in so doing either implicitly or explicitly prescribed who they

should be and how they should behave. All groups shared the problem of figuring out a basis

upon which assessments and judgments could be trusted. The federal Government made clear

that it wished to be viewed as a prudent planner, one that could act ethically in regard to future

generations as well as responsibly in light of sustainable development ideals.[60] The AECB made

clear that it saw itself as having to make judgments in the face of uncertainty. The only way to

move forward under such conditions was by injecting "a fair element of common sense" into

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[55] Dr. Bill Leiss (Philosophy, Queens University), 15 March 1996, *HT* [Vol. 5], 94-118.
[56] Ella de Quehen (Northumberland Environment Protection), 13 March 1996, *HT* [Vol. 3], 157.
[57] Marion Penna (Inter-Church Uranium Committee), 26 March 1996, *HT* [Vol. 7], 97.
[58] Norm Rubin (Energy Probe), 13 March 1996, *HT* [Vol. 3], 80-81.
[59] Norm Rubin (Energy Probe), 11 March 1996, *HT* [Vol. 1], 77-78.
[60] Dr. Peter Brown (NRCan), 11 March 1996, *HT* [Vol. 1], 35-40.

proceedings.[61] AECL and Ontario Hydro relied upon technical, political, and public consensus

about the need to move forward as the basis for a claim they ought to be entrusted with the

responsibility to do so:

> The information available to Ontario Hydro strongly indicates that the public
> expects us to move ahead towards disposal. Ontario Hydro supports geological
> disposal. With certain qualifications, several review groups have indicated that
> geological disposal is viable. Safety assessments have been carried out in other
> countries confirming the safety of geological disposal. Deep disposal is a policy
> direction in most OECD countries.[62]

Notice here the strong emphasis upon basing judgments of trust on the need to move forward. Of

course, AECL outlined five principles that any implementing organization ought to adhere to:

safety and environmental protection, voluntarism, shared decision making, openness, and

fairness (AECL 1994a, 256). These principles could carry an organization into the future, and

form a risk management approach sensitive to public input.[63] Despite this emphasis upon the

future, critics were not about to base their *assessments* of trust on the claim that moving forward

would require trust and that AECL and Ontario Hydro *could* be trusted because they would

adhere to particular principles. The past, not the future, was for critics the relevant domain for

deciding whether or not to trust. Here is where agenda talk mattered, for critics were not about to

trust organizations with such a vested interest in a particular future. As one NGO argued

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[61] Ken Bragg (AECB), 13 March 1996, *HT* [Vol. 3], 11.
[62] Ken Nash (Ontario Hydro), 11 March 1996, *HT* [Vol. 1], 44.
[63] Dr. Ken Dormuth (AECL), 11 March 1996, *HT* [Vol. 1], 72-76.

You don't start science with your conclusion and then build the evidence to match the conclusion. That is almost a hallmark of bad science.[64]

5.7 The Issue of Public Trust

Some critics regarded the entire science of waste disposal as untrustworthy because it was funded by the nuclear industry.[65] Others were more discerning, accusing AECL of being self-interested and thus not trustable.[66] Some claimed Ontario Hydro had not saved the money it claimed to have collected to fund disposal,[67] which Ontario Hydro admitted was true in the sense money had been used to retire debt rather than create a segregated fund.[68] Others argued bluntly that AECL was the kind of organization capable of bribing communities to gain acceptance for a disposal site.[69]

Despite Seaborn's early clarification that Phase 1 lacked a "proponent," Environment Canada nevertheless labeled AECL "the proponent" (as did Seaborn by the beginning of Phase 2).[70] Critics (correctly) presumed existing industry actors would become the implementing agency (see Chapter 7). Yet the body language of these would-be proponents was consistently cited as indicating they were not to be trusted. Aboriginal groups accused AECL of duplicity and bribery, complaining that visits to First Nations communities were vehicles for pitching

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[64] Gordon Edwards (Canadian Coalition for Nuclear Responsibility), 15 March 1996, *HT* [Vol. 5], 41.
[65] Ella de Quehen (Northumberland Environment Protection), 13 March 1996, *HT* [Vol. 3], 145-64.
[66] Patricia Lawson (Environmental Protection Group), and Marc Chenier (Campagne Contre l'Expansion du Nucleaire), 14 March 1996, *HT* [Vol. 4], 77-85 and 170-185 respectively.
[67] Irene Kock (Nuclear Energy Awareness), 26 March 1996, *HT* [Vol. 7], 136-45.
[68] Fred Long (Ontario Hydro), 29 March 1996, *HT* [Vol. 10], 8-26.
[69] Tom Lawson (Port Hope Citizens for Responsible Management of Radioactive Waste), 27 March 1996, *HT* [Vol. 8], 71-72.
[70] See Blair Seaborn (Panel Chair), 11 March 1996, *HT* [Vol. 1], 8; John Mills and George Cornwall (Environment Canada), 11 March 1996, *HT* [Vol. 1], 161-168; Blair Seaborn (Panel Chair), 10 June 1996, *HT* [Vol. 15], 8.

claims about economic prosperity masquerading as information sessions.[71]   Others claimed

Ontario Hydro "don't listen to anybody," especially "Indians [and] women," citing Ontario

Hydro's activities in the MacKenzie Valley Pipeline Inquiry (1974-77).[72]   Acquiring information

from AECL and Ontario Hydro had also proved difficult for many, with some participants

spending their entire presentation discussing their negative experiences.[73]   One book about such

difficulties carried the not-so-subtle title *Getting the Shaft* (Robbins 1984).   Toward the end of

Phase 1 AECL was routinely being referred to as the disposal proponent, making it significant

when one NGO (to repeated agreement by respondents) declared AECL "completely out of

touch with Canadian values," "discredited" because of questionable foreign reactor sales

practices, and "unfit" to be the implementing agency because it "has so abused the public

trust."[74]

In an image combining inter-personal metaphors and references to institutional

behavior, one NGO thus succinctly stated that industry groups do not have "clean hands."[75]   Not

only did critics fear the consequences of matters being left in such hands after the inquiry was

completed, but some felt "dirty" actually participating in a process that may actually be co-

option:

> There are certain of us here today that feel we're co-opting ourselves just by
> participating in the process to begin with, that we're somehow legitimizing a

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[71] Malvina Iron (Malvern Indigenous Women Environmental Foundation), 28 March 1996, *HT* [Vol. 9], 155-69.
[72] Fred Bianchi and Rita O'Sullivan (Aboriginal Rights Coalition), 29 April 1996, *HT* [Vol. 11], 12-28. See Campbell (1985) for an account of the Berger Inquiry.
[73] David Plummer and Ann Lindsey (Concerned Citizens of Manitoba), 11 March 1996, *HT* [Vol. 1], 1-50.
[74] Peter Prebble (Saskatchewan Environmental Society), 29 March 1996, *HT* [Vol. 10], 32-37 and 191-194.
[75] Lloyd Greenspoon (Algoma-Manitoulin Nuclear Awareness), 30 April 1996, *HT* [Vol. 12], 16.

concept that we don't agree with.[76] . . . I feel completely co-opted by being here, and that I am adding an air of legitimacy to an otherwise . . . bizarre . . . ludicrous thing.

The direct answer to whether AECL and Ontario Hydro were considered trustworthy is thus a resounding 'no.' Yet recall that, for many critics, the problem was the "housing" of science rather than scientists *per se*.

Thus one respondent questioned several technical assertions but nevertheless reminded the audience that he had "a great deal of respect for science, and I trust you do too".[77] An invited speaker stressed how society needs experts, even if those experts do not always frame their claims properly.[78] The critics still valued expertise, in other words. NGO's would make this clear during Phase 2, held to discuss technical matters explicitly, albeit in a somewhat comical fashion. Energy Probe thus argued "we don't allow Homer Simpson to run our nuclear generating stations . . . we insist on people of some qualifications and training."[79] So what was to be done with the experience undoubtedly 'housed' within AECL and Ontario Hydro, if the organizations themselves could not be trusted? Two positions on the question were outlined: one that saw a use for the skills of a person once they were "rid of the corporate umbrella" and another that saw a person as "tainted for life by their association with the tainted organization."[80] The question was asked how to balance the two. Critics and proponents thus shared a similar problem of what to do about trust. Technical and Government groups often argued for sympathy as a means to develop trust. The AECB thus noted the difficult transition from a "purely

[76] Julie Dingwell (People Against Lepreau 2), 27 March 1996, *HT* [Vol. 8], 164; and 28 March 1996, *HT* [Vol. 9], 57-58.
[77] Bill Crowley (Port Hope), 25 March 1996, *HT* [Vol. 6], 121.
[78] Dr. Bill Leiss (Queen's University, Philosophy), 15 March 1996, *HT* [Vol. 5], 107.
[79] Norm Rubin (Energy Probe), 10 June 1996, *HT* [Vol. 15], 144.
[80] Norm Rubin (Energy Probe), 29 March 1996, *HT* [Vol. 10], 211-212.

scientific and technical organization to one which is much more sensitive to these broader

issues."[81] The Canadian Nuclear Society objected to references to "the public feels this or the

public feels that," when its members were also part of the public.[82] AECL asked for a more

sympathetic appreciation that they were "working hard" and wanted "nice things."[83] Even critics

could not deny that Canadian-based organizations were at least "accountable to the Canadian

public."[84]

Yet critics were not terribly concerned about whether *individual* scientists or policy-

makers were attuned to broader issues, or were citizens just like them, or worked hard, or could

be sanctioned. Lack of trust in broader organizational and institutional actors was the issue. In

such a situation, critics often constructed the desired science as one attaining a very high level of

certainty. Critics did not trust prevailing technical groups to make the right decision in a context

of ambiguity and interpretive flexibility. These points are apparent in how one participant

connected standards of scientific evidence, to general issues of scientific attitudes, and then to

Canada's nuclear elites specifically:

> A permanent solution demands failsafe guarantees. The experts cannot give this.
> Not one of the experts will be responsible for failure. . . . [Nuclear science] . . .
> [quoting from a science journalist] '. . .has produced a virtual priesthood of
> scientists and technologists who deal with matters presumed to be far beyond the
> comprehension of the layman.' . . . There are not a lot of informed critics of the
> nuclear establishment willing to speak out in this country, most of those trained in
> nuclear technology have to find employment within or at least dependent upon the
> industry, this included all the university research funded by the industry. AECL's

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[81] Ken Bragg (AECB), 13 March 1996, *HT* [Vol. 3], 43.
[82] Ken Smith (CNS), 14 March 1996, *HT* [Vol. 4], 186.
[83] Colin Allen (AECL), 12 March 1996, *HT* [Vol. 2], 327-29.
[84] Walter Saveland (Concerned Citizen), 3 May 1996, *HT* [Vol. 14], 10.

proposal is based on self-interest . . . the wider view . . . [is] dependent on a measure of disinterest.[85]

For critics, AECL and Ontario Hydro were attempting to separate their interest in waste disposal from their interest in nuclear expansion. Denying this connection meant maximizing the connections between AECL and Ontario Hydro and their organizational past. Moreover, establishing this connection with the past not only established what their interests were, but also their expected behaviour.

In effect, for critics the past was their political weapon. Critics evaluated industry claims as part of a social package, in which knowledge claims were irretrievably joined to the "body language" of technical and policy elites: "the interests people think lie within it, the social values and relationships it is thought to imply" (Wynne 1991, 116). NGOs thus referred to the secrecy with which early nuclear decisions took place and the history of regulatory cosiness with the industry being regulated:

> We are angry over the lack of honesty, openness and fairness which has characterized the nuclear debate at the federal level for as long as I can remember.[86]

NGOs routinely impugned the "credibility of [the] proponent [AECL]" because of their "own very negative experience with the proponent."[87]

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[85] Patricia Lawson (Environmental Protection Group), 14 March 1996, *HT* [Vol. 4], 70, 77, and 84 respectively. Quoting from Howard Ross.
[86] Gordon Edwards (Canadian Coalition for Nuclear Responsibility), 11 March 1996, *HT* [Vol. 1], 268.
[87] Brennain Lloyd (Northwatch), 11 March 1996, *HT* [Vol. 1], 219.

While we thus see technical and policy elites shifting matters to a future political terrain,

critics seek to shift matters back to the more local and immediate level, perceiving that any

future terrain may lack broad participation. In Giddens' (1990) terms, critics' strategy appeared

to be a response to the threat of disembedding mechanisms (the removal from local control).

Critics responded by attempting to establish re-embedding mechanisms (local control is re-

established). Re-embedding mechanisms place the practices of an institution within a local

context of community action, representing it in terms consonant with evaluations of inter-

personal contact. Thus note below the mixing of inter-personal metaphors and institutional

behaviour:

> one of the things that has struck me about the entire project which I have
> laboured through and read through and worked through is that this is an
> extraordinary project . . . So what is wrong with the technical stuff, the
> scientific stuff? It's probably very good. I do not know. But is it credible,
> because the interests of the agency has been mixed with the scientific
> endeavour, and that is very hard when you are going to go to the public and
> say, 'Believe me, believe my science.'[88]

5.8 Conflicting Social Relations

With hindsight, the public inquiry inherited a problem it could do nothing about within the

confines of a public hearing process: address the lack of trust in dominant institutions. As noted

in Chapter 6, the distrust would continue. Thus in Phase 1 nuclear industry workers claimed anti-

nuclear activists had a "vested interest" (raising public concern and financial support) in

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[88] Maria Paez-Victor (Voice of Women), 15 March 1996, *HT* [Vol. 5], 207.

critiquing the disposal concept,[89] a neat inversion of the critics' agenda-talk. In Phase 2 one critic addressed such claims by outlining ontological categories that distinguished the "true scientist" from the "technocrat . . . [who] will say what he is paid to say."[90]

AECL had attempted to reconstruct its relationship with the public prior to the public inquiry. The AECL R-Public (1994b, 64) cited prominent works in the academic risk perception literature (such as Slovik 1992, Otway 1992) in order to note that it had addressed social valued dimensions (for instance, the voluntarism requirement). Nevertheless AECL arguably failed to grasp the central recommendations of the literature it cited, or at least deemed the problem too great to handle. As I note in Chapter 7 and 8, this problem has been tackled by the NWMO directly. Slovik (1992) and Otway (1992) both stress avoiding a reductionistic framing of consultative processes: do not neglect socially valued dimensions nor take for granted the competence and trustworthiness of managing institutions. The narrow mandate of the panel made it difficult for the inquiry process itself to address these dimensions. The mandate represented a broken political promise and symbolized political restrictions on deliberation about energy options. Accepting the restriction of discussion to a concept alone seemed politically suicidal to critics, who regarded approval of that concept as ushering in nuclear expansion by default. Moreover, organizations already extensively distrusted were being shielded by a mandate that denied the relevance of their future political-economic interests.

A further complicating factor was that "acting reasonably" meant different things to different groups involved in the inquiry process. For AECL acting reasonably meant

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[89] David Shier (President of the Canadian Nuclear Workers Council), 25 March 1996, *HT* [Vol. 6], 142.
[90] Tom Lawson (Port Hope Citizens for Responsible Management of Radioactive Waste), 11 June 1996, *HT* [Vol. 16], 197.

acknowledging the unavoidability of dealing with nuclear waste, regardless of energy policy futures. Yet this conception implied political sterility for critics, for anything done about nuclear waste was perceived to be a move favouring nuclear expansion. Different groups were thus able to ascribe irresponsibility to the other. For the nuclear industry doing nothing constituted irresponsibility. A 'closed' nuclear fuel cycle buttressed claims of environmental sensibility and a 'problem solved' attitude, and rendered political opposition tantamount to creating environmental hazards. For critics, approving waste disposal seemed to reward an industry that had pushed ahead before a solution to foreseeable problems was at hand. Moreover, it would hand nuclear interests a public relations victory suitable for justifying nuclear expansion. Given that nuclear industry groups - apart from AECL and Ontario Hydro - indicated they supported waste disposal because doing so advanced the cause of nuclear power, it seemed clear that pro-nuclear actors could afford to adopt a strategy of supporting a narrow mandate. A narrow mandate focused matters away from nuclear expansion and, if such a mandate could help secure acceptance of waste disposal, then this would mean achieving by procedural means what would otherwise be a messy political battle. The strategy of critics was thus directed at what they saw as the end-game, nuclear expansion. Not only did critics demand a nuclear Phase out (Stevenson 2003, 91-92), but they sought to reveal the political implications embedded in the disposal concept. Given that all groups agreed waste disposal removed a central argument against nuclear expansion, it was evident that accepting waste disposal at least opened up policy options. Yet these options were evaluated differently: nuclear expansion as either disastrous policy accident waiting to happen or as support for an environmentally clean and sustainable energy option.

This opening of policy options highlights how industry and Government groups relied on a different set of social experiences than public participants. Clearly bureaucratic agencies, such as the AECB and NRCan, were going to remain involved in decision making. Industry actors, such as AECL and Ontario Hydro, mostly took for granted their participation in future decision-making steps. AECL had already argued in its EIS that those who are currently responsible for, and owners of, used nuclear fuel, should also be responsible for implementing the disposal concept (AECL 1994a, 344-45). Ontario Hydro reiterated the same argument on the first day of public hearings, noting that "Ontario Hydro firmly believes that the waste producers are accountable and are responsible . . . for the cradle to grave management of all of our wastes."[91] NRCan representatives confirmed the Government held the same opinion as AECL and Ontario Hydro, referring to a policy framework on radioactive waste that recommended waste owners be responsible for wastes and Government with oversight duties. NRCan concluded that "it is important that we start to determine preferred positions on implementation issues and look at the implications."[92] Indeed, the policy framework referred to had *already* been completed at the end of 1995, but would not be officially released until 10 July 1996 (half-way through Phase 2 of hearings). As discussed in Chapter 6, NGOs and other public members were not consulted about this framework, giving some credence to their Phase 1 speculations that it was unlikely they would remain involved in decision making beyond the public inquiry.

Technical and Government groups were thus already involved in post-inquiry discussions relevant to implementing a disposal concept, and thus confident of their continuing involvement. This comfortable political knowledge was an exclusive resource, but it also served to transform

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[91] Ken Nash (Ontario Hydro), 11 March 1996, *HT* [Vol. 1], 44-45.
[92] Dr Peter Brown (NRCan), 11 March 1996, *HT* [Vol. 1], 30.

the wide boundary framing of opposition groups into premature and hypothetical talk. Such talk was outside the mandate, apparently reserved for another political day, but only some groups could feel confident they would be around for that future political day. Dominant groups could literally afford to see critical perspectives as counter-productive to policy-making. For technical and policy elites, the future was a political weapon. Yet for critics their social experiences consisted of being outside the decision-making arena. For those accustomed to exclusion from decision-making, the public inquiry represented a rare but temporary window into the policy process. For some this was cause for concern, for they feared the public inquiry would be just a "temporary creature", after which decision making would become dominated by a nuclear industry armed with a "flawless" proposal.[93] Critics had little problem with politics *per se* dominating the inquiry, for what critics wanted was the "return to the political arena [of] decisions of an essentially political nature".[94] Given that critics were arguing technical decisions were in fact default political decisions, the salient issue for critics was the presence of an undemocratic level of *already made* political decisions. The problem was the threat of a kind of politics characterized as "irrevocable,"[95] or a politics in which framing political commitments were not up for discussion and in which such tacit politics might "prejudge" technical assessments and options.[96]

In effect, policy-participation catch-up was in process. The social experiences of critics encouraged them to collapse future decisions and uses of a disposal site into the decision on the concept itself. Having been previously excluded from the decision making arena, critics were

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[93] Gordon Edwards (Canadian Council for Nuclear Responsibility), 11 March 1996, *HT* [Vol. 1], 282.
[94] Walter Saveland (Concerned Citizen), 3 May 1996, *HT* [Vol. 14], 131-32.
[95] Dave Plummer (Concerned Citizens of Manitoba), 14 March 1996, *HT* [Vol. 4], 49-50.
[96] Norm Rubin (Energy Probe), 11 March 1996, *HT* [Vol. 1], 34.

wary of the temporary nature of the inquiry and the threat of already made decisions being

legitimated in and through the inquiry. Indeed some doubted whether they were in control of

their relationship to political decision making. One participant thus asked whether nuclear

industry and policy elites saw "public opinion as an acceptability problem to be solved".[97]

Another summed up general misgivings, after a roundtable session aimed at soliciting public

viewpoints, in the following fashion:

> But I felt that in some ways we are being used for the proponent to understand
> more about how they could soften the acceptability of a site or this concept, you
> know, how to make it - how they will be able to come into a community and
> sociologically do it in a correct way, that they will know then how to establish
> trust and all this kind of thing. So in some ways I feel like I'm doing the job that I
> don't want to be doing.[98]

5.9 Discussion

Phase 1 confirmed Wynne's argument that a failure to focus on the "social foundations of risk

framing by expert institutions only provokes a greater sense of denigration and skepticism of

authority on the part of the public" (Wynne 1992a, 278). Even though AECL admitted the

disposal project possessed an "unavoidable degree of uncertainty,"[99] such advertised reflexivity

about technical matters was not matched by a similar degree of reflexivity about political

matters. Technical and governance groups appeared to adopt a position more superficial rather

than substantive in regards to public consultation. At the least, such groups under-estimated the

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[97] Chaitanya Kalevar (Concerned Citizen), 14 March 1996, *HT* [Vol. 4], 166.
[98] Marion Penna (Inter-Church Uranium Committee), 25 March 1996, *HT* [Vol. 6], 235-36.
[99] Mary Grebber (AECL), 12 March 1996, *HT* [Vol. 2], 266.

extent to which democratic expectations have grown, producing "more 'critical citizens' or perhaps 'disenchanted democrats'" (Norris 1999b, 27; and see Norris 1999a, Pharr and Putnam 2000) increasingly willing and able to subject authority figures to "more searching scrutiny than they once were" (Inglehart 1999, 236; 1997, chap. 10). Critics proved to be unhappy with the politics on offer, not that politics was present. Critics suggested the real meaning of the waste disposal concept, the real issue of concern, was that any decision about a disposal concept might be taken as tacit approval for either the continuation of nuclear power or its expansion. Critics were thus unhappy with the combination of specific commitments to nuclear expansion and institutional inertia within public policy-making in general. Being unable to challenge the specific commitments, and of the opinion they would be frozen out of later decision making, critics found the democratic process on offer not of a high standard.

This concern with follow-on effects points to one of the contentious issues between those who seek to erect boundaries around public involvement in decision-making (Collins and Evans 2002, 2003, 2007), and those more concerned to restrict the scope of expert authority (Jasanoff 2003a, 2003b, 2005; Wynne 2003, 2005). One of Wynne's points about analyzing public debates is to be wary about presuming social relations consist just of explicit choices and actively strategizing actors, to the exclusion of routinized practices and tacit understandings (Wynne 1996b, 359). As noted in Section 5.3, Wynne argues (1996b, 384; 2003, 410) this was long ago dismissed by Habermas as 'decisionism' (Habermas 1973): "a model in which policy and political processes are conceptualized exclusively as a series of completely unrelated specific decisions, each one of which has no interaction with any other" (Wynne 2003, 410). For Wynne it is such decisionistic models of political processes that encourage fetishizations of expertise, in

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which it is presumed distinctions between types of competences and divisions between technical and political aspects can be smoothly mapped onto the objectively ascertained meanings of public issues involving expertise (Wynne 2003, 410-411). The crucial assumption made by Collins and Evans (and those who routinely discuss public limits in regard to expert debates), according to Wynne, is that public issues involving expertise are about propositional questions and 'downstream' risks and effects. While the STS-informed positions (such as Collins and Evans) do not presume such issues are capable of being represented in objectivist, universal terms, at the least the issue is conceived of as one capable of allowing for assessments of degrees of precision and levels of available prediction and control. Were such issues the core issue of expertise in public policy, then possibly mapping competences onto distinct policy roles within distinct phases of debates would make perfect sense.

These points are germane here because what disposal concept critics were alluding to was not explicit decisions *per se*, but default decision-making; the routine continuation of established commitments with little reflection on their merits, meanings, origins and implications. Wynne's point is to say that analyses such as Collins and Evans obscure the shift from science as a resource to science as the agent of cultural meaning, which in this case involved obscuring the way solutions to the waste disposal problem (science as resource) were being put to work justifying an energy policy option (nuclear power) that ought to be subject to social negotiation (to avoid science as default agent of cultural meaning). Presuming that one must locate specific competences and understandings in order to see who can contribute to what phase of a debate, the technical and/or political, presupposes that specific competences and understandings are what is at issue and thus what needs to be explored to resolve the issue. Yet

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public critics opposed the narrow mandate because of the broader meanings they perceived to be attached to ostensibly specific decisions about waste disposal. The 'issue' was both what waste disposal meant in terms of the social priorities and research purposes of its proponents, and what approving waste disposal might be taken to imply by existing political culture. The past was irredeemably implicated in what present waste disposal proposals meant, while those contemporary proposals were perceived as carrying implications for future decisions. Critics were calling for negotiations about these chains of meanings, and rejecting a policy culture that pretended the present could be discussed in isolation of both past and specific futures. For Wynne, to the extent such broader chains of meaning are at issue, context becomes content and every democratic citizen has the right and capacity to negotiate their meaning (Wynne 2003, 410-411).

A reasonable question to ask here is the following: 'yes, but will a nuclear waste repository allow radioactive waste to escape or not?' Collins and Evans represent this link of response to Wynne-style analysis. While Collins and Evans agree that "it is wrong to assume that the envelope of inquiry is exhausted by propositional questions" (2003, 438), they (sensibly) note it would be odd to "insist that certain questions not even be asked" (439). Thus Collins and Evans hold that involving every democratic citizen applies "only to questions that are not propositional" (439). What Collins and Evans thereby do is construct a domain of decision making in which propositional questions, admittedly to be assessed by an expanded set of experts than typical credential-based definitions of expert would allow, are conceived of as being tackled as *discrete* questions. Their point is not the simple one that facts of the matter can be 'read off from nature', for they acknowledge interpretive judgment is always required, that

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"science and politics cannot be disentangled" (444). Rather, cleaving to the possible discreteness

of propositional questions is advertised as a prescriptive move to avoid the cynicism that would

arise from believing there either is or should not be a distinction between "science and

realpolitik" (445). Here Collins and Evans are responding directly to Jasanoff's claim that

mapping a culture's civic epistemology, or "the criteria by which members of that society

systematically evaluate the validity of public knowledge" (Jasanoff 2003a, 394), means

investigating the boundaries drawn between science and politics. Jasanoff argued these

boundaries do exist, yet they are entry points for viewing the relations between science and

power, and thus ought not to be reduced to epistemological questions (394).

What is significant about this exchange, for understanding disposal concept critics and

their way of understanding the disposal concept, is that Collins and Evans gave voice to a

common, persuasive, but ultimately limited conception of expertise. Overlooking Jasanoff's

acknowledgement that boundaries between science and politics existed,[100] Collins and Evans

argued that Jasanoff's call to integrate expertise and democracy (Jasanoff 2003a, 398) implied

there must be an "expertise *per se*" (Collins and Evans 2003, 444). That is, postulating two

entities to integrate implies each must exist separate from the other. The persuasiveness of this

conception of expertise is captured by how Collins and Evans put their 'expertise *per se*' to use:

just because politics is intrinsic to science, few advocate external political influence as a means

to produce facts of the matter. The democratic Phase of a debate can thus reveal hidden values,

promote alternative visions, and raise questions about priorities, but ultimately subject-specific

knowledge is required to facilitate the exercise of judgment about propositional claims and those

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[100] Jasanoff refused to draw boundaries *a priori* in order to make her points (Jasanoff 2003a, 394).

producing or criticizing them (Evans and Plows 2007, 846-47). Collins and Evans are correct

that talk of integration implies duality not monism. Nevertheless the limitations of this 'expertise

per se' are that it ultimately hinges on a model of humans, specifically experts, as characterized

by their degrees of understanding(s), competence(s) and commitment(s) in regard to research

science. Thus a case-study application of Collins and Evans' demarcations between types of

experts concluded that, because there was nothing special about ubiquitous expertise (the kinds

of civic capacities much discussed by Wynne and Jasanoff), "it is only those who stand outside

the committed knowledge cultures of both the scientific and activist communities who can

operationalize a genuinely *civic* epistemology" (Evans and Plows 2007, 845; emphasis in

original).

Here *civic* capacities are constructed according to distance away from scientific

understandings and engagements. Such a conception is the mirror-twin of how Collins and Evans

construct expertise *per se* as a social institution in which the locus of legitimate interpretation is

proximity to scientific understandings and engagements (Collins and Evans 2007, 125-33). This

is a one-dimensional scale within which to situate both experts and the public. The civic

epistemology endorsed by Wynne and Jasanoff opposes such a one-dimensional scale (Jasanoff

2005, 247-71; Wynne 1992b, 2003). The public is to be understood as characterized by

multivalent identities and as existing within a multiplicity of social relationships. The model of

the human involves an integrated belief system, where ambivalence, ignorance and uncertainty

coexist with routinized understandings. Aside from Wynne's proviso that the reflexive capacities

of institutional experts are contingently structured by their relations to power structures (1993,

337), I suggest this integrated model of the human also incorporates institutionalized experts. To

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the extent this is the case, the picture of 'expert *per se*' deployed by Collins and Evans (a sophisticated version of 'neutral experts') suffers from its inevitable 'thinness'. Or, to the extent context becomes content (as Wynne notes), experts become political. That is, institutionalized interests and routine practices can shape standards of evaluation and assessment, what uncertainty and ignorance mean, and how research potential is related to present standards of proof. The boundaries erected between science and politics can serve to implicitly extend the politics of the former domain into the latter, thus colonizing broader meanings in accord with narrower conceptions. Indeed, nuclear waste disposal proponents, of both the technical and policy kind, were perceived of as political in the integrated sense Wynne and Jasanoff suggest.

Critics' refusal to dissociate experts and policy elites from broader chains of meanings was more than cynicism about the possibility of disentangling science from politics. Critics were pro-actively holding to account those experts and elites. The civic epistemology at work was not simply derived from understandings of what was or could not be known. It was much closer to Jasanoff's definition of civic epistemology as "culturally specific ways of knowing [that are] historically and politically grounded" (Jasanoff 2005, 9 and 249). Jasanoff argues that "how publics assess claims by, on behalf of, or grounded in science forms an integral element of political culture in contemporary knowledge societies" (249). Indeed because society has shared understandings of credibility, "public reasoning, then, achieves its standing by meeting entrenched cultural expectations about how knowledge should be made authoritative" (249). When waste disposal proponents and policy elites denied the broader chains of meaning linking past, present and future, they violated expectations about how expertise for public policy ought to be made authoritative. That is, a realistic circle of follow-on implications and possible

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associated decisions needed to be discussed in an open and deliberative fashion. The juxtaposition between proponents denying extrinsic politics was relevant, but supporters routinely invoking external politics as justifying acceptance, instilled a deep sense of mistrust in what the public inquiry process meant and in what the disposal concept itself meant. Holding this juxtaposition to account was not an avoidance of the issue, on behalf of public critics, but a claim about what the issue actually was, and about what it should actually be. The issue was supposed to be about the chains of meaning between past, present and future.

Chapter 6

Technical Matters

6.1. Introduction: mobilizing the future

Phase 2 was held in Toronto in two parts, the first 10-28 June 1996, and the second 18-21

November 1996. Phase 2 was intended to discuss:

> . . . technical hearings focusing on the long-term safety, the post-closure period of
> AECL's concept of geological disposal from the scientific and engineering
> viewpoints. . . . [as well as] the environmental, health and social and economic
> impact issues specific to the pre-closure period of the proposed disposal facility.[1]

Consistent with this focus on technical matters, Seaborn requested from AECL and Ontario

Hydro:

> . . . a brief clear statement of what is the concept which AECL are asking the
> Panel to assess for safety and acceptability, the relationship of the two case
> studies which they have presented to their concept, and the relationship of these
> two case studies to each other.[2]

Yet this request of Seaborn's came ten days of testimony into a scheduled twelve days of Phase 2

hearings, and in effect twenty-four days into a public inquiry held to investigate that very

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[1] Blair Seaborn (Panel Chairman), 10 June 1996, *HT* [Vol. 15], 6. This chapter draws upon verbal testimony to the
Seaborn panel. To facilitate the identification of individual identity, group affiliation, and source of evidence, in this
chapter I use footnotes of the following form. Direct verbal testimony, as found in the hearings transcripts (CEAA
1997), is cited as: Name (group affiliation), date of testimony, *Hearings Transcripts* (abbreviated as *HT*) [Volume
number], page number(s).
[2] Blair Seaborn (Panel Chairman), 21 June 1996, *HT* [Vol. 24], 137-38.

concept. What had occurred to occasion a request, half way through an inquiry, that the subject of that inquiry be given a clear definition?

This chapter shows that AECL and Ontario Hydro consistently advertised the concept as flexible in terms of design choices, and thus capable of being flexibly tailored to diverse site conditions. Uncertainties were thereby domesticated, because where they pertained to engineering features and environmental conditions they could be remedied via site-specific assessments and community involvement, and where they pertained to social issues they could be managed by a commitment to particular implementation principles. Two kinds of responses were initially mounted against this presentation of the concept. Technical and bureaucratic groups, including the SRG, AECB and NRCan, identified deficiencies in the documentation supporting the concept, and in the means of methodological assessment offered, yet regarded the concept as acceptable or workable *in principle*. These groups also reiterated the commitment to fostering public participation in decision-making, implying that attention to consultative practices would bestow democratic legitimacy upon the process of resolving residual uncertainties. NGOs and other public groups criticized the flexibility, considering the concept relatively amorphous in some respects, but nevertheless treated the concept as clear enough that identifiable deficiencies and weaknesses were reason to reject the concept. Moreover, by treating the concept as separable enough from similar deep geological disposal approaches in other countries, critics implicitly posited a stable identity for the concept. For critics, the important point was that 'workable in principle' should not be taken to imply 'demonstrated to be acceptable'. Nevertheless critics were also concerned to ensure that, even if the concept were approved, public participation at the siting stage would not be constrained by claims that particular technical matters had been demonstrated and were thus to be considered settled.

All of these positions were in fact pre-figured in the initial assessment of the AECL EIS in 1994-95 (see Chapter 4), were reiterated in brief ways during Phase 1, and became prominent as the Phase 2 technical hearings commenced. Seaborn's request for clarification on the concept actually resulted, not from these disputes necessarily reaching an impasse, but because AECL introduced *more* evidence to substantiate its claims about the disposal concept. Although the AECL EIS had constituted the reference case for illustrating the concept since 1994 (AECL 1994a), during Phase two AECL introduced a further (five-volume) reference case, with different engineering and geophysical parameters (AECL 1996). This new reference case had been produced in response to a panel directive (of 8 December 1995) to address deficiencies in the EIS. AECL had notified the panel on 9 May 1996 (between Phase 1 and 2) that such evidence would be presented during Phase 2, but the new evidence was not formally introduced into discussion until 19 June 1996 (the eighth day of a scheduled twelve days of Phase 2 hearings). Almost universal complaint ensued when AECL introduced this additional documentation, with most groups regarding the new material as abusing the inquiry process. These complaints were taken as sufficiently serious for Phase 2 to be extended. Phase 2 ran to its originally scheduled ending of 28 June 1996, and then adjourned for almost five months, before being reconvened for a further four days of testimony 18-21 November 1996.

This chapter argues that the provision of more information, which one would intuitively think might resolve some issues, only exacerbated the pre-existing schism over how to interpret the degree of flexibility in the concept. AECL, Ontario Hydro and nuclear industry groups defended the new documentation as simply a further illustration of the flexibility of the concept, and as the normal engineering practice of optimizing design features. Technical and bureaucratic groups, including the SRG and the AECB, were relatively pleased with the additional evidence if

not its manner of introduction. Nevertheless the increased flexibility meant the concept now bordered on vagueness and lack of clarity. These groups still defended the argument that the concept was workable in principle, but they acknowledged that the fuzziness of the concept posed problems for evaluating the concept within a set framework. In other words, democratic accountability was hindered because it was now more difficult to set boundaries around what the concept was or was not. NGO's and other public groups interpreted the new documentation as another EIS, and considered the concept strategically flexible. Approving a fuzzy concept would grant too much discretion to AECL and Ontario Hydro, argued the critics. For instance, a concept with weak boundaries seemed to allow AECL and Ontario Hydro to evade the requirement to demonstrate safety and acceptability in the context of the public inquiry itself. Critics also argued that approving a vague concept would remove all possibility of constraining the institutional discretion of any future implementing organization.

To illuminate the basis of this conflict, over why the concept exhibited degrees of flexibility in the first place and what to do with such a flexible concept, I draw upon the literature on expectation dynamics. This literature stresses that expectations are more than just abstractions, but can be part of the creation of obligations, accountability and potential (Van Lente 1993, Van Lente & Rip 1998). The field of Science and Technology Studies (STS) has recently extended this literature to theorize the ways in which technological expectations and anticipations are performative: they mobilize the future in an attempt to shape the present (Brown, Rappert & Webster 2000). The performative nature of technological expectations suggests our analytic attention ought to be shifted from "looking into the future to looking at the future, or how the future is mobilized in real time to marshal resources, coordinate activities, and manage uncertainty" (Brown and Michael 2003, 4). I thus suggest that concept supporters

mobilized the future in order to minimize the discrepancy between what the concept had so far demonstrated and what it was projected to eventually demonstrate. That is, what could happen in the future was used to support action in the present. Disposal concept supporters thus articulated a 'proactionary' approach, in which projecting the future resolution of present technical deficiencies marginalized concern about such deficiencies. Present technical uncertainty was also politically domesticated by stressing the need to solve current problems and make decisions. By contrast, critics of the disposal concept articulated a 'precautionary approach', which involved mobilizing the future to articulate political objections but refusing to allow the future to be mobilized to allay concerns about present technical deficiencies. Critics constructed a future political context of unequal power relations during siting discussions as reason to dispute the legitimacy of the concept's present technical flexibility, which if allowed to pass would grant too much discretion to elites in future political bargaining. Yet critics also emphasized the disjuncture between the future and the present. Critics equated the mobilization of the future, in support of present assessments of the disposal concept, to the bypassing of the (present) public inquiry as a means to subject the disposal concept to testing and assessment.

This discussion of technical matters also bears upon themes developed in previous chapters, regarding whether the crucial issue for science policy discussions is whether experts or publics know better or whether the deeper issue is the definition of the issue itself. This chapter suggests that different ways of mobilizing the future are part of strategies (variously implicit or active) to manage public policy conflict about issues involving specialist knowledge and technological application. Specifically, I suggest that a proactionary approach (at least in the case discussed here) is where future realization and the need to act are mobilized as a surrogate for present deficiencies in evidentiary demonstration. Simultaneously a particular conception of the

future is mobilized, specifically a political future constructed as apparently innocent of present institutional interests. Proactionary approaches may tacitly enact a slippage from expertise informing public policy to institutionalized expertise colonizing public meaning. Conversely, I suggest that a precautionary approach (possibly specific to the case discussed here) is where standards of evidence are limited to what can be demonstrated in the present, and where this legalistic approach to evidence is coupled to a mobilization of future politics constructed as overly favourable to incumbent interests. Precautionary approaches either actively or tacitly defend conceptions of broad public meaning. In the discussion section I suggest Wynne and Jasanoff's critical approach to framing issues successfully maps how and why boundaries are drawn between science and politics because it remains sensitive to the implications of mobilizing the future. Moreover, despite Collins and Evans explicitly articulating a normative theory of expertise, I suggest their approach remains shallow because it is not well suited to theorizing what mobilizing the future means for public policy disputes involving expertise.

6.2 Initial articulations of the disposal concept

In suggesting a difference in approaches, proactionary and precautionary, I am not suggesting disputes about the disposal concept were primarily political in nature. Suggesting such would be to repeat the mistake of the AECB, who suggested at the beginning of Phase 2 that:

> . . . by and large what we heard in Phase 1 was a lot of members of the public aren't terribly interested in all of the sophisticated scientific and engineering information that's being presented, it's much more a reactive, more of an intuitive kind of a process as to whether this is a good thing as opposed to whether it's safe or not.[3]

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[3] Ken Bragg (AECB), 11 June 1996, *HT* [Vol. 16], 159.

NGOs responded that Phase 1 was about social issues; hence "there was no basis in those rooms for that kind of technical discussion, and I think I would just encourage people to not confuse those circumstances".[4] Phase 2 would thus become an arena of conflict over technical matters, with supporters of the disposal concept content to rest the identity of the concept in the hands of later users, but critics committed to disallowing such conceptual charity. Prior to Phase 2 commencing, critical NGOs and other public groups had witnessed how technical deficiencies in the disposal concept could nevertheless be subsumed by a proactionary approach that stressed either its workability in principle or the pragmatic need to act (or both).

The disposal concept had been initially defined in AECL's EIS as a multi-barrier system (meaning engineered and geophysical barriers) in which "the containers of waste would be emplaced in rooms in a disposal vault or in boreholes drilled from the rooms" (AECL 1994a, 82). The vault itself would be buried 500-100 metres in plutonic rock.[5] This concept included the avoidance of institutional (human) controls as part of the safety system, on the grounds that human institutions could not be relied upon beyond several hundred years (AECL 1994a, 2, 336; AECB 1987, 1, 9). The possible sources of uncertainty in post-closure assessment of a repository had already been identified and were thus (potentially) controllable (AECL 1994a, 315-17). AECL's confidence was such that deep geological disposal in plutonic rock was declared the "only viable option" for managing nuclear fuel waste in the long-term (334). As noted in Chapter 4, technical and Government groups (during the initial review of the EIS in 1994-95) found deficiencies in AECL's supporting documentation regarding the disposal concept, but

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[4] Brennain Lloyd (Northwatch), 11 June 1996, *HT* [Vol. 16], 160-61.
[5] The plutonic rock of the 'Canadian Shield' is an intrusive (below the surface) igneous rock formation, and is believed to have been formed by crystallization of magma or the chemical alteration of pre-existing rock (AECL 1994a, Chap. 4; SRG 1995a, 2).

nevertheless approved of the concept. The SRG regarded Ontario Hydro's pre-closure

assessment highly, but was heavily critical of AECL's post-closure assessment, yet because the

SRG regarded the concept as workable "in principle" they recommended moving forward to

siting (SRG 1995a, 17). Similarly, the AECB argued that "the EIS does not adequately

demonstrate the case for deep geological disposal", but siting should proceed because they were

confident the concept was "safe and viable".[6] The persuasiveness of this view of the disposal

concept was suggested on Day 1 of the public inquiry, when NRCan cited international

agreement that permanent disposal was the right option as reason to turn toward the "important"

task of determining positions on implementation and siting issues. NRCan thus cited pragmatic,

proactionary, reasons for moving to the siting stage: the ethical imperative to relieve future

generations of the burden of handling this generations waste, the fact that the Government

supported nuclear power as an energy option compatible with sustainable development policies

(and solving the waste disposal problem thus increased the credibility of this energy option), and

the time and money that had thus far been invested in investigating nuclear waste disposal.[7]

During Phase 1 AECL and Ontario Hydro had argued that technology was available to

safely dispose of nuclear waste, plutonic rock was a secure medium in which to bury nuclear

waste, review groups had found the concept viable in principle, and that the choice of deep

geological disposal itself was confirmed by the fact other nations had reached the same

conclusion.[8] Ontario Hydro emphasized that because siting was both in the future and a process

to be handled in a step-wise fashion, one of the virtues of the disposal concept was the fact it

remained flexibly responsive to "improved scientific data and [possible changes in] societal

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[6] AECB, *PC*, Pub. GOV 002, 2.
[7] Peter Brown (NRCan), 11 March 1996, *HT* [Vol. 1], 14-30.
[8] Ken Nash (Ontario Hydro), 11 March 1996, *HT* [Vol. 1], 41-52; Kenneth Dormuth (AECL), 11 March 1996, *HT* [Vol. 1], 62-76.

values". For Ontario Hydro, the combination of a viable and flexible concept, and the fact an

implementing agency would be guided by the principles of implementation outlined in the AECL

EIS, implied "society must now decide what it wants to do. Does it want to move forward?"[9]

AECL concurred, reiterating that if an implementation organization adhered to its previously

stated risk management principles (safety and environmental protection, voluntarism, shared

decision making, openness, and fairness (AECL 1994a, 146)) it would be trusted. According to

AECL, the combination of the deep geological disposal concept and the implementation

principles had in fact resulted from flexibly "integrating our understanding of societal issues with

the results of our scientific and technical research".[10] The flexibility of the concept was thus no

impediment to action. Early in Phase 1 AECB confirmed this proactionary approach, and

signalled what it considered the accompanying regulatory standard. AECB noted that it did not

require the "best" site or technology.[11] Environment Canada followed suit, noting that while the

AECL EIS "does not provide sufficient justification to support the acceptability of the concept"

the concept was nevertheless "potentially sound".[12]

During Phase 1 critics had begun to formulate objections to this proactionary approach to

technical matters, but the procedural division between social issues and technical matters limited

the extent of their interrogation of the approach. In response to the moral position implied by the

claim that action must be taken, for instance, one group asked whether it was "a self-fulfilling

prophecy when you say that we have an obligation to come up with a site and a concept".[13] An

SRG member later made clear the pragmatics of flexibility: "if the concept on the table cannot

respond to changes, then it's not particularly useful because things change. Our knowledge and

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[9] Ken Nash (Ontario Hydro), 11 March 1996, *HT* [Vol. 1], 46 and 42-43.
[10] Kenneth Dormuth (AECL), 11 March 1996, *HT* [Vol. 1], 73 and 76.
[11] Ken Bragg (AECB), 11 March 1996, *HT* [Vol. 1], 139-40.
[12] John Mills and George Cornwall (Environment Canada), 11 March 1996, *HT* [Vol. 1], 165 and 168.
[13] Lloyd Greenspoon (Algoma Manitoulin Nuclear Awareness), 11 March 1996, *HT* [Vol. 1], 145.

our understanding changes. And because this process is taking so long and the ultimate decision of finding a site may be taking even longer, we need lots of flexibility."[14] An NGO responded by articulating how public groups could have misgivings about flexibility, asking "whose flexibility are we talking about here? I love having flexibility. I hate it when somebody who is threatening me with something has flexibility."[15] Yet when one respondent queried how technical groups could "find so many major deficiencies and then agree to the basic proposal,"[16] Seaborn intervened to suggest such details were "most appropriately" deferred to Phase 2,[17] which the SRG member agreed with because it would "take me a long time" to answer.[18] With procedural matters in Phase 1 limiting the extent of cross-examination, critics outlined the basic form of the precautionary approach instead. With specific reference to the claim that "in principle" the disposal concept could be implemented safely, critics used legal metaphors to claim AECL and Ontario Hydro, rather than critics, bore the burden of proof. Rather than a standard of proof emphasizing the disposal concept was potentially capable of being demonstrated in the future, critics demanded the disposal concept be assessed by whether or not it was demonstrated to be acceptable in the present. Finally, the public inquiry was the appropriate location for deciding if the concept had passed sufficient tests, not future contexts.

Thus one NGO argued the concept ought to be "abandoned", because "proponents cannot prove beyond a doubt that their concept is both safe and robust".[19] A citizen noted political accountability would be maximized if the panel recommended "site exploration and screening as a means of modifying and improving the EIS. This approach would correct the unfruitful

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[14] Stella Swanson (Golder Associates), 15 March 1996, *HT* [Vol. 5], 137. Swanson offered this opinion in her capacity as a private consultant, not an SRG member, but this opinion is consistent with the SRG position.
[15] Norm Rubin (Energy Probe), 15 March 1996, *HT* [Vol. 5], 146.
[16] Tom Lawson (Concerned Citizens of Port Hope), 15 March 1996, *HT* [Vol. 5], 152.
[17] Blair Seaborn (Panel Chair), 15 March 1996, *HT* [Vol. 5], 153.
[18] Stella Swanson (Golder Associates), 15 March 1996, *HT* [Vol. 5], 153.
[19] Dave Plummer and Ann Lindsay (Concerned Citizens of Manitoba), 29 April 1996, *HT* [Vol. 11], 49.

scientific and engineering exercise of examining a concept without feedback from a variety of real possibilities."[20] Some NGOs offered extensive arguments to the effect that waste should be kept at reactor sites because "what they are trying to do is dispose of the problem, rather than dispose of the waste". For this NGO the panel was *not* being asked to judge whether the concept of deep geological disposal

> . . . is desirable, not whether it is better than other options, not whether scientists feel in their bones that this is a good solution, but whether, in fact, it has been proven acceptable. Now, I believe that it is essential, like a jury at a trial, to place the burden of proof clearly where it belongs, which is with the prosecution, in this case the proponent, to demonstrate, beyond a reasonable doubt, that in fact this concept is proven acceptable.[21]

6.3 Seven days in the life of a disposal concept

During Phase 2 the deep geological disposal concept would become increasingly elastic, but because disposal concept critics and supporters were committed to different standards of proof, this elasticity would prove more disconcerting for critics than for proponents and supporters. As noted, the introduction of extensive additional documentation on the eighth day of Phase 2 testimony (19 June 1996) stretched the disposal concept beyond what critics found acceptable for technical assessment purposes. While disposal concept supporters did not interpret the additional evidence as hindering technical assessment, both critic and supporter of the disposal concept concluded the additional documentation hindered efforts to secure political accountability. This section discusses how AECL and Ontario Hydro presented the disposal concept prior to the introduction of additional documentation, and how supporters received the proposal (especially

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[20] Walter Saveland (Concerned Citizen), 3 May 1996, *HT* [Vol. 14], 10.
[21] Gordon Edwards (Canadian Council for Nuclear Responsibility), 3 May 1996, *HT* [Vol. 14], 30 and 17-18.

the Scientific Review Group (SRG), mandated to provide independent technical advice). News

of pending additional documentation lingered throughout discussions, even if little of it was

available for review.

AECL began Day 1 of the Phase 2 technical hearings by arguing that apart from a few

unfavourable geological conditions to avoid, such as seismic risk zones and highly oxidizing

(high presence of oxygen) conditions, "there should be a minimum of exclusionary criteria".

According to AECL, "from a technical point of view . . . [there are] . . . no show-stoppers", with

the only exclusionary criteria possible being those related to long-term stability or community

and/or socio-economic issues.[22] AECL concluded its initial talk by noting:

> I would like to remind the Panel, the SRG, and the audience that the concept
> includes a wide range of design choices for the engineered barriers that can be
> tailored to a wide range of site conditions to achieve the desired level of overall
> safety of disposal concept.[23]

Seaborn panel members understood that AECL was attempting to "maintain flexibility in the

widest range of siting options", but nevertheless wondered if "there some limits somewhere".[24]

What I call the proactionary approach meant technical and bureaucratic groups did not

approach either the flexibility in the concept, or identified deficiencies, as a reason to restrict the

applicability of the concept. The SRG thus found AECL's geotechnical information inadequate,

their socio-economic data not well integrated, their site selection criteria lacking in specificity,

their choice of titanium canister questionable, and the Ontario Hydro pre-closure assessment

vastly superior to the AECL post-closure assessment (the former hypothetical and generic, the

latter using mathematical and computer models but built upon site specific data). Yet the SRG

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[22] Cliff Davison (AECL), 10 June 1996, *HT* [Vol. 15], 12 and 38.
[23] Cliff Davison (AECL), 10 June 1996, *HT* [Vol. 15], 28.
[24] Dougal McCreath (Seaborn panel member), 10 June 1996, *HT* [Vol. 15], 38.

still concluded that "in principle, the concept of which siting is one part is workable".[25] Other

technical review groups concluded similarly, for instance recommending the optimization of

engineering barriers (because geo-sphere variability made it difficult to predict rock fractures),

but otherwise concluding that "the principles of multiple barriers and of maintaining flexibility

during vault construction in our view are essential."[26] Seaborn panellists set these observations

within a context of the need to make some kind of decision, which was understandable given the

panel's remit to make recommendations. Although noting the concept became "very fuzzy"

when organizations list deficiencies but suggested acceptable in principle, NGO discussion of

uncertain science was said *not* to remove the question of what to do.[27] Another asserted that,

while NGOs had a point that a lack of specific criteria hindered the assessment goal of

discovering "drop dead problems," nevertheless no approach "removes uncertainty" entirely.[28]

Despite this talk of flexibility, lack of specificity, and future orientation, the object (concept)

possessed enough stability for AECL to commence Day 2 with a description of its features.

AECL explained that the deep geological disposal concept involved the burial, 500-

1000m deep in low-permeability and sparsely fractured plutonic rock, of waste filled titanium

alloy canisters. The canisters would be emplaced in boreholes in the floor of disposal rooms, and

then surrounded by a clay-based buffer, before the vault was back-filled and sealed. The safety

of the concept included the fact that it was passive safety, meaning both that the geosphere

would protect the engineered barriers and that institutional controls were avoided (the vault

would be permanently closed upon being sealed). Indeed AECL expected the vault to eventually

saturate with water, creating a non- or low-oxidizing environment (as the oxygen is stripped

[25] Robert Kerrich (SRG), 10 June 1996, *HT* [Vol. 15], 131-32.
[26] Norm Wardlaw (Joint Committee of the Canadian Academy of Engineering and the Royal Society of Canada), 10 June 1996, *HT* [Vol. 15], 148.
[27] Pieter Van Vliet (Seaborn panel member), 10 June 1996, *HT* [Vol. 15], 156 and 182.
[28] Dougal McCreath (Seaborn panel member), 10 June 1996, *HT* [Vol. 15], 125 and 183.

from the water as it descends in plutonic rock (i.e., consumed by organic matter and iron minerals)), which would thus minimize many forms of microbial activity.[29] This concept had been subjected to technical assessment by the SRG, prior to public hearings, and NGOs thus had access to these reports. The SRG's original report (SRG 1995a) on the AECL EIS was basically divided in two. Chapter 5 discussed the generic concept of a multiple-barrier deep geological repository system, and found it to be acceptable in principle. Chapter 6 discussed AECL's post-closure assessment report, based on data from the Whiteshell Research Area near the Underground Research Laboratory (URL) in Pinnawa, Manitoba, and concluded that the reference case did not adequately demonstrate the acceptability of the concept. As noted in Chapter 4, their reasons included disliking much of the modelling work and the lack of independent peer review.

Despite having declared the concept workable the previous day, on Day 2 the SRG heavily criticized AECL: "AECL has not convincingly shown how the reference case study that illustrates the concept can be safely implemented at other sites." Nevertheless this conclusion was no grounds for inaction. The SRG argued that siting should go forward because the concept was the "best option" and because AECL and Ontario Hydro remained the best qualified to be the implementing agency. The SRG did, though, recommend to the Panel that moving forward was conditional on the Panel accepting that compliance with AECB guidelines could be shown later if not at present.[30] The AECB held a similar view to the SRG, lamenting "we have a poor EIS. Independently of that, we have recommended that you [the Panel] go ahead . . . Because we're in a concept Phase, which is unique, we have gone further [than simply rejecting the

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[29] Ken Dormuth (AECL), 11 June 1996, *HT* [Vol. 16], 5-21. AECL's post-closure assessment case study is also described in detail elsewhere: Alf Wikjord and Brian Amiro (AECL), 18 June 1996, *HT* [Vol. 21], 5-35. The problem with microbial activity was said to be related to the potential for altering of environmental conditions (such as degradation or breakdown of barriers, gas generation and/or uptake and transport of nuclides).
[30] Ray Price (SRG), 11 June 1996, *HT* [Vol. 16], 124, 129-30 and 138.

proposal]." As a regulator, the AECB recognized that they were "walking a very thin line".[31]

The AECB also referred to both AECL's response to AECB criticisms of the EIS, and to the fact

they were aware that AECL was soon to provide additional documentation. Regarding the

former, the AECB were "disappointed" because the response amounted to "a re-statement of the

original position", while the lateness of the latter was considered "inappropriate".[32]

Significantly, the AECB felt the new documentation meant "the concept is still very unclear. I

don't know whether it is now the impervious 50 metres of rock that's the concept, or a copper

canister concept. It is still completely – it's completely ambiguous." Nevertheless the AECB

shared the SRG's proactionary framework: "the way we feel to move ahead collectively within

the country is to go to a real design, a real site, a real integrated assessment."[33]

NRCan shared the same proactionary framework. NRCan began by noting deficiencies.

NRCan was unhappy with either of the canister materials proposed (corrosion-resistant titanium

or corrosion-allowance copper), they felt much more investigation was needed in regard to vault

conditions and design, and they argued that the modelling work completed on geosphere features

and processes was either compromised by inadequate linkages between the distinct models

involved or simply not transferable to other potential sites.[34] Nevertheless NRCan concluded

that "the implementation of the disposal concept is feasible with current technology . . . the

performance assessment methodology developed is adequate to demonstrate the soundness of the

concept [and that] Natural Resources Canada supports AECL's concept for deep geological

disposal of nuclear fuel waste in plutonic rock of the Canadian Shield."[35] In response to NGO

questioning, the NRCan representative confirmed the kind of intuition that lay behind noting

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[31] Ken Bragg (AECB), 11 June 1996, *HT* [Vol. 16], 155-57.
[32] Ken Bragg (AECB), 11 June 1996, *HT* [Vol. 16], 146-47.
[33] Ken Bragg (AECB), 11 June 1996, *HT* [Vol. 16], 148 and 149.
[34] John Ramsey (NRCan), 11 June 1996, *HT* [Vol. 16], 177-83.
[35] John Ramsey (NRCan), 11 June 1996, *HT* [Vol. 16], 183.

deficiencies but approving the concept: "a lot of faith that key concerns associated with what

we're dealing with here can be addressed in the future. And can be adequately resolved."[36] On

Day 3 the SRG noted they were also aware that AECL was working on a copper canister; this

was the SRG's preferred choice. The SRG argued AECL's choice of a titanium canister was "the

key deficiency" in the disposal concept, due to its probability of mechanical failure, likelihood of

crevice corrosion, and potential to thus facilitate microbial growth in the vault.[37] The concept, in

other words, was not so fuzzy that specific features could not be identified as deficient.

Similarly, on Day 4 the SRG noted that the poor choice of titanium canisters, and thus its

associated problems, was accompanied by (possibly explained by) "an essential denial of

microbial issues".[38] Though noting the SRG had gained access to a summary of AECL's

pending further documentation (AECL 1996), the SRG noted they were yet to "digest it".

Moreover, one SRG member likened it to being sure of the time when one has one watch, but

being unsure of the time when one has two watches.[39] For the SRG, the new documentation

represented new possibilities rather than an alternative concept. The SRG (re)emphasized this by

arguing that the entire concept fails if the geo-mechanical stability of the vault failed. That is, if

the vault was crushed, leaving only the geo-sphere as a barrier to radionuclide migration, then a

multi-barrier concept would have become a one-barrier concept.[40] Hence the SRG interpreted

the potential increase in flexibility of the concept, represented by the new documentation, as

involving new possibilities *within* the concept. Yet this flexibility did not preclude considerations

about which possibility was true, for instance on Day 5 an SRG member claimed the "greatest

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[36] John Ramsey (NRCan), 11 June 1996, *HT* [Vol. 16], 196. Ramsey specified he was speaking "as an individual" in saying this, but the intuition remains a consistent feature of the proactionary framework diverse organizations appeared to share.
[37] David Duquette (SRG), 12 June 1996, *HT* [Vol. 17], 128 and 123-33 *passim*.
[38] Roy Cullimore (SRG), 13 June 1996, *HT* [Vol. 18], 63.
[39] Schlomo Neuman (SRG), 13 June 1996, *HT* [Vol. 18], 129-31.
[40] David Duquette (SRG), 13 June 1996, *HT* [Vol. 18], 120 and 142.

weakness of the concept as currently represented in the reference case study" was the projection - based on finding low-permeability rock at the URL site - that such rock existed in sufficient quantity in a much larger volumes of rock (the Canadian Shield) than just the Whiteshell area.[41] Nevertheless truth claims were not the SRG's main complaint. Rather, the way AECL related its data and models was not so much "wrong" as "unreliable" and "unsubstantiated".[42]

The SRG could adopt a standard of proof privileging reliability over truth because site-specific inquiries were considered to be the location within which truth claims were to be resolved, leaving conceptual matters subject to whether they were reliable or not. The SRG made this apparent at the end of Day 5, in response to NGOs wondering if all the talk of new documentation (unseen by NGOs) meant a different EIS was being discussed. An SRG member encouraged NGOs to keep in mind a distinction between matters that were site specific and matters that were generic,[43] and that the SRG's critique of AECL focused on the fact some models (i.e., GEONET and BIOTRAC) were site specific and thus inadequate evidence for the generic concept. What concerned the SRG was not flexibility in the concept *per se*, but the ability to acquire a close understanding about how judgments about the relation between data and models had been reached. This required that AECL be more flexible about its documentation. The AECB shared the same complaint, noting on Day 6 that AECL's dose conversion factors relevant to their BIOTRAC model (measures of the amount of radionuclides populations and individuals would be exposed to via vault failure) had not been updated to match recent guidelines. For the AECB, this suggested "the inflexibility of what they [AECL] have done".[44] Similarly, the SRG regarded the estimates of radionuclides escaping to the biosphere, based upon

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[41] Schlomo Neuman (SRG), 14 June 1996, *HT* [Vol. 19], 149-50.
[42] Ray Price (SRG), 14 June 1996, *HT* [Vol. 19], 126 and 132.
[43] Emil Frind (SRG), 14 June 1996, *HT* [Vol. 19], 171-72.
[44] Ken Bragg (AECB), 17 June 1996, *HT* [Vol. 20], 55.

the BIOTRAC model, "not entirely convincing" because AECL appeared to have "followed a

path of simulating realism by increasing detail in calculations".[45] AECL's lack of

responsiveness thus troubled both the AECB and the SRG. Nevertheless they expressed

sympathy with AECL's task of projecting into the future even as new information flooded in.[46]

By Day 7 the SRG had an opportunity to respond directly to AECL's presentation of its

post-closure assessment reference case.[47] Again, the SRG noted the reference case was not

reliable because choices about inputs and parameters were not well documented and because the

uncertainty analysis did not accommodate reasonable environmental and other factors. Again,

deficiencies in the reference case did not impinge upon the concept itself, which was in principle

acceptable. Having participated in one week's worth of technical hearings, where issues

surrounding flexibility coexisted with the shadow of additional documentation, the SRG argued

that an "inherent tension" existed between applying a generic assessment methodology to a

reference case and projecting whether suitable sites will exist. Moreover, uncertainty could not

be eliminated: "we will always be unsure that we're sure how unsure we are."[48] For the SRG,

concerns about flexibility in the concept were simply misplaced; what really mattered was that

> . . . the EIS is neither flexible nor robust enough to convincingly demonstrate
> safety . . . [Nevertheless] . . . the SRG over the next couple of days will continue
> to emphasize these two points: the concept can work in principle; the reference
> case doesn't show it, and that's the bottom line.[49]

For the SRG, deficiencies in present evidence were no barrier to implementation, and hence

flexibility in the concept posed no difficulties. One Seaborn panellist thus asked the SRG

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[45] Fred Roots (SRG), 17 June 1996, *HT* [Vol. 20], 93 and 96.
[46] Fred Roots (SRG), 17 June 1996, *HT* [Vol. 20], 91-92.
[47] Stella Swanson (SRG), 18 June 1996, *HT* [Vol. 21], 109-34.
[48] Stella Swanson (SRG), 18 June 1996, *HT* [Vol. 21], 113.
[49] Stella Swanson (SRG), 18 June 1996, *HT* [Vol. 21], 120 and 124-25.

whether it is "your knowledge, common sense, worldwide knowledge" that makes the concept

"doable",[50] to which the SRG replied "that's correct".[51] An NGO interpreted this position as

implying that in principle the multi-barriers meant we "can compensate for anything",[52] to

which the SRG replied "right . . . it's not perhaps so much a failsafe but a safe even if it fails type

scenario".[53] Technically speaking, the future could fix anything. The safety and acceptability

(the meaning) of the deep geological disposal concept was thus constructed as *independent* of its

material failure to be realized (its application, or 'use') in the AECL reference case.

6.4 Demonstrating unacceptability

NGOs and other public critics had access to the reviews of the AECL EIS, plus the EIS itself,

prior to the public hearings. Hence the standard of proof that hinged on 'possible in principle'

was familiar to them by Phase 2. Given the strong public perception that approving waste

disposal would be used to support nuclear expansion, during Phase 2 public critics sought to

restrict the discretion (political and technical) AECL and Ontario Hydro might have over what

the disposal concept implied.

Energy Probe thus suggested the AECB ought to be providing exclusionary criteria,[54]

thereby limiting the ability to site a repository. Given the technical flexibility in the concept,

Northwatch stated that accepting a concept ought not to be interpreted as deciding upon what

constituted the value of an ecosystem component, whether the right kind of rock was available,

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[50] Mary Jamieson (Seaborn panel member), 18 June 1996, *HT* [Vol. 21], 126.
[51] Stella Swanson (SRG), 18 June 1996, *HT* [Vol. 21], 126.
[52] Norm Rubin (Energy Probe), 18 June 1996, *HT* [Vol. 21], 129.
[53] Stella Swanson (SRG), 18 June 1996, *HT* [Vol. 21], 130.
[54] Norm Rubin (Energy Probe), 10 June 1996, *HT* [Vol. 15], 69-70.

or whether the permeability of plutonic rock decreases with depth.[55] NGOs were thus concerned

that a 'possible in principle' approach might imply no "specific criteria"[56] could be used, for

instance, to exclude particular rock types from consideration.[57] Attempts to restrict the

discretion created by technical flexibility would remain a consistent feature of NGO positions.

Thus several days into Phase 2 hearings Energy Probe wanted it to be placed on record that,

because the possibility of CANDU reactors using Mixed-Oxide Fuel (MOX) was off the agenda

of the public inquiry, accepting the concept could not be taken to imply that the waste from such

fuel could be considered a fuel form reviewed at the public inquiry.[58]

NGOs and other public members were not the only audience sceptical about the 'possible

in principle' standard of proof. Lois Wilson, who would later write a book highly critical of

public policy-making about nuclear matters (Wilson 2000), pointedly asked the SRG on Day 1 of

Phase 2 what validated the disposal concept rather than invalidating it.[59] Northwatch articulated

the relevant 'public' standard of proof, asking the SRG:

> I wonder if you would agree that there is a distinction that could be made and
> must be made between a proposal being potentially acceptable or acceptable in
> principle, and having been demonstrated acceptable or having had the safety and
> acceptability demonstrated. Would you make that distinction?[60]

Although the SRG argued this distinction was implicit in the difference between Chapter 5 and 6

of their original report (SRG 1995a), as Section 6.3 indicated technical and bureaucratic groups

regarded potentially acceptable as the relevant standard of proof for justifying policy action.

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[55] Brennain Lloyd, 10 June 1996, *HT* [Vol. 15], 75-78.
[56] Norm Rubin (Energy Probe), 10 June 1996, *HT* [Vol. 15], 144.
[57] Brennain Lloyd (Northwatch), 10 June 1996, *HT* [Vol. 15], 105.
[58] Norm Rubin (Energy Probe), 12 June 1996, *HT* [Vol. 17], 205.
[59] Lois Wilson (Seaborn Panel member), 10 June 1996, *HT* [Vol. 15], 135.
[60] Brennain Lloyd, 10 June 1996, *HT* [Vol. 15], 143.

Although public critics acknowledged uncertainty could not be eliminated, that "nothing in this life is guaranteed" as one said, accepting 'potentially acceptable' was to accept too high a degree of uncertainty. The Saskatchewan Environment Society captured what seemed to animate much public disquiet, finding objectionable the "tentativeness" of the proponents, the unsatisfactory nature of the "adequate, but deficient" reviews, and the lack of conclusions of the form "we are convinced, we are satisfied."[61]

In the initial stages of Phase 2 public critics seemed confident they could direct criticism at a specific target. This was evident when the AECB stated it was confident in the disposal concept, in principle, because other nations (Sweden, Finland, Switzerland) had presented workable versions of deep geological disposal. Northwatch replied that "just because I know how to drive doesn't mean my sister gets a license", while Energy Probe asked if the inquiry process "can deal with that amorphousness of your faith".[62] In arguing that the success of other national projects was irrelevant to assessments of the disposal concept under investigation, critics implicitly argued AECL's disposal concept was distinguishable enough to be adequately assessed at the inquiry. It was the context of Canada's public inquiry that mattered for assessment purposes, not geographically and politically displaced contexts. By Day 3 public critics had heard several presentations by AECL and Ontario Hydro highlighting the flexibility in the concept. Review groups and bureaucratic agencies had both mentioned additional documentation and the possibility of further options within the concept. Energy Probe summed up public frustration:

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[61] Ann Coxworth (Saskatchewan Environment Society), 10 June 1996, *HT* [Vol. 15], 173, 186, and 188.
[62] Brennain Lloyd (Northwatch), 11 June 1996, *HT* [Vol. 16], 162; Norm Rubin (Energy Probe), 11 June 1996, *HT* [Vol. 16], 164.

> I am finding it increasingly confusing about what it is that we are all assessing
> here. I mean, we're getting into incredible technical detail on what are
> increasingly described as one of a near infinite series of options, and I don't see
> anything here that anyone can comment on, because as soon as a point is made
> about the reference case, we're told that the reference case study really is a near
> randomly selected micro . . . you know, a little dot on the universe of possibilities,
> and what we're left with is the good faith, intelligence, educability, institutional
> culture, et cetera, et cetera, of either this organization or whatever the infinite
> possibilities of organizations in the future will carry forward, this or some other
> plan.[63]

This comment is directed less at the flexibility in the concept itself, but at the flexibility ("what

we're left with...") gained by a possible implementing organization. This organizational

flexibility is maximized, according to this critique, by the extent to which the AECL reference

case is actively separated from the concept.

Public critics were concerned an implementing organization would be unaccountable if a

precedent was set that deficiencies did not imply non-viability. This concern was exacerbated

because, as Northwatch noted, if organizations such as Ontario Hydro were made the

implementing organization then the public would be faced with an entity whose "track record

isn't great" in terms of public involvement.[64] Given such scepticism about the trustworthiness of

potential implementing organizations, public critics sought to maximize the opportunity for

public involvement offered by the public inquiry. Thus by Day 4 public critics began to focus

upon the references to additional documentation by technical and bureaucratic groups, which

typically included reference to the fact AECL had investigated replacing the titanium canister

discussed in the EIS (AECL 1994a, Section 4.6) with a copper canister. Although AECL and

Ontario Hydro argued that alternate canister materials were not excluded in the EIS, Energy

Probe claimed even if copper was mentioned "in a paragraph in the EIS" it ought to be treated as

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[63] Norm Rubin (Energy Probe), 12 June 1996, *HT* [Vol. 17], 84.
[64] Brennain Lloyd (Northwatch), 12 June 1996, *HT* [Vol. 17], 199.

an "alternative concept". The reason for this was less to do with whether or not the deep

geological disposal concept did or did not include such options, but because "we're not having a

hearing on that . . . that's not what we've been asked to examine, that's not what's been tested,

that's not where the science has been applied."[65]

Public critics thus constructed the public inquiry as the proper forum in which the

disposal concept ought to tested, and this commitment implied it was the original EIS of 1994

that was on trial. Indeed, some public critics thought it was a weakness that AECL had yet to

decide on what material would be used for the containers.[66] The Saskatchewan Environment

Society similarly admitted "frustration" with the proponents, but otherwise applauded how

"ideas are being challenged here in public for the first time . . . [this is] extremely fruitful". Yet

such an interactive process was considered to be in jeopardy of losing its legitimacy to the extent

"a lot of new information" might lead to the "case study and the safety assessment . . . rapidly

retreating into irrelevance."[67] This comment was prophetic, as the public experienced increasing

difficulties maintaining the relevance of the original EIS. Thus on Day 5 AECL gave a

presentation on the geo-sphere aspects of the disposal concept, which included the rocks

surrounding the vault, overlying sediment, and groundwater features. The geo-sphere was

advertised as an essential barrier protecting the vault, maintaining appropriate geophysical and

geo-mechanical conditions favourable for isolating the vault, and limiting the transport of

radionuclides to the surface. As AECL noted, the EIS utilized an in-borehole emplacement

method (for canisters) and advertised the advantages of a zone of sparsely fractured, low-

permeability rock.[68]

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[65] Norm Rubin (Energy Probe), 13 June 1996, *HT* [Vol. 18], 156-58.
[66] Patricia Larkin (Concerned Citizen), 13 June 1996, *HT* [Vol. 18], 203.
[67] Ann Coxworth (Saskatchewan Environment Society), 13 June 1996, *HT* [Vol. 18], 160-63.
[68] Cliff Davison (AECL), 14 June 1996, *HT* [Vol. 19], 9-35. Also see AECL (1994a, 95-111).

Seaborn panel members found it difficult to keep AECL confined to the original EIS. AECL answered questions about geo-sphere conditions by referring to models discussed in their additional documentation, in which an in-room emplacement was investigated and the zone of low-permeable rock was replaced by rock of higher permeability. The Seaborn panel thus asked whether "when we are dealing with the concept, which is what we are asked to deal with - not with illustrative examples, but the concept - is the existence of a zone of low permeability rock . . . a fundamental part of the concept or not".[69] AECL answered that it was not, but for some citizens this answer was not necessarily a bad development. Reiterating the general public view that the public inquiry was the appropriate forum for deciding matters, one citizen made clear this ought not to preclude actively learning from the process of questioning: despite "very difficult and complex" issues, the inquiry remained a "precious opportunity" to explore those issues.[70] The situation was different for NGOs, because for many NGOs their participation involved considerable time and resources (notwithstanding intervenor funding). The inquiry as a forum to test proposals, rather than simply explore them, was one means to ensure resources consumed could potentially be brought to bear directly on decisions.

Northwatch was thus critical of the flexibility AECL displayed in its discussions of the geo-sphere features. AECL was content to "expect" that the vault depth would be somewhere in the 500-1000m range, dependent upon "the actual condition at a site" (and thus not known until future siting).[71] Northwatch objected that AECL was not only extrapolating from observations at lower depths (200-450m), but that their approach amounted to saying the vault depth would be "five hundredish to a thousandish perhaps". Northwatch thus formally requested that the Seaborn panel restrict the ability of AECL to depart from the EIS:

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[69] Dougal McCreath (Seaborn panel member), 14 June 1996, *HT* [Vol. 19], 55.
[70] Sarah Gladhill (Concerned Citizen), 14 June 1996, *HT* [Vol. 19], 90-92.
[71] Ken Dormuth (AECL), 14 June 1996, *HT* [Vol. 19], 109-10.

> I'm hoping that we might be able to bring some definition to the elasticity that
> seems to have entered into the discussion every day . . . I think that their failure to
> bring some definition in advance and in questioning is just clear evidence of the
> failure of the concept.[72]

Northwatch's call for some definition in advance made sense in the context of a precautionary

approach that wished to use the public form as a testing environment. Nevertheless the difficulty

with trying to legislate what constituted a departure from the EIS is that the meaning of a concept

is open-ended: collective judgments shape what will be considered proper or correct extensions

of a concept (cf. Barnes, Bloor, and Henry 1996, 55-59; Bloor 1997, 9-26).

Thus while different conceptions of the disposal concept were at stake, the salient contest

involved failing to reach a collective agreement about the context in which judgments about the

boundaries of the concept were to be resolved. Thus the Geoscience Council of Canada stated

that it was "pointless" to try and prove safety in the "abstract", and that they did not agree that

reaching a specific design was a suitable goal for the inquiry stage, because "any future design

would have to be adaptive."[73] Although this view reiterates AECL's view that the disposal

concept ought to be considered flexibly adaptable to local site conditions, it also smuggles into

this view of the disposal concept the added commitment that only local siting and not the public

inquiry was the context for deciding acceptability. NGOs protected the potential for the public

inquiry to act as a test of the acceptability of the concept, despite any complications arising from

the lack of a site. The procedural integrity of the inquiry was thus a potential resource for NGOs.

Northwatch thus argued NGOs would need "turnover time" because they relied on expert

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[72] Brennain Lloyd (Northwatch), 14 June 1996, *HT* [Vol. 19], 109-10.
[73] Gordon West (Geoscience Council of Canada), 14 June 1996, *HT* [Vol. 19], 154 and 159.

consultants, but could not afford to have them sit in the hearings themselves.[74] Energy Probe

also emphasized democratic integrity, noting that the community visits format of Phase 3 would

not be the place to "test the validity and plumb in public the range of technical views on the

second scenario". Energy Probe envisioned the role of the public inquiry as such showing that

> AECL's concept, which we're still trying to define, has been shown in a public
> process . . . proven to be acceptable. . . we are going to get what, to some of us,
> seems like a brand new EIS on a brand new concept, and to other people of course
> seems merely to be a further stretch of the existing concept.[75]

According to public critics, pushing all evidentiary matters to site specific investigations, or

allowing no restrictions upon what the object was under discussion, undermined the inquiry

process. It suggested that public opinions did not matter to considerations about what to do in the

face of technical uncertainty. In effect, the definition of social acceptability was at stake. Indeed

technical and bureaucratic groups operated with a definition of social acceptability that public

groups found dissonant. The SRG thus responded to a question about what to do in the face of

uncertainty by making the issue about consequences:

> Thank you for the $64 question . . . a great deal of the acceptability will be based
> upon social and political acceptance of the consequences that might occur to some
> future society or to some future quality of the environment. . . [It is also important
> to say that predictive models ought to be] . . . as accurate as we can make it.[76]

Public groups were certainly interested in debating questions of accuracy. Northwatch asked how

AECL can establish "sufficient certainty", at a "conceptual stage", without "actual data".[77]

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[74] Brennain Lloyd (Northwatch), 14 June 1996, *HT* [Vol. 19], 168-9.
[75] Norm Rubin (Energy Probe), 14 June 1996, *HT* [Vol. 19], 160-61 and 170.
[76] Fred Roots (SRG), 17 June 1996, *HT* [Vol. 20], 118-19.
[77] Brennain Lloyd (Northwatch), 17 June 1996, *HT* [Vol. 20], 139.

Northumberland Environmental Protection cited a study critiquing the AECL geo-sphere model

(for underestimating the rate at which contaminants will appear), and asked how such uncertainty

would affect AECL's models. It was asserted that even if the public had difficulty with

uncertainties they could nevertheless grasp "inconsistency and contradiction".[78]

But public critics did not solely measure social acceptance by whether or not deliberation

about what consequences to accept had taken place. This had become clear by Day 7, by which

time the public was aware that AECL was due to introduce its additional documentation the

following day (19 June 1996). Northumberland Environmental Protection suggested that AECL

had not anticipated such scrutiny of its post-closure assessment, and the SRG and AECB were

able to think a deficient evidentiary base still meant an acceptable concept, because "the nuclear

lobby" thinks "it can be done". Accepting a concept despite deficiencies was said to be

"politically worth it" in terms of limiting critique to site specific complaints and marginalizing

"protest to the hazardous technology at local level."[79] The issue here was whether or not the

political intentions of proponents were being sufficiently scrutinized. Similarly, Energy Probe's

concern was why flexibility was sought in the first place: "what is to one person a necessary

flexibility of the proponent is to another person, and that's me, unwarranted discretion by a party

whose motives I don't trust, at least organizationally."[80] As Wynne has noted, the public is often

concerned about upstream issues of purposes and goals, not just downstream issues of

consequences and impacts (Wynne 2005, 67).

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[78] Ella de Quehen (Northumberland Environmental Protection), 18 June 1996, *HT* [Vol. 21], 71-72 and 183.
[79] Ella de Quehen (Northumberland Environmental Protection), 18 June 1996, *HT* [Vol. 21], 192-93.
[80] Norm Rubin (Energy Probe), 18 June 1996, *HT* [Vol. 21], 240.

6.5 'Leaky container, tight rock' *versus* 'tight container, leaky rock'

Phase 2 altered course on 19 June 1996, and never quite recovered. AECL introduced into discussion their second case study. Initially AECL noted that "we thought that it would be of help to produce another case study in which the specifics were changed. We realize that this information is provided much later in the process than the original environmental impact statement". AECL's tone changed within a few days, when they presented the new case in more detail, now noting that "we regret that the explanation of what we're asking the Panel to review has not been sufficiently clear. We're grateful for the opportunity to clarify what the concept is, our interpretation of a safe concept and the relationship of the case studies to the concepts and to each other."[81]

The second case study (consisting of a summary plus five volumes) was introduced and discussed in depth on three separate occasions during the remainder of Phase 2;[82] notwithstanding that inquiry participants discussed both cases when stating their views. The second case study remained a multi-barrier system. But now waste filled copper canisters (not titanium) would be emplaced directly in disposal rooms (not in boreholes), buried 500-1000m deep in moderately permeable rock (rather than low-permeability rock). Although the new emplacement method meant half the backfill volume was needed, the vault size itself was twice as large, meaning different vault geometry was at issue and twice as much buffer volume was needed. The second case study was advertised as a pessimistic scenario, in which the permeability of the plutonic rock was so high that the geo-sphere barrier did not offer as much protection (of the vault) as the original EIS case study suggested it would. Engineered barriers

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[81] Ken Dormuth (AECL), 19 June 1996, *HT* [Vol. 22], 20; Ken Dormuth (AECL), 27 June 1996, *HT* [Vol. 25], 8.
[82] See AECL presentations of 19 June 1996, *HT* [Vol. 22], 20-44; 27 June 1996, *HT* [Vol. 25], 8-13; and 18 November 1996, *HT* [Vol. 27], 110-21.

were thereby shown to be capable of making up for geo-sphere deficiencies, with the overall

system performance still exceeding present regulatory requirements regarding potential

radionuclide release (though not by as wide a margin as claimed for the EIS reference case).

AECL argued the two reference cases "are not separate"; just "another case with a fictitious geo-

sphere," or "examples of what a concept might look like," because they were "trying to illustrate

the range within the concept" rather than "alternative designs for a specific site."[83] For AECL,

the concept included options capable of accommodating different sites and conditions.

Public critics were not pleased to be receiving extensive documentation late in the

inquiry process, and argued that accepting the new reference case deprived the process of

democratic legitimacy. Northwatch declared the lack of review time "does not constitute a

legitimate use or respect of process", while Nuclear Awareness Project accused AECL of

"abusing" the process and that this was yet more evidence of AECL complying with AECB

guidelines not the Panel guidelines. Energy Probe argued that, because the role of the public was

to help the Panel in "integrating the technical issues with the broader issues", the inquiry-related

difficulties associated with discussing "this new EIS" was analogous to the situation that would

be faced by local communities with minimal resources. The Canadian Environmental Law

Association labelled the "eleventh hour" presentation "dismissive" of the public. The

Saskatchewan Environmental Society asked which case ought to be believed; which case was

superior. Individual citizens, with even less resources at their disposal than the NGOs, found the

new case "inaccessible", or declared their "disgust" at being swamped with new data.[84] Over the

remaining four days of Phase 2 hearings (as originally scheduled), critics would refer to the

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[83] Ken Dormuth (AECL), 19 June 1996, *HT* [Vol. 22], 50-53.
[84] See 19 June 1996, *HT* [Vol. 22]: Brennain Lloyd (Northwatch), 77; Irene Koch (Nuclear Awareness Project), 97 and 99; Norm Rubin (Energy Probe), 84 and 84-87; Cathy Cooper (The Canadian Environmental law Association), 95; Graham Simpson (Saskatchewan Environmental Society), 105 and 109; Concerned Citizens (Cathy Frazer) 97, (Ms Moffatt), 99.

additional documentation as both compromising democratic legitimacy and reflecting the

exercise of unequal power relations. Some claimed the new case was a political project of

"shutting out" the public and "bypassing" the NGOs.[85] Another drew an implicit contrast

between AECL's "barrage of scientific information" and the public being otherwise "like sheep

in a pasture", given restrictions on "examining all our nuclear problems."[86] Others declared they

were "amazed" AECL had been asked half way through an inquiry to define their concept, and

concluded the explanation for the fuzziness was a "vested interest" in nuclear "expansion".[87]

Just prior to Phase 2 ending (before being reconvened in November), one citizen aptly summed

up the drift of public criticism regarding the new reference case. AECL's purpose at the inquiry

was said to be "to get further political approval, jump another bureaucratic hurdle to keep its

public relations campaign running."[88]

The public focus on the threat the new reference case posed for the procedural integrity

of the public inquiry reflected their commitment to the public inquiry as the legitimate domain

within which to test the disposal concept. Accepting additional documentation was thus to allow

in new evidence without opportunity for review. By contrast technical and bureaucratic groups

claimed the new reference case was already implicit within the concept sent to the public inquiry

for review, but they also tacitly treated the public inquiry as not the salient forum for deciding

safety and acceptability. The new reference case illustrated more than just the range within the

concept. It also signalled a commitment to forums outside (later in time than) the public inquiry,

namely actual site investigations and discussions during siting, as the salient forum for deciding

safety and acceptability. Although AECL was apologetic for introducing additional

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[85] Graham Simpson (Saskatchewan Environmental Society), 20 June 1996, *HT* [Vol. 23], 94-95.
[86] Shirley Farlinger (Concerned Citizen), 27 June 1996, *HT* [Vol. 25], 182.
[87] Dave Plummer (Concerned Citizens of Manitoba), 28 June 1996, *HT* [Vol. 26], 114.
[88] Phillip Penna (Inter-Church Uranium Committee), 28 June 1996, *HT* [Vol. 26], 189.

documentation late in the process, they appeared shocked that it would call into doubt the

identity of the concept. Reiterating that the two cases were just "two different examples of the

concept", AECL declared it an "extreme exaggeration" to call – as critics had done - the new

case a new EIS.[89] The Canadian Nuclear Association (CNA) concurred, arguing the new case

was "simply another illustrative example of the methodology which falls within the range of

parameters in the original concept as defined in the EIS".[90] One Seaborn panelist (McCreath)

also thought flexibility was inherent in the concept as found in the EIS.[91] Others were similarly

bemused, noting they always presumed the concept would be put into practice via specific

"tools" (which is what the cases were), or that they never presumed the concept was a "plan"

because they presumed at siting things would be done differently.[92]

The AECL Technical Advisory Committee (TAC) criticized the public critique, claiming

"it is not a vague concept; it is there in specific categories." In fact the TAC considered the

concept "feasible" *because* of the "additional elements that must be built into it as it proceeds."

Even though both cases constituted an "illustrative example", with some necessarily "arbitrary"

choices, according to the TAC it was this flexibility that actually demonstrated the safety of the

concept.[93] Some considered critic's frustrations with the boundaries of the concept "well

meaning", but ultimately driven by "overwhelming fear of nuclear".[94] These quotes indicate that

technical groups saw nothing abnormal in further reference cases to illustrate the concept. The

Canadian Nuclear Society (CNS) thus stated it was "normal engineering practice" to establish

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[89] Bruce Goodwin and Ken Dormuth, respectively (AECL), 19 June 1996, *HT* [Vol. 22], 105 and 109.
[90] Ian Wilson (CNA), 19 June 1996, *HT* [Vol. 22], 103.
[91] Dougal McCreath (Seaborn panel member), 19 June 1996, *HT* [Vol. 22], 130.
[92] Mori Mortazavi (Peto MacCullum Engineering Consultants), 19 June 1996, *HT* [Vol. 22], 154; Susan Keifer (Canadian Geoscience Council), 19 June 1996, *HT* [Vol. 22], 231.
[93] L. W. Schemilt (AECL Technical Advisory Committee), 20 June 1996, *HT* [Vol. 23], 11, 12, 15, and 33 respectively.
[94] Hans Tammemagi (Concerned Citizen), 20 June 1996, *HT* [Vol. 23], 44. Tammemagi refused to accept questions from the floor, but denied he "represented" industry. Nevertheless he was the author of AECL (1976), an early deep geological disposal proposal.

criteria (designs and regulations) and then "optimize the design to minimize the cost."[95] A

consulting engineer articulated the same claim, noting that "the idea of adding new designs as

you go down that track is perfectly normal to me."[96] Technical and industry lobby groups thus

constructed the inquiry as an unsatisfactory forum for deciding upon the safety and acceptability

of the disposal concept, and the new reference case only made this clearer:

> The CNA believes that the level of detailed information needed to license a site
> can only be obtained by proceeding to siting, and is far in excess of the level
> necessary to judge the viability and practicality of the Concept, especially looked
> at in principle. And we further believe that it would be wasteful to expend further
> resources at this time in assessing a wide range of hypothetical alternatives
> encompassing all the complex interrelationships between vault layouts,
> engineered and natural barriers, hydrology and geology, and the biosphere.[97]

Ontario Hydro, which in 2002 would become the major waste owner operating the Nuclear

Waste Management organization (NWMO), shared with the CNA the same rationale regarding

the concept and its reference cases. Ontario Hydro noted that, in regard to most questions, "a

definitive answer would have to, you know, await implementation stage".[98]

Yet arriving at an answer about the disposal concept was what public critics regarded as

the task of the inquiry itself. If technical groups mobilized the future as a domain in which

options could be narrowed down, designs optimized, and uncertainties resolved, public critics

mobilized a future characterized by unequal power relations. With such a future looming, public

critics sought to restrict the discretion of elites in those environments. One means to do this was

to enforce a notion of strict testing, in which the reference cases constituted evidence for or

against the concept. This was in opposition to the claim that each reference case was just one

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[95] Ken Smith (Canadian Nuclear Society), 21 June 1996, *HT* [Vol. 24], 30.
[96] Robin Charlwood (Acres Consulting) 19 June 1996, *HT* [Vol. 22], 161.
[97] Ian Wilson (CNA), 21 June 1996, *HT* [Vol. 24], 34-35.
[98] Theo Kempe (Ontario Hydro), 27 June 1996, *HT* [Vol. 25], 49.

among an unspecified number of possible instantiations of the concept. As such, no one case

could disprove the concept, though multiple cases could suggest concept 'robustness'. In their

efforts to restrict the boundaries around the concept and influence what constituted evidence, the

public had the Seaborn panel as both ally and hurdle. McCreath regarded the various options as

implicit within the concept (not separate), but Wilson noted the SRG implicitly separated

reference case and concept by finding the former deficient but the latter acceptable.[99] Although

SRG members approved of the "two scenarios", the latest illustrating an extreme end of the

spectrum where the geo-sphere fails,[100] overall the SRG also identified with public critics.

The SRG noted with "concern" the recent submissions, stating it was "at a loss with

respect to how to respond scientifically to the new case", and that "confusion regarding what

constitutes the concept and what constitutes illustrative examples of the concept . . . is quite

understandable."[101] Unlike other technical groups, the SRG realized the new case threatened to

violate public demands that the disposal concept be held accountable within the inquiry forum:

> . . . [the 'illustrative example' claim is] not good enough . . [as AECL must show
> how the new case] . . materially affects the acceptability and applicability of the
> concept . . . The public wants some brackets, some frame within which safety of
> any example is assured.[102]

Some public critics argued that 'frame' was already burdened by the legacy of a 1970s "political

decision" to pursue permanent disposal, and that everything AECL did was "governed" by a

commitment to instantiate old politics at any cost.[103]

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[99] Lois Wilson (Seaborn panel member), 19 June 1996, *HT* [Vol. 22], 48-49.
[100] Emil Frind (SRG), 19 June 1996, *HT* [Vol. 22], 148.
[101] Stella Swanson (SRG), 19 June 1996, *HT* [Vol. 22], 135-37.
[102] Stella Swanson (SRG), 19 June 1996, *HT* [Vol. 22], 138.
[103] Graham Simpson (Saskatchewan Environment Society), 20 June 1996, *HT* [Vol. 23], 90.

In the first week or so of Phase 2 hearings NGOs and public groups had often reiterated similar criticisms of the AECL EIS as the SRG and other technical/bureaucratic groups. This was due to a combination of utilizing the reviews of groups like the SRG, NRCan and Environment Canada, retaining the services of technical consultants, and drawing upon intra-group forms of expert knowledge or experience. The new reference case presented a distinct challenge, with no chance for extensive review. Overtly political positions became prominent, but this was in response to what appeared to be science-justified politics. Coupled with extrapolations from technical critiques of the original case study, public critics mobilized future political contexts. Sometimes the politics was technology specific, as when Northumberland Environmental Protection claimed approving the AECL disposal concept might result in a "proliferation of such technology throughout the world".[104] But the main kind of politics invoked involved conceptions of discretionary power. Thus Northwatch noted that, because technology and information was "evolving as it moves forward," decision-making about nuclear waste might be skewed by the discretion this afforded nuclear elites.[105] Critics argued that a failure to hold to account such flexibility implicitly resulted in a low burden of proof at the public inquiry. Thus Energy Probe claimed the standard should be changed from "innocent until proven guilty" or "the EIS doesn't rule out the possibility of success", to "that what has been done will lead to success and not failure".[106] Even this low burden of proof was constructed as better than what the future might hold. Unequal power relations in the future meant flexibility was not an unalloyed good, as Energy Probe argued:

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[104] Ella de Quehen (Northumberland Environmental Protection), 20 June 1996, *HT* [Vol. 23], 134.
[105] Phil Richardson (Northwatch), 20 June 1996, *HT* [Vol. 23], 163.
[106] Norm Rubin (Energy Probe), 20 June 1996, *HT* [Vol. 23], 177.

If that flexibility is the flexibility of a despot, to put it bluntly, since despots usually have great flexibility, they just don't use it in responsiveness, that is bad flexibility, and we are hoping for some other kind of flexibility. . . [Moreover, at any siting you are going to have a negotiation between] . . . an elephant and a mouse.

Northwatch later developed the metaphor of inequality:

When I hear the proponent tell me that the container material, the depth of the repository, whether it's bore-hole or in-room, will be up for discussion with the siting stage communities - I don't find that credible. . . . the elephants tend to grow large in northern communities.[107]

Others continued the theme that concerns about unequal power relations were "well founded":

[There is not a] . . . level playing field out there . . . [because] . . . the nuclear industry has always operated with its own people setting its own regulations for itself.[108]

Public critics drew distinct morals from the precedent that technical discussions seemed to be setting. Northwatch thus asked whether, if proponents could not demonstrate - at a conceptual stage – an appreciation of the range of issues deemed publicly relevant, then "we have little cause to expect that the siting process would go with the necessary fairness and informativeness at later stages. If we don't get it right now, why would they get it right later?"[109]

Public critics thus mobilized the future as a domain where relatively powerless communities would be confronted by a repository proponent with potentially limitless flexibility. The public inquiry represented a place where either the disposal concept could be outright rejected as an inadequate basis upon which to proceed to siting, or a locale where the flexibility

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[107] Brennain Lloyd (Northwatch), 21 June 1996, *HT* [Vol. 24], 19-20.
[108] Dr. Rosalie Bertell (Concerned Citizen), 27 June 1996, *HT* [Vol. 25], 139-40.
[109] Brennain Lloyd (Northwatch), 27 June 1996, *HT* [Vol. 25], 218-19.

of the concept could be delimited. Limiting its potential flexibility was constructed as a means to

specify, in advance of siting, what might constitute the safety and acceptability of a proposal.

This was perceived to be vital to the extent repository siting might take place in communities at a

disadvantage, in terms of resource and experience, in dealing with technical and policy elites.

Perceiving that any implementing agency would be industry dominated, critics made clear they

did not trust nuclear elites in the role of decision makers:

> . . . asking the nuclear industry to solve the problem of radioactive waste is like
> asking the tobacco industry to solve the problem of nicotine addiction.[110]

6.6 Phase 2 (Part 2), the *Policy Framework for Radioactive Waste*, and Recommendations

On 28 June 1996 Seaborn had announced that Phase 2, instead of ending as originally scheduled,

would be reconvened in November 1996. Phase 3 would be pushed back from its originally

scheduled 23 September 1996 opening (eventually taking place 13 January to 27 March 1997).

The SRG was instructed to report to the Panel on the second reference case by 15 September.

The SRG did so, concluding that AECL's copper canister was a more satisfactory container

material, that they were confident that suitable blocks of sparsely fractured rock did exist, and

that while AECL's post-closure assessment was still unreliable this did not imply the concept

was unacceptable; hence the SRG recommended the process of site selection should being (SRG

1996). Part 2 of Phase 2 thus took place 18-21 November 1996.

Seaborn commenced the first day of the re-convened Phase 2 by noting the Panel was

interested in whether any participants wished to "supplement or modify their previous

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[110] Dave Plummer (Concerned Citizens of Manitoba), 28 June 1996, *HT* [Vol. 26], 151.

assessments, taking into account this new information which we have received."[111] Technical

and bureaucratic groups shifted ground very little, except to indicate that the flexibility evinced

by the multiple illustrations of the concept increased their confidence in the disposal concept. If

anything, the concept became simplified. Thus the AECL TAC noted the two cases "illustrate

choices and alternatives" in a concept that is "simply a series of multiple barriers".[112] The SRG

reported that the concept had to be "demonstrated" at each candidate site, but the new case

"strengthens" their confidence in the concept because it illustrated that in a multiple barrier

concept "if one fails, another provides back-up." Siting was recommended because, according to

the SRG, "our collective judgment is that you have to designate a specific site."[113] Nevertheless

the SRG found the modelling work in the second case study unreliable.[114] Two of AECL's

models were found to be limited in their applicability (GEONET because it was limited to

steady-state flow of water; MOTIF because it could not handle large-scale groundwater flow

systems in the Canadian Shield). Another was found to be structurally flawed (SYVAC because

the geosphere model assumed water transport in sparsely fractured rock is diffusive (vertical),

when AECL's own data suggested the transport is advective (horizontal); this could result in

radionuclides migrating advectively to higher permeability rock and thereby diffusing quickly to

the surface). For the SRG, these uncertainties actually increased the need to go to siting:

> . . . when you come right down to it, what is the best way of spending our time
> and money from now on. We have come to the conclusion that it's likely that
> there are good candidate sites, and we have decided that it's more productive to
> proceed to real live sites. And the second reason . . . is it will give a wider variety

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[111] Blair Seaborn (Panel Chair), 18 November 1996, *HT* [Vol. 27], 9.
[112] Les Shemilt (AECL Technical Advisory Committee), 18 November 1996, *HT* [Vol. 27], 21-22.
[113] Raymond Price (SRG), 18 November 1996, *HT* [Vol. 27], 69, 76 and 94.
[114] Raymond Price (SRG), 19 November 1996, *HT* [Vol. 28], 113-21.

of stakeholders input into the beginning of a new conceptualization of what we mean about what we want, what we desire, what is acceptable...[115]

The SRG had thus reached a stage where their proactionary approach was also coupled to a specific mobilization of the future, in which a diversity of stakeholders would become involved in deciding the meaning of issues and the way to proceed.

The SRG position thus over-looked the public view that any siting situation would involve inequality in power relations. Hence Northwatch cautioned that once "a number of communities [are] dragged into the discussion", the question would become "what is going to be off the table", or "is everything still open? Have we retired any issues yet?"[116] Northumberland Environmental Protection also reacted strongly to the implication that all technical matters would be implicitly deferred to the siting stage. Such a situation implicitly treated the public inquiry as inconsequential: "as for saying this is just a vague learning process, it is not at all; there are other people involved in this hearing, and as far as we are concerned, this is a test within set, formal terms, and it is a formal public hearing process."[117] If NGOs needed any further convincing that the public inquiry was a temporary window into the policy process, best maximized to the extent they could, this was confirmed by revelations toward the end of Phase 2 that Government and industry ('internal') negotiations had produced a policy document (authored by NRCan) dealing with the institutional and financial arrangements pertaining to the disposal of radioactive waste. Although NRCan had briefly mentioned the existence of this policy framework in Phase 1, its sheer brevity meant it had not been pursued.[118]

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[115] Stella Swanson (SRG), 19 November 1996, *HT* [Vol. 28], 129-30.
[116] Brennain Lloyd (Northwatch), 19 November 1996, *HT* [Vol. 28], 148-49.
[117] Ella de Quehen (Northumberland Environmental Protection), 19 November 1996, *HT* [Vol. 28], 157-58.
[118] Peter Brown (NRCan), 11 March 1996, *HT* [Vol. 1], 27-30.

I discuss this policy framework in Chapter 7, but wish to make a few points regarding it

here. The *Policy Framework for Radioactive Waste* (NRCan 1996), released 10 July 1996 (half

way between Phase 1 and 2), had been formulated by internal Government-industry negotiations

in the March-December 1995 period. NGOs and other public critics had not been consulted. The

CNA first mentioned the policy framework on 19 November 1996, implying the Government

should develop a framework even though it had already done so (and the CNA had been

consulted), and noted it ought to stipulate that waste owners should fund, plan and operate an

implementing organization (the policy already stipulated so).[119] The CNS next mentioned the

policy framework on 20 November 1996, calling it a "most refreshing" consultative exercise.[120]

Energy Probe replied it had not been consulted, suggesting the narrow base was more illustrative

of policy-making about nuclear matters than the present public inquiry.[121] Energy Probe

subsequently argued (21 November 1996) that consultation about the policy framework, which

established waste owners as central actors in any implementation plan, "runs the gamut from A

to B."[122] NRCan confirmed the policy framework privileged waste owners, but claimed it was

simply a way for the Government to be prepared to act on Seaborn panel recommendations.[123]

Yet Wilson declared it "irresponsible", because it meant the public had no chance to integrate it

into their discussions,[124] while McCreath wondered what role Panel recommendations could now

play in implementing decisions.[125] With NRCan stating "it is time now to move towards

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[119] Murray Stewart (CNA), 19 November 1996, *HT* [Vol. 28], 228.
[120] Ken Smith (CNS), 20 November 1996, *HT* [Vol. 29], 134.
[121] Norm Rubin (Energy Probe), 20 November 1996, *HT* [Vol. 29], 150.
[122] Norm Rubin (Energy Probe), 21 November 1996, *HT* [Vol. 30], 177.
[123] Peter Brown (NRCan), 21 November 1996, *HT* [Vol. 30], 235.
[124] Lois Wilson (Seaborn panel member), 21 November 1996, *HT* [Vol. 30], 247.
[125] Dougal McCreath (Seaborn panel member), 21 November 1996, *HT* [Vol. 30], 280.

disposal,"[126] NGOs considered the policy framework to be "prejudging" panel conclusions and denying the public a "reasonable and fair chance" to comment on institutional arrangements.[127]

As Phase 2 thus drew to a close, political disaffection with the difference between the front stage performance of the Seaborn inquiry and the back stage performance of the policy framework pointed to long-standing public disquiet about nuclear decision-making. AECL and Ontario Hydro exacerbated discontent by announcing a joint AECL/Ontario Hydro project, in which $70 million over three years ($40 million on research) would be committed to research on nuclear waste disposal, with a reference date for disposal of 2025. This was advertised as prudent planning to both make best use of the $700 million already spent and to maintain relevant skill bases within the industry.[128] Northwatch summed matters up for many, deeming it "a very cynical and a very political move by a proponent in the last session and the last day of the technical hearings where they've failed to demonstrate safety and acceptability, and so they're going to do an end-run. Other people think that the NRCan policy framework is the end-run; I think this is the attempt at an end-run. . . . is this responsible action or pre-emptive action?"[129]

With suggestive signs the inquiry consultation was a temporary creature, public critics were intent to make clear what their recommendations were and why they were making them. Most asserted that AECL and Ontario Hydro could not be trusted and thus should not be appointed an implementing agency. Monitored, retrievable, storage (MRS) was considered essential if deep geological disposal was going to go ahead at all, as was continued public involvement. All public intervenors agreed that AECL had not demonstrated the concept. All agreed that AECL's documentation was riddled with deficiencies. Most technical and

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[126] Peter Brown (NRCan), 21 November 1996, *HT* [Vol. 30], 248.
[127] Dave Plummer (Concerned Citizens of Manitoba), 21 November 1996, *HT* [Vol. 30], 249; Brennain Lloyd (Northwatch), 21 November 1996, *HT* [Vol. 30], 251.
[128] Ken Nash (Ontario Hydro), 21 November 1996, *HT* [Vol. 30], 280.
[129] Brennain Lloyd (Northwatch), 21 November 1996, *HT* [Vol. 30], 287 and 289.

bureaucratic groups agreed regarding the deficiencies, so the difference here was that NGOs and public critics saw this as a reason to reject the concept itself. All public intervenors argued the concept should be rejected as unsafe and unacceptable. But here the consensus broke down, with different suggestions about what to do after rejecting the generic concept. To make these positions clear I will summarize them, drawing upon testimony that in some cases is spread out across several days (again, noting that all recommended rejecting the disposal concept itself).

The Saskatchewan Environment Society was alone in recommending going to site-specific investigations, arguing that present generic assessments were an "unproductive groove." They considered most conceptual questions unanswerable. One concern of theirs was that drilling in the plutonic rock may in fact destroy the medium in which it was hoped to place the waste. There was no means to ascertain if this would be the case without site inquiries.[130] Prominent academic Ursula Franklin argued similarly, noting that MRS was a necessity, but also making the philosophical case that both AECL and Ontario Hydro modelled their assessments on an undisturbed medium (mostly un-drilled plutonic rock). This meant their proposals did not adequately represent reality as it would be found in any repository construction project.[131] Others drew radical separations between what models could show and what could be learned by experimentally-based empirical inquiry at actual sites. Northumberland Environmental Protection articulated this kind of critique forcefully, declaring the "fuzziness" between models and the real world a "failure gap." The problem here was the switch from doing experiments to constructing models, with the latter considered incapable of attaining enough data-specificity. More research was thus needed to establish an empirically-based framework within which

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[130] Ann Coxworth and Graham Simpson (Saskatchewan Environment Society), 19 November 1996, *HT* [Vol. 28], 192-96; 20 November 1996, *HT* [Vol. 29], 103-27.

[131] Dr. Ursula Franklin (Concerned Citizen), 19 November 1996, *HT* [Vol. 28], 166-68; 20 November 1996, *HT* [Vol. 29], 194-203.

models could be assessed.[132] Some advanced a case that drew largely upon the expertise of the

SRG, and their identified deficiencies in the AECL post-closure assessment, but then drew the

opposite lesson to the one drawn by the SRG. Where the SRG concluded a deficient generic

assessment does not mean the concept is unsafe, Concerned Citizens of Manitoba concluded that

nor does it make it safe. Hence they recommended siting cannot proceed.

Several public critics called for further research to be conducted, indeed site specific

studies. The Inter-Church Uranium Committee suggested that AECL was "not finished with the

experiment" yet, and should conduct more site-specific inquiries at the Whiteshell Research

Area.[133] The Canadian Council for Nuclear Responsibility also recommended site-specific

studies, but via obtaining field experience with putting waste into a vault but not sealing the

vault. Deep geological disposal was considered an "advanced form of dumping", while the

AECL post-closure assessment was declared "advanced wizardry" (unreliable, faulty, a series of

conjectures).[134] Energy Probe and Northwatch resisted offering paths forward. Energy Probe

declared AECL's approach to modelling to be similar to the assumption "assume the cow is a

sphere". Energy Probe advanced two reasons against progressing to siting. Energy Probe argued

the concept, which prior to case two appeared to be a kind of defence in depth concept where

each barrier was both sufficient and present (similar to nuclear reactor safety philosophy), now

appeared to be a concept that did not insist on both engineered and geo-sphere barriers being

present (one could do in the absence of the other). Energy Probe also noted that the

federal/Ontario policy statement of 1981 stated no site investigation until concept approval,

hence the Panel could advise this be changed but could not do so unilaterally. Moreover, any

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[132] Ella de Quehen (Northumberland Environmental Protection), 18 November 1996, *HT* [Vol. 27], 52-66.
[133] Phillip Penna (Inter-Church Uranium Committee), 18 November 1996, *HT* [Vol. 27], 93-94; Stefania Fortugno and Phillip Penna (Inter-Church Uranium Committee), 20 November 1996, *HT* [Vol. 29], 207-32.
[134] Gordon Edwards (CCNR), 20 November 1996, *HT* [Vol. 29], 251-65.

concept would require public acceptance, which currently it lacked.[135] Northwatch was similarly

opposed to siting, stating that the SRG and other groups had not made clear what their "bridge"

was between their observations and their conclusions. Approval, argued Northwatch, could not

and should not be granted on the basis of concept failure.[136]

6.7 Discussion

Thus far it ought to be clear that facts were open to multiple interpretations, and that politics was

intrinsic to science deployed as public authority, even if external politics was not entirely trusted.

Under such circumstances, one sensibility is to demarcate science from politics in order to find

'the technical component' buried within the political disputes (Collins and Evans 2002, 2007).

Another sensibility is to argue that the contingency of facts highlights the importance of publicly

arrived at boundaries around the scope of expert authority, to guard against expertise colonizing

politics or science slipping from informing policy to being the default agent of public meaning

(Wynne 2005, 2007; Jasanoff 2003b, 2005). In previous discussion sections (Sections 4.8 and

5.9) I have argued that Collins and Evans' efforts to avoid science being conflated with politics

fall short of either adequately capturing expertise as it actually exists, or of providing sufficient

defence against expertise colonizing politics. This is because intrinsic, small-p, politics is not as

harmless and trivial as their demarcation criterion would imply; a more robust sense of small-p

politics is required to guard against the illegitimate de-politicizing of decision-making.

Moreover, Collins and Evans' combination of expertise *per se* and bifurcated decision-contexts

relies upon a conception of propositional questions as discrete, and thus recapitulates an unhappy

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[135] Norm Rubin (Energy Probe), 20 November, *HT* [Vol. 29], 267; 21 November 1996, *HT* [Vol. 30], 170-86.
[136] Brennain Lloyd (Northwatch), 20 November, *HT* [Vol. 29], 157-77.

model of politics in which each decision is unrelated to other decisions either prior to it or following from it.

The disputes characteristic of Phase 2 suggests a further deficiency in Collins and Evans' approach. Collins and Evans implicitly neglect the social processes of science, and how they might connect to issues of accountability, while their science/politics demarcation criteria of 'family resemblance' appears ill-suited to handling future-oriented policy-relevant expertise. Collins and Evans under-theorize the distinct challenges that are posed to democratic politics, where policy-making involving expertise faces uncertainties and ambiguities that possibly only the future could resolve. Competing mobilizations of the future highlight the importance of accountability relations. Let me start with the social processes of science. Collins and Evans acknowledge that expert institutions have often exercised an unhealthy monopoly over how issues are framed (2002, 237; 2003, 439-40; 2007, 8 and 136), and that for most the pressing problem is to curtail the ability of experts to make ex-cathedra judgments (2002, 237). Yet their original essay was not intended to be about "social relations between science and society" nor whether scientists or scientific institutions are "trustworthy" (2002, 236-37). Nevertheless in their book-length study, typical conflations of political rights with technical abilities was said to be a result of over-zealous levelling of the epistemological playing field. Collins and Evans resisted such levelling, arguing there are vertical dimensions to the epistemological field; some claims appear to stand on firmer ground than others (2007, 138-39). Collins and Evans thus asked:

> . . . how can the public, with their rights to make political choices intact, best
> bolster them with wise decisions with respect to the purely technical part of
> technical judgments? . . . [T]he answer appears to be that, in the absence of
> suitable specialist experience, the citizen can make technical judgments [only by]

choosing *who* to believe rather than *what* to believe. Surely, one of the tasks of
the social sciences is to help the citizen make better discriminations of this kind
by revealing more fully the social processes of science and by explaining the
kinds of expertises that bear directly on matters of science and technology (139).

Here I want to overlook the contentious implication that making technical judgments is about

deciding on which knowledge claims to accept. Wynne (2003, 2005, and 2007) has done enough

to suggest the partiality of this view of technical judgment, for instance that the character and

scope of expert judgment is often conditioned by its institutional housing.

My point is whether Collins and Evans have revealed enough of the social processes of

science, in order to assist citizens in making better discriminations? Conceptually speaking, in

dividing the public from experts Collins and Evans reinvent a form of the deficit model, for part

of their postulated demarcation criteria is the lack of contributory expertise (among the public).

But this presupposes that expertise can be liberated from the social processes of science, so it

remains unclear how treating expertise as separate from the social processes of science

illuminates those processes. If the social processes of science thus remain obscured, it is unclear

how Collins and Evans can assist citizen discrimination. Moreover, Collins and Evans presume

citizens are left with choosing who rather than what to believe. But again this reinvents the

deficit model; this time by presuming lack of understanding of the 'what' (defined in

propositional terms) is the salient dimension for understanding the position of the citizen. Nor is

'who' necessarily the salient issue, for if it were the fact that assessments of the doability of deep

geological disposal were structured by competing mobilizations of the future would make

futurologists the sought after category of expert. In effect, Collins and Evans focus on

representation in democratic politics: are citizens represented by those they identify with, or

those they trust. Of course, trust is vital and not to be over-looked (cf. Yearley 1994). But what

the disputes of Phase 2 suggest is that accountability was the relevant social process, not

representation. The tradition of STS/PUS theorizing that investigates accountability is one that

focuses squarely on theorizing democratic politics itself (contra Collins and Evans). This

tradition appears better equipped to theorize the social relations of accountability that concerned

critics in the Phase 2 deliberations.

Thus Turner (2001, 145-46) argues expertise is only a problem for democracy when we

presume there is some other standard available, for judging experts, than ordinary democratic

processes of legitimation and deligitimation. During Phase 2 expertise appeared to become a

problem to the extent normal means of testing claims in the present were avoided. Similarly

Jasanoff (2003b, 561) argues that because experts produce bounded conceptions of reality,

judging their quality and reliability involves subjecting claims to deliberation. In this connection

it is not representation of diversity itself that is the adjudicating mechanism, but the deliberative

process as well. During Phase 2 critics were in fact cynical about future representation, so what

mattered most was the quality of deliberation available to them in the public inquiry. As Fuller

(2007) notes, to the extent the accountability of the representatives to the represented is the

salient issue, what matters is not de-politicized expertise but democratic rather than authoritarian

expertise; the testing situation becomes vital in ensuring the former rather than the latter prevails.

This was particularly germane during Phase 2, when public critics rejected attempts by disposal

concept proponents and supports to bypass the public inquiry as a forum for testing safety and

acceptability. Critics wanted to have a forum within which technical claims could be sufficiently

tested; within which claims could be held to account. Moreover, as argued by Wynne (2007), it

is a mistake to readily accede to the meanings of science given only by science; broad

involvement is about meaning generation not just being there in body. Phase 2 showed that

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public groups rejected the proactionary framework confronting them, instead attempting to insert their own precautionary framework. As one participant noted, he thoroughly believed the deficiencies identified by experts were in fact deficiencies; hence he could not fathom their conclusion to forge ahead despite the deficiencies.[137]

Different mobilizations of the future in fact reveal a major challenge for efforts to demarcate science from politics. Collins and Evans note that one heuristic for separating science and politics is to rely on a notion of family resemblance (2007, 125-33). The formative intention (the norm) of experts is thus said to be to sustain continuity of activities and paradigms, and if initiating change in activities and/or paradigms then this is internally governed by the intent to maintain group membership (not become an outsider, but to be accepted by the mainstream). Yet Collins and Evans note that "looking far into the past and far into the future, then, makes the notion of family resemblance unworkable. To use the family resemblance notion we have to talk about science as we know it, not science as it once was or might be one day" (130). Yet what science might be one day was precisely what was in dispute in Phase 2: concept supporters argued that deficiencies now did not detract from future viability. When critics opposed this mobilization of the future they were opposed to a relaxed approach to present standards of evidence, coupled to urgency about making decisions. Proactionary politics in fact readily absorbed technical criticism; indeed it thrived on isolating problems and issues. As one NGO commented, "to produce outlines and lists of criticisms begins to look rather like just so many unrelated complaints."[138] The issue was what criticisms *amounted to*, and different mobilizations of political presents and futures structured answers to such questions.

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[137] T. Jansen (Mechanical Engineer), 12 June 1996, *HT* [Vol. 17], 152-53.
[138] Ella de Quehen (Northumberland Environmental Protection), 18 November 1996, *HT* [Vol. 27], 53.

In Collins and Evans' terms, saving the workability of the family resemblance demarcation criteria would involve emphasizing how, even though deep geological disposal proponents drew evidence from a future yet realized, the "publicly accessible rules of science" include viewing "difficult problems [as] opportunities to deepen knowledge [and explain them] within science's purview by scientific means" (2007, 130). The trouble with this rescue operation is that it appears ad hoc to the extent 'deepen' is pushed to the foreground as a vague intellectualist defence. Incumbent interests may also frame the context of evidentiary appraisal in a way that pushes to the background their interests in pursuing some 'opportunities' but not others (i.e.: nuclear expansion, not nuclear phase out). In effect, Collins and Evans' cannot draw a boundary between science and politics, where mobilizations of the future are prominent, without resorting to a picture of social appraisal that minimizes the political-economic pursuit of opportunities. But such a marginalization exercise would be to repeat the conceit one NGO criticized in AECL presentations, in which AECL presented itself as "an innocent bystander caught up in the circumstances."[139] To treat incumbent interests as innocent bystanders is to ignore the political-economic dimensions of contemporary expertise, which include attempts to control a future yet realized. *Pace* Collins and Evans, the way to reveal the science/society social relations embedded in and enacted by such mobilizations of the future is interrogate what accountability means in expert-infiltrated democracies.

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[139] Brennain Lloyd (Northwatch), 21 June 1996, *HT* [Vol. 24], 10.

Chapter 7

Deciding

7.1 Introduction: stipulating science/politics relations

In February 1998 the Seaborn panel concluded that "from a technical perspective, safety of the

AECL concept has been on balance adequately demonstrated for a conceptual stage of

development, but from a social perspective, it has not" (CEAA 1998, 2). The Panel

recommended an "arm's length" agency be formed to investigate waste management options (3

& 68), and outlined that such an agency should assess options from the perspective of "social

safety" (41-63). In December 1998 the federal Government responded to the Seaborn panel

report, agreeing with many recommendations except where it applied to an independent agency

(NRCan 1998). The Government then conducted industry-Government (and inter-agency)

discussions, as well as holding Parliamentary debates, on legislation to establish and form the

mandate of a waste management organization. The result was the passing of the *Nuclear Fuel*

Waste Act (NFWA; in effect 13 June 2002), thereby forming the Nuclear Waste Management

Organization (NWMO) in 2002. The NWMO conducted public consultations on waste

management options 2002-2005, and AECL and Ontario Hydro continued to explore deep

geological disposal concepts (producing a third case study, for instance, see OPG 2004). The

NWMO reported to Government in November 2005, recommending an Adaptive Phased

Management (APM) approach (NWMO 2005b), and this approach was accepted by Government

in June 2007 (NRCan 2007).

This chapter reconstructs the events and processes outlined above (Seaborn panel report, Government response, NWMO consultation) as attempts to stipulate the relations between science and politics. I begin by discussing some of the debates that took place during Phase 3. I indicate how calls for an independent agency were associated with different models of the relationship between public integrity and institutional interests: one held that public legitimacy could only be achieved if an implementing agency was separate from institutional interests, while another held that making this separation in an implementing agency would dilute accountability relations. I also briefly indicate how AECL identified the disposal concept with its flexibility, whereas public critics made empirical claims about the concept's lack of social acceptability. These two themes figured prominently in the Seaborn Panel report, which I discuss as an attempt to stipulate how scientific and political dimensions of decision-making ought to be related. I suggest the Panel advocated a *co-operative* framework, within which acceptability could not be demonstrated unless a concept satisfied both technical and social considerations.[1] Although the Government response also stipulated relations between science and politics, the Government implicitly utilized an *adversarial* framework. For the Government, boundaries mattered. Particular public preferences that might impact upon the discretion of waste owners were rejected, with the Government response citing their incompatibility with the *Policy Framework for Radioactive Waste* (NRCan 1996). I show how this policy framework,[2] which dealt with institutional arrangements, had been arrived at in complete absence of public input. In effect, the Government indicated that the outcomes of waste owner activities would be politically

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[1] In Chapter 8 I suggest this co-operative framework was more than just inclusive rhetoric, but was actually capable of being operationalized via the panel's concept of 'social safety'. I also suggest that the NWMO reconfigured the meaning of this concept, in the NWMO's final report (NWMO 2005b, Chap. 8), by using the concept in a different way than the Seaborn panel used the concept.

[2] My evidence in this regard is from a primary source analysis of Government documents, obtained under the *Access to Information Act*.

accountable, but the performance of such activities would be left in the hands of waste owners. In discussing the NWMO, I suggest such Government intentions were built into the NFWA of 2002. I then discuss the NWMO public consultation program 2002-2005. I reserve discussion of the NWMO recommendation of APM (NWMO 2005b) to Chapter 8. I suggest that the NWMO can be conceived of as a boundary organization, straddling typical boundaries between public/private and science/politics. I argue that the NWMO seeks to manage these boundaries by embracing its external accountability, but otherwise internalizing negotiations about where the boundaries reside. In the process, the NWMO assumes a high degree of discretion over the definition of salient problems, especially over the roles of sound science and public preferences in informing decision-making.

In discussing these different attempts to stipulate the relation between science and politics, especially in the case of the NWMO, I draw upon David Guston's principal-agent theory (Guston 2000, 2003) and Stephen Hilgartner's dramaturgical approach (Hilgartner 2000). In Chapter 4 I drew upon Hilgartner to analyse how the AECL EIS stage-managed the boundaries between science and politics. Hilgartner analyzes science advice as performance (how do advisory bodies create a trustworthy and credible voice). Here I join dramaturgy with Guston's principal-agent theory in order to theorize the broad problem of delegation (how do non-scientists get scientists to do what citizens decide, and what quasi-contractual relations underpin such delegations). The two perspectives are mutually reinforcing to the extent the integrity and productivity of research, along with the overall credibility of science advice and science policy, are simultaneously at stake.

Guston uses principal-agent theory to formalize discussions of delegation. Drawing inspiration from the sociology of organizations and transaction-cost economics, Guston theorizes

in the subjunctive mood. Relations between parties can be understood as if those parties had

entered into a contract specifying their rights and obligations. The principal is to be understood

as a party that requires a task to be performed, but either lacks the ability to perform that task

directly or desires that another party perform it. The agent is an actor to whom the principal

delegates the performance of a task, or indeed the principal may engage in a contract (with an

agent) for the performance of the task. A principal can be the agent of a higher-order principal,

and agents can themselves become principals. Principal-agent theory thus encounters no

difficulties with parties beholden to multiple and potentially conflicting interests. The NWMO is

in precisely this situation. The analytic focus of Guston's principal-agent theory is on the

boundary managing and creating activities of parties as elements of science policy making.

Guston outlines two problems of delegation: adverse selection and moral hazard. In 'adverse

selection', how does the principal (such as a patron) select an appropriate agent? Which agents

most share the interests of the patron? Second, the problem of 'moral hazard' points to a dual

incentive inherent in acts of selection. Selection provides for two incentives: to perform tasks,

but also to engage in various forms of misconduct. How does the principal ensure its goals are

pursued after delegation? A final element to Guston's principal-agent theory is the concept of

boundary organizations. Wherever one finds actors negotiating a boundary between politics and

science, one could conceivably imagine boundary organizations straddling that boundary-in-the-

making, as well as stabilizing the boundary as part of the maintenance of social order. The key

characteristic of a boundary organization is that it internalizes the negotiations that go into

maintaining the provisional and ambiguous boundary. A successful boundary organization will

satisfy two sets of principals, scientific and political: rather than isolating itself from external

political authority, boundary organizations make themselves accountable and responsive to

external authorities, thereby internally negotiating science/politics boundaries in order to be externally indistinguishable from either.

Guston's principal-agent theory usefully connects with Hilgartner's (2000) dramaturgical perspective on science advice, because Hilgartner's dramaturgical analysis facilitates an expansion of the 'interfaces' managed by boundary organizations to include broader audiences (such as lay citizens). Dramaturgy theorizes how specific discursive rhetoric will be deployed in specific locales, and here I use dramaturgy to analyse the discursive rhetoric of the NWMO as a boundary organization. Utilizing the dramaturgical perspective of Erving Goffman, typically applied to verbal performances, Hilgartner expands the approach to consider written reports and their dramatic qualities. Conceiving of science advice as performance, or stage management, provides a means to theorize how science advice can remove some issues from the political domain by transforming them into technical questions, or place some issues in the political domain by making them a political issue. The shaping of reports, argues Hilgartner, is structured by struggles over the enclosure and disclosure of information. Such struggles result in sharp distinctions between front and backstage. I suggest the NWMO 'back-stages' technical matters by treating waste management science as 'sound', in contrast to how public knowledge is problematized, on the front stage, as diverse and fractured. The boundary between the opaque workings of science advisory bodies as autonomous professional agents, and science advisory bodies as delegated agents responsible to broader principals (such as funding bodies and public approval), is also controlled by such stage management. The flow of persons, speech, and documents is stage-managed in order to restrict access to backstage negotiations, especially where incumbent interests may be at stake. Simultaneously, a universal and disinterested front stage is presented. With the NWMO the actual interests of waste owners, who are also energy

actors in their own right, are shifted to the backstage. The NWMO brings itself to the front-stage

as a dutiful delegate of federal will, pursuing apolitical technical concerns.

7.2 Independence & Public Acceptance (excerpts from Phase 3)

Phase 3 of the public inquiry was held over twenty-four days of testimony (Jan 13 – March 27,

1997), and was concerned with community visits in which "local participants' views on the

safety and the acceptability of the concept and on any other issues relevant to the Panel's

mandate" were sought.[3] Phase 3 was held in fifteen communities spread across five provinces

(Ontario, Quebec, New Brunswick, Manitoba, and Saskatchewan) and three First Nations

territories (Sagkeeng, Ginoogaming, and Serpent River). At each community (hence, fifteen

times) AECL, as the proponent, presented precisely the same testimony about both the disposal

concept and the political history leading up to the disposal concept.[4]

First, AECL presented deep geological disposal as enjoying national and international

regard as the most appropriate waste management option. AECL stated this was so as early as

1978, prompting the Government to request AECL and Ontario Hydro to conduct research on

disposing of waste deep in plutonic rock. AECL then noted that a 1981 decision was made (by

Government) to publicly review a disposal concept, and to refrain from selecting a site until a

concept had been approved. In 1988 a public review was thus initiated. Given the political battles

discussed in Chapter 3, especially where they apply to the overt political-economic agency of

AECL and Ontario Hydro, AECL's Phase 3 account of the policy history was a highly sanitized

political account. AECL was carving out an image of itself as a dutiful delegate of federal

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[3] Blair Seaborn (Panel Chair), 13 January 1997, *HT* [Vol. 31], 10.
[4] Cf. Ken Dormuth (AECL), 26 March 1997, *HT* [Vol. 53], 12-33. The presentation outlined here, at the Ottawa session on the penultimate day of hearings, is entirely consistent with every other AECL Phase 3 testimony.

political will. The Government was the principal, and AECL was simply an agent of the Government. Yet, as Chapter 3 discussed, AECL, Ontario Hydro, and federal-provincial Governments up until the mid-1980s, experienced little problems of adverse selection. That is, these entities shared similar goals with respect to commercial nuclear power. Principal-agent theory suggests that under such conditions images of delegation relations as hierarchy-based, which can facilitate agents presenting themselves as apolitical (following orders), are probably strategic misrepresentations of actual principal-agent transactions. As Northwatch had noted during Phase 2, AECL continually attempted to situate itself as an "innocent bystander".[5] With similar goals, the question that occurs is the extent to which AECL and Ontario Hydro were the principals with respect to governance bodies (i.e. EMR (later NRCan), AECB). All of this complexity is obscured by the simplified principal-agent relationship forged by AECL on the front-stage.

Second, AECL presented the disposal concept as inherently flexible. This flexibility was pushed to the front-stage as an artefact of the natural adaptability of the disposal concept, with any indication that the flexibility might afford proponents political room to move pushed to the backstage. The concept was defined as the proposal to excavate a vault deep in the plutonic rock of the Canadian Shield. The vault would be 500-1000 metres deep, and the surface area required would be about four square kilometres. The waste would be sealed in "long-lasting" containers, made of copper, titanium "or some other material". The waste would be transported to a site via road and rail, in specially designed crash-tested canisters. The waste form was yet to be determined; it would depend upon decisions about recycling used fuel. Each container would be surrounded by "a sealing material" (a buffer), with the vault ultimately "back-filled and sealed with sealing materials" (they "could be based on" cement, clay, or a mixture of the two). The

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[5] Brennain Lloyd (Northwatch), 21 June 1996, *HT* [Vol. 24], 10.

system should be capable of passive safety, meaning safe regardless of whether a future society

cared to manage the waste or not. Emplacement of the waste could be either "borehole or in-

floor emplacement". AECL assumed groundwater would be present, but the vault seals would

limit groundwater and contaminant movement and waste form dissolution. The geosphere

protects the vault, thus making the system one of natural and engineered barriers. The

radiological dose rate from a disposal facility was estimated as far below AECB regulatory

guidelines. The safety and acceptability of the disposal concept was acknowledged to also

involve how it was implemented, hence any implementing agency would have to abide by pre-

established principles (safety and environmental protection, voluntarism, openness, shared

decision-making, fairness). Affected communities should be involved in decision-making.

Monitoring and retrieval options should be available, prior to closure of the repository. The

federal Government and waste owners ought to be responsible for the safe management of used

nuclear fuel. Siting should commence.

NGOs during Phase 3 critiqued both the largest political claims and most minute

technical claims associated with this standardized presentation. Northwatch argued that the

claimed international consensus was a chimera, presenting a commissioned report which claimed

that the closer to implementation a disposal program moved the greater the uncertainties became.

Northwatch thus inverted the presentation of AECL, bringing to the front-stage what AECL

removed to the backstage (disagreement and uncertainity). Moreover, Northwatch claimed that

"the EIS engaged in a game of radiation denial," thereby attempting to politicize what AECL

hoped to render apolitical.[6] Similarly, Energy Probe attacked the radiation hazards estimates

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[6] Brennain Lloyd (Northwatch), 10 February 1997, *HT* [Vol. 40], 243-51; 11 February 1997, *HT* [Vol. 41], 100. The specific debate is over whether or not an acceptable radiation dose threshold exists, with Lloyd asserting significant sectors of the scientific community believe there is no dose too low to be concerned about. Northwatch and other NGOs thus drew on sectors of the scientific community that uphold the 'linear no-threshold hypothesis', which

produced by a former AECL employee, claiming the estimates significantly ignored the actual

history of radioactive contamination at storage locations and other hazardous chemical facilities,

while also asserting that international consensus was actually moving away from permanent

disposal and toward monitored, retrievable storage.[7] Some historians of nuclear waste

management have in fact agreed with this kind of assessment of trends (cf. Berkhout 1997). Yet

it has to be admitted that the community visits format meant there was less opportunity,

compared with Phase 1 and 2, for detailed cross-examination of AECL and Ontario Hydro. Many

presentations repeated criticisms made earlier in the hearings, or asked questions which had been

asked earlier. Procedurally there were also more presentations scheduled per day than in the

previous Phases, sometimes as much as two-dozen presentations (plus question time) in a single

day. Nevertheless some issues were dealt with in more depth than had been previously tackled,

in particular the views of Aboriginal communities, who often narrated quite different experiences

of the nuclear fuel chain than other groups or communities.[8] Aboriginals, for instance, reframed

major aspects of the AECL front-stage: from concerns about not burdening future generations, to

a concern with not burdening *again* First Nations communities that had already suffered the

effects of the full nuclear fuel chain (i.e. uranium mining) in ways communities near reactors had

not. In some cases, though, one can sympathise with claims that public inquiries solicit both

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asserts that damage due to ionizing radiation is proportional to the dose at all levels. In contrast, other models hold that below a certain level, radiation exposure is harmless, or in fact (the 'hormesis' model) that high doses are harmful but low doses beneficial. An up to date review of the technical literature is Kant and Chakarvarti (2006), a philosophical appraisal of the debate is Shrader-Frechette (2004), and a political science perspective is Silva, Jenkins-Smith, and Barke (2007).

[7] Norm Rubin (Energy Probe), 26 February 1997, *HT* [Vol. 46], 70-82.

[8] See Stanley (2006) for an analysis that sustains this claim, AFN (2005) for a perspective on the problem authored by Aboriginals, Stevenson (2003, 15-16 and 95-104) for a series of direct quotes from the inquiry transcripts, and the Seaborn report for a self-critique to the effect that Aboriginal participation had not been handled adequately (CEAA 1998, 64-66).

rigorous and less rigorous public feedback. One presenter used the allotted ten-minutes to sing

several songs, for instance.[9]

NGOs, for their part, took the opportunity of more limited time during Phase 3 to make

their recommendations clear. NGOs recommended that an independent agency needed to be

appointed to research and possibly implement any waste management option. The industry could

be an agent, for instance, but not a principal. The main concern was moral hazards: the public

had been previously unable to affect nuclear decisions, so why create further opportunities for

the industry *not* to consider public concerns by delegating to them discretion over waste

management plans? For some the moral hazard problem manifested as AECL having an

"untrustworthy" reputation.[10] For others AECL and Ontario Hydro were guilty of more than just

a poor institutional history (secretive, escaping public scrutiny). It was claimed that AECL had

demonstrated a "cynical impunity" during the inquiry, by routinely failing to engage in serious

debate.[11] Nevertheless all argued that what was at stake was the overall democratic legitimacy of

decision-making; quite simply that appointing waste owners as implementers would not secure

sufficient distance between institutional interests in nuclear expansion and handling the biggest

obstacle to such plans.[12] NGOs of course had their own political interests, and many argued that

waste could not be disposed of, only managed. Hence in addition to "substantial criticisms of the

concept wherever it might be implemented," NGOs suggested stopping the production of waste

(a nuclear phase out) was a "first step".[13] Yet critical NGOs were not the only hearings

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[9] David Greenfield (Canadian Nuclear Workers Council), 14 January 1997, *HT* [Vol. 32], 393-401. He noted he was opposed to the disposal concept.

[10] Peter Prebble (Saskatchewan Environmental Society), 13 January 1997, *HT* [Vol. 31], 91.

[11] Phillip Penna (Inter-Church Uranium Committee), 14 January 1997, *HT* [Vol. 32], 66.

[12] Cf. Peter Prebble (Saskatchewan Environmental Society), 13 January 1997, *HT* [Vol. 31], 91-94; Irene Kock (Nuclear Awareness Project), 27 February 1997, *HT* [Vol. 47], 45-52; Julie Dingwell (People Against Lepreau 2), 11 March 1997, *HT* [Vol. 49], 28-36; Kristen Ostling, Brennain Lloyd, Irene Kock and Phillip Penna (Campaign for Nuclear Phase-Out), 27 March 1997, *HT* [Vol. 54], 163-79.

[13] Cf. Dave Plummer and Anne Lindsey (Concerned Citizens of Manitoba), 28 January 1997, *HT* [Vol. 36], 40 & 45.

participants recommending an independent agency needed to be formed. Significantly, some

technical review groups did as well, arguing that although they found the concept technically

sound it was clear to them that "social considerations will probably have greater relevance" in

regards to implementation. An independent agency was thought to be a first step to any kind of

public acceptance.[14]

If one model for an implementing agency relied upon accountability as ensured via

separation of interests in waste disposal and nuclear expansion, another relied upon

accountability as being created by being held directly responsible for cleaning up any wastes

created. Thus Ontario Hydro argued that

> A multi-stakeholder agency independent from Government and waste producers
> is unprecedented. More importantly, accountability will be diluted by taking away
> responsibilities from producers. Having policy and regulation fully separated from
> waste management function clarifies accountabilities and it enhances
> independence, effectiveness and the credibility of each.[15]

Although once can discern the logic in this suggestion, which is that removing the burden of

fixing a problem one created is to fail to hold to account the problem-maker, the political model

involved in this suggestion lacks the same kind of realism as the call for independence.

That is, not only is there a built-in incentive (continuation of waste generating activities

via a solution to their clean-up) for the polluter to be optimistic about solving potential problems

(i.e., the 'workable in principle defence'), but the implicit political model assumes decisions

made in one place do not strongly pre-empt decisions taken in another place. In effect, this is

equivalent to the theoretical assumption that in acts of delegation there simply are no problems

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[14] Fred Matich (Joint Committee of the Canadian Academy of Engineering and the Royal Society of Canada), 25 February 1997, *HT* [Vol. 45], 93.
[15] Ken Nash (Ontario Hydro), 26 March 1997, *HT* [Vol. 53], 106-107.

of adverse selection (who is the appropriate agent?) and moral hazard (how to ensure the

principal's goals are pursued?). Note here that 'principal' can be the public. The key point is that

Ontario Hydro simply assumed it was the most appropriate agent, and that Government-industry

goals were parallel to public goals, while also implicitly prescribing the view that clear lines of

delegation were enough to secure legitimacy. For critics, though, even transparency between

principal (Government) and agent (industry) was not much use without the ability to hold the

agent accountable for something other than just its delegated relation with its principal. For

instance, the moral hazard involved fears that industry plans would be interpreted as something

other than solutions to waste disposal. That is, it was the hazard of restraining possible

implications. As discussed in Chapter 8, the federal Government referred to the NWMO's APM

proposal as "part of" plans for securing the expansion of nuclear power (NRCan 2007). Disposal

concept critics, as noted in Chapter 5, always feared this slippage would take place. Their

problem of moral hazard came to fruition.

The final aspects of Phase 3 discussed here is that although public groups attempted to

undermine the credibility of AECL and Ontario Hydro, technical presenters were not above

returning the 'favour'. Thus the AECL Technical Review Committee thought the public had

seriously misconstrued what deficiencies in the concept meant. The deficiencies were actually

pointers to the soundness of the disposal concept, because they drew attention both to the need

for revisions, and thus also to the flexibility and adaptability of the concept.[16] Robertson,

formerly of AECL, claimed that the public demands for absolute safety were unrealistic, that

differences in expert opinion were to be expected, and that because the public did not appreciate

either of these truths this indicated they were likely to believe any myth.[17] As previous chapters

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[16] L. Shemilt (Technical Advisory Group to AECL), 27 March 1997, *HT* [Vol. 54], 105-21.
[17] J. A. L. Robertson (Concerned Citizen), 27 March 1997, *HT* [Vol. 54], 147-63.

have demonstrated, there is little evidence to support this characterization of the public as

craving absolute certainty or as surprised by expert disagreement. More accurate were public

critics, citizens and NGOs alike. One citizen noted that, having "counted 144 separate

presentations since mid-January by citizens and spokespeople for organizations that either

completely reject AECL's proposal or have grave doubts about it," the Panel ought to conclude

that the disposal concept lacked social acceptance.[18] An NGO similarly noted that "after 7 years

of public hearings, it is obvious to us that the concept is not acceptable to the majority of citizens

and interest groups that have participated."[19]

7.3 The Seaborn Panel Report (February 1998)

As has been noted, ultimately the Panel expanded the definition of safety and acceptability to one

largely in line with that espoused by public critics of the disposal concept (Wilson 2000, 3;

Murphy and Kuhn 2001, 261). The Seaborn report (of February 1998) concluded that:

> from a technical perspective, safety of the AECL concept has been on balance
> adequately demonstrated for a conceptual stage of development, but from a social
> perspective it has not. . . . The concept in its current form does not have the
> required level of acceptability to be adopted as Canada's approach for managing
> nuclear fuel wastes (CEAA 1998, 2 & 41).

As the Panel made clear in its report, specifically Chapter 7 'Matters Outside the Mandate',

"without public trust and confidence, any initiative to manage nuclear fuel wastes in the long

term will face difficulties. Unless the issues of public concern presented in this chapter are

addressed, they will continue to haunt a nuclear fuel waste management agency no matter which

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[18] Penny Sanger (Concerned Citizen), 26 March 1997, *HT* [Vol. 53], 186.
[19] Marc Chenier (Canadian Coalition for Nuclear Responsibility), 25 March 1997, *HT* [Vol. 52], 58.

option for managing nuclear fuel wastes it pursues" (82). Specifically, the Panel identified issues

such as general energy policy, renewable energy sources, possible importation of foreign waste

and the use by industry of Mixed Oxide Fuel (MOX), and the potential to recycle or reprocess

waste. The Panel also reached two primary recommendations.

> In light of the diversity of views [on safety and acceptability], a concept must
> satisfy both technical and social interpretations of the criteria [of safety and
> acceptability] to be considered broadly acceptable (35). . . . If there is to be any
> confidence in a system for the long-term management of nuclear fuel wastes, a
> fresh start must be made in the form of a new agency. The agency must be at
> arm's length from the producers and current owners of the wastes (66).

Given that the concept lacked social acceptability, the Panel did not recommend siting, but

instead an arm's length agency to develop a social/ethical framework, via public consultation,

and to use that framework to evaluate permanent disposal within the context of a range of

alternatives (CEAA 1998, 64-79). The problem of delegation in this instance was how to ensure

the public could act as a principal, delegating to the agent (the industry) what tasks ought to be

pursued. The Panel's report thus drew a boundary between science and politics, but otherwise

argued the domains were complimentary and thus considerations from each were relevant.

In Chapter 4 (33-40), the Seaborn panel stipulated the "acceptability" of a waste

management concept ought to mean: it has broad public support, it is safe from both social and

technical perspectives, it was developed within a sound ethical and social framework, it has the

support of Aboriginal people, it would be selected from a comparison with alternatives, and that

it was advanced by a trustable proponent and overseen by a trustworthy regulator. The "safety"

of a concept was indicated as: robust in meeting regulatory requirements, based upon a thorough

scenario analysis, uses realistic data, models and natural analogies, incorporates sounds science

and best practice, demonstrates flexibility, demonstrates that feasibility is possible, and integrates

peer review and international expertise. The Panel was also careful to note that "the two

perspectives are not evident in the criteria themselves, but in their application" (37). In Chapter 5

(41-63) the Panel turned to applying these criteria, noting that its views reflected a balancing of

the overall criteria. In arguing that "on balance" safety from a technical perspective had been

demonstrated, the Panel concurred with the assessment of technical groups that the concept was

viable in principle despite deficiencies in the documented evidence. Nevertheless many

shortcomings remained, hence the "on balance". The panel indicated caution was required

because of the long-term hazards involved, because they were not reassured by experts finding

deficiencies but recommending siting regardless, and because safety for the public meant

protection from harm, not just the probability of meeting regulatory requirements.

The Panel also identified innumerable shortcomings in the technical 'case' (41-63). The

Panel lacked confidence in the methodologies AECL used to show compliance with regulatory

requirements (i.e. concerning radiological doses), as well as in the models AECL used. Both

methodologies and scenario analysis needed broader public input. AECL was criticized for

treating social concerns as only about pro/anti nuclear stances, leading them to neglect doing

quality social science, such as investigating social disruption within potential host communities.

AECL's penchant for treating the concept as infinitely flexible was also criticised, not because

flexibility itself was not desired (it was), but because without any sense of limits to how

engineered barriers would be adapted to site-specific conditions the concept became abstractly

applicable anywhere. Similarly, the Panel found that the feasibility of a site was not proven

because of the lack of exclusion criteria. Lastly, the panel critiqued the lack of peer review.

When the Panel turned to acceptability, they bluntly asserted it was lacking. The concept lacked

broad public support, indeed "the concept cannot be regarded as acceptable if it fails to demonstrate safety from both perspectives" (59). The Panel argued that no "comprehensive" or "systematic" social and ethical framework had been developed, in part because values are difficult to describe, diverse, and vary over time, but mostly because the disposal concept had been isolated from broader issues in the first place. In effect, the Panel claimed that AECL had obscured the real-world connections between backstage institutional interests and front-stage claims. The Panel also reported that Aboriginals were strongly opposed to the concept, and that the concept had not been discussed in the context of alternatives: "a choice of one is not a choice" (61). Finally, the Panel found that not only did AECL and Ontario Hydro not enjoy sufficient trust, but without a clear policy statement from the Government about the future of nuclear energy, trust would not be developed. Again, this was a problem created by insufficient delegation; with the lack of federal direction creating a situation where too much discretion accrued to the industry (the agent could set its own goals).

7.4 The Government response (1998) & the *Policy Framework for Radioactive Waste* (1996)

In December 1998 the Government of Canada responded to the Seaborn panel report, acknowledging that the concept had been found (on balance) technically demonstrated but not socially acceptable, that an arm's length agency had been recommended, and that the Panel reflected a "synthesis" of views expressed by public, bureaucratic, technical and industry groups (NRCan 1998, 4). Yet in its summary response the Government began with the 1996 *Policy Framework for Radioactive Waste*, specifically how it "established" that waste producers and owners were responsible for establishing a waste management agency as a separate legal entity.

The policy framework was said to also specify that waste owners would establish a fund to support research, and that the agency would report to Government on its plan for long-term waste management, including: waste management options, provisions for public involvement (especially Aboriginal participation), an ethical/social framework, and comparisons of alternatives (5).

It was thus immediately apparent that the Government was delegating to the nuclear industry important roles and tasks that public critics had not wanted placed in industry hands. Forcing the polluter to pay was one thing, but granting the polluter discretion over the research and planning process was quite another. Moreover, the Government now returned to linking waste management solutions to nuclear power:

> Resolving the nuclear fuel waste issue will further support nuclear energy, and particularly the CANDU option, as a sustainable electricity supply option (6).

Similarly, though claiming to agree "in part" with the Panel recommendation of an arm's length agency, the Government designated waste owners as responsible (7). In fact the Government repeatedly invoked maintaining consistency with the policy framework as their reason for rejecting particular recommendations or agreeing only with their "intent".

Although the Government endorsed calls for ensuring public involvement and a social basis of assessment, the Government response sought to protect industry discretion: the Board of an agency should not be "representative" of stakeholders (8), the agency should only be subject to Government oversight and not be directly accountable to multiple oversight bodies (9-10), the Government alone would review any proposal, rather than multiple review bodies (14), and the designated agency would devise a siting process and ought not be held to that suggested by the

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Panel (14-15). Where had the grounds for ensuring industry discretion come from? From the policy framework, which NRCan representatives later described as the "cornerstone" of nuclear waste policy making in Canada (Brown and Letourneau 2001, 113). Indeed this representative had briefly mentioned the policy framework during Phase 1 testimony.[20] Documents obtained via the *Access to Information Act* reveal some of the negotiations that produced the policy framework, though significant gaps remain due to exemption provisions in the *Act*.

Although an Auditor General of Canada report of May 1995 had recommended the federal Government arrive at a policy for managing nuclear waste (OAG 1995), draft documents regarding such a policy were available as early as March 1995. NRCan's Uranium and Nuclear Energy Branch handled the consultations. An undated memo, though it does contain what appears to be a scribbled March 1995 date, lists the objective of formulating a "comprehensive approach" to "all radioactive wastes". AECL and Ontario Hydro are listed as on the advisory group (NRCan 1995a). A March 1995 document states the objective of the consultation was to consult a "broad range" of stakeholders regarding a policy framework, "including the financial and institutional aspects, for a comprehensive approach to radioactive waste disposal in Canada" (NRCan 1995b, 1). Included within the "policy aims" was that NRCan "disfavours continued storage" (4). The document also noted that that import/export of radioactive waste was "guaranteed" (5), and that a recommendation "can only be generated once the Consultative Document is made public (?) and the consultation document is concluded" (7). Evidently *public* consultation was not assured. The consultation timetable appears to have been: drafting a discussion paper by March 1995, complete it by 2 June, distribute it for viewing by stakeholders June to early July, hold consultations July-August, and arrive at a final report by 30 October 1995 (NRCan 1995c). In what appears to be a June-July 1995 document containing information

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[20] Peter Brown (NRCan), 11 March 1996, *HT* [Vol. 1], 27-30.

for stakeholders, NRCan begins with why there is "pressure on the federal Government to get on with disposal", which included federal requests for an "overall approach to managing Canada's radioactive wastes", the need to respond to the OAG report and the Seaborn panel, and because "disposing of radioactive wastes will make the nuclear option more acceptable as a source of energy, and reassure CANDU customers that Canada has a valid and integrated approach to the management of wastes from the CANDU cycle" (NRCan 1995d, 1-2). This document further indicates the only institutional arrangements considered were various combinations of Government and waste owners' obligation/responsibility/control scenarios NRCan (1995d, 2-7). Regardless, by July 1995 a 16-page discussion document was sent to stakeholders (NRCan 1995e), repeating the aforementioned pressures, and indicating the Government's position that a comprehensive framework for disposal was required (1). The policies arising from the consultation were advertised as putting the Government in a "good position to respond to" the Seaborn panel and move toward "disposing" of wastes (2). Indeed the document notes the "federal Government has been the major investor in the nuclear fuel waste disposal concept and would want to see the concept implemented, if found safe and acceptable by the CEAA [Seaborn] Panel" (5). The document stipulated that waste owners ought to be responsible (according to a 'polluter pays' principle), and quotes the AECL implementation principles as guiding principles for siting (11-12).

Who were the stakeholders consulted? As far as is possible to discern, a list of 77 recipients were identified (NRCan 1995f, NRCan 1995h). The stakeholders consisted entirely of AECL, Ontario Hydro, various uranium mining companies, AECB, various federal and provincial Government agencies, and groups and individuals associated directly with the nuclear industry in some capacity (including the Canadian Nuclear Association (CNA) and the Canadian

Nuclear Society (CNS)). A 31 August 1995 document summarises the positions of

approximately 30 stakeholder submissions,[21] indicating that a general consensus formed around

waste owners funding and operating a waste management agency, with federal oversight, and the

avoidance of multiple agencies for different waste streams (NRCan 1995g). This document had

been formalized by October 1995 for review by federal Ministers and, while stressing waste

owners should be responsible for their waste and the Government for oversight, also noted that

"concerns were expressed about the long time frames involved in obtaining environmental

approvals and the need for formalized public review processes that result in additional costs and

uncertainties that have to be borne by the proponent. The conduct of the public reviews and

approvals process must be clarified and made more timely" (NRCan 1995i, 12). Clearly waste

owners were frustrated by the public review process, but what is also noticeable about these

consultations is what they assumed: disposal was the right option, that disposal was very likely to

be accepted (hence the pressure to formulate policy), that control over decision-making was an

industry/Government matter alone, and that nothing was amiss in discussing quite broad aspects

of nuclear waste disposal in complete isolation of a public inquiry process into that very issue.

The complete *Policy Framework for Radioactive Waste* (NRCan 1996) was released 10 July

1996 (half way between Phase 1 and 2). Not only had these negotiations been entirely 'back-

staged', but that act of concealment reflected a presumption that governance relations pertaining

to nuclear waste disposal were not the prerogative of public input. As Chapter 5 noted explicitly,

though, just such a presumption was very much at issue for public critics.

Public critics had been made aware of the policy framework, in fact, but almost by

accident. During Phase 2 the CNA had recommended to the panel that Government-industry

"should develop" a policy framework, in fact recommending just what was in the policy

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[21] It appears approximately a dozen further submissions arrived in September-November period.

framework already (waste owners as responsible); thereby using the front-stage of the public

inquiry to air views arrived at via backstage negotiations.[22] Although Seaborn panellists correctly

identified the CNA proposal as referring to an "exclusive club,"[23] nevertheless the CNS referred

to the "consultative approach" involved with producing the policy framework as "most

refreshing".[24] Yet Energy Probe considered the policy framework an insult to the public:

> I was not on the mailing list, and I guess I'm wondering if anyone can tell me who
> was, because this may have been done the way multi-stakeholder consultation in
> the nuclear field is usually done, rather than the way it is being done in this
> unusual instance.[25]

Later Energy Probe cited the policy framework as "evidence that help[s] prove the

unacceptability of the concept's approach to voluntarism and openness".

> I believe [the policy framework] shows part of the nuclear decision-making status
> quo, which makes this concept in 1996 unacceptable. That document apparently
> was circulated to some, but was not circulated to parties like public interest
> groups with a long-standing interest in the subject, and the document itself
> enshrines one-sided consultation on an on-going basis [just NRCan and AECB]. .
> . . That is consultation that runs the gamut from A to B."[26]

Although NRCan argued the policy framework did not imply the public inquiry was not the

"primary public consultation forum for used nuclear fuel disposal,"[27] most did not regard the

policy framework as quite so benign.

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[22] Murray Stewart (CNA), 19 November 1996, *HT* [Vol. 28], 228.
[23] Mary Jamieson (Seaborn panel member), 19 November 1996, *HT* [Vol. 28], 234.
[24] Ken Smith (CNS), 20 November 1996, *HT* [Vol. 29], 134.
[25] Norm Rubin (Energy Probe), 20 November 1996, *HT* [Vol. 29], 150.
[26] Norm Rubin (Energy Probe), 21 November 1996, *HT* [Vol. 30], 177-78.
[27] Peter Brown (NRCan), 21 November 1996, *HT* [Vol. 30], 235.

Wilson noted being "shocked" by NGO/public exclusion, declaring it meant they could

not "integrate it into their questions and into the discussion, and that seems to me highly

irresponsible."[28] Coupled with NRCan's Phase 2 conclusion that "it is time now to move

towards disposal,"[29] NGOs considered the policy framework a "prejudging" of panel

conclusions; indeed it denied to the public a "reasonable and fair chance" to make comments on

institutional arrangements.[30] Energy Probe queried the logic behind "restrict[ing] your

consultation to the polluters," before sarcastically asking "how much radioactive waste do we

have to acquire to become stake-holders?"[31] Somewhat prophetically, given that the

Government response to the Seaborn panel report rejected panel recommendations where they

clashed with the policy framework, one panellist wondered how panel conclusions would "play a

role" in decisions about institutional arrangements.[32] By Phase 3 the policy framework was

better known, infamous from the perspective of critical NGOs, with one claiming it meant

Ontario Hydro would be in command of all aspects of waste management.[33] What this policy

framework episode shows is that important considerations bearing upon how the Government

responded to the Seaborn panel report had nothing to do with the public inquiry. The public was

literally bypassed. Moreover, the public had brought to the front-stage the issue of the integrity,

productivity and trustworthiness of AECL and Ontario Hydro. These entities were not trusted

enough to have discretion delegated to them, according to disposal concept critics. Nevertheless

the Government response to the Seaborn panel report suggested the public inquiry was but a

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[28] Lois Wilson (Seaborn panel member), 21 November 1996, *HT* [Vol. 30], 247.
[29] Peter Brown (NRCan), 21 November 1996, *HT* [Vol. 30], 248.
[30] Dave Plummer (Concerned Citizens of Manitoba), 21 November 1996, *HT* [Vol. 30], 249; Brennain Lloyd (Northwatch), 21 November 1996, *HT* [Vol. 30], 251.
[31] Norm Rubin (Energy Probe), 21 November 1996, *HT* [Vol. 30], 253 and 272.
[32] Dougal McCreath (Seaborn panel member), 21 November 1996, *HT* [Vol. 30], 280.
[33] Graham Simpson (Saskatchewan Environmental Society), 14 January 1997, *HT* [Vol. 32].

temporary anomaly in public consultation. Backstage negotiations 'of old' had never left (secret, non-transparent, and unaccountable – with cynical impunity, to repeat the NGO lament).

7.5 The NWMO

This section analyses the NWMO, doing so in two stages. The first stage involves explicating the NWMO's place in a system of delegations: who asked it to do what, how does it get its work done, what kinds of networks of associations became involved in NWMO activity. Hence the first stage involves theorizing the transactions between different kinds of policy domains. I use Guston's principal-agent theory (2000, 2003) to illustrate how the federal Government delegated to the NWMO two tasks: propose a management approach, and make it socially acceptable. I then turn to a second stage, which is to use Hilgartner's (2000) dramaturgical perspective to analyse more closely the content of NWMO activity: how does it draw upon the system of delegations within which it sits to manage information flow, bringing some things to the front-stage but otherwise keeping other things in the backstage. In general terms, I ask why *this* particular organizational 'face' in *this* context? The NWMO proposed Adaptive Phased Management (APM) in November 2005 (NWMO 2005b) as a waste management approach, but in this section I discuss NWMO public consultations 2002-2005 (see Chapter 8 for a discussion of APM). Although I apply principal-agent theory and dramaturgy separately in how I present matters in this section, my intent is to convey how dramaturgy deepens principal-agent theory and thus how the two approaches are mutually reinforcing.

After several years of industry-Government negotiations, the *Nuclear Fuel Waste Act* (NFWA) was sent to Parliament for debate. Northwatch described the passage of the Bill though

Parliament as "the antithesis of the Panel's vision of an open, transparent and public process.

Hearings on the Bill were short, with limited notice and very few witnesses" (Northwatch 2002,

3). Prominent issues during Parliamentary readings on the Bill included criticisms that nuclear

waste was still being conceived of in isolation of energy policy, that there was little provision for

public oversight, that an independent agency was not being considered, and that details about

how the public (especially Aboriginal peoples) would be consulted were non-existent.[34] The

NFWA was eventually approved in June 2002. In Senate debates, Lois Wilson (former Seaborn

panellist) argued the NFWA was structured by the presumption that science was on a sound

footing, with the remaining task to achieve public acceptance. According to Wilson, this

assumption ignored the significant shortcomings the Panel had identified in the technical

evidence, while also misrepresenting 'social safety' as the task of addressing public

misunderstanding (Wilson 2002).

The NWMO was established in 2002 by the NFWA. As a collaborative effort between

the public and private sector, the NFWA mandated that the NWMO propose approaches to the

management of nuclear waste and then implement the chosen option. The NWMO is composed

of waste owners, primarily Ontario Hydro (Ontario Power Generation (OPG) from April 1999),

AECL, New Brunswick Power, and Hydro Quebec. The NWMO was born into an atmosphere of

competing attributions of trust/distrust, and has actively sought to secure its credibility by

distancing itself from its nuclear parents and the politics of nuclear expansion. In principal-agent

terms, the NFWA is a legislative contract specifying the rights and obligations of the NWMO,

but because the public also acts as an 'ultimate principal', the NWMO also participates in

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[34] See *Hansard* House of Common Debates between the first reading of 25 April 2001, through the second readings between 15 May 2001 and September 2001, and the subsequent third readings from 29 November 2001 to 22 February 2002.

continual contract negotiations with the public over its scope of responsibility. Some chains of delegation are thus clear: the public expects the Government to ensure nuclear safety, and the Government delegated to the industry (polluter pays) the task of presenting waste management options and ascertaining what would make them publicly acceptable. In turn, the NWMO delegated to AECL and OPG the task of investigating technical means to waste management. The NWMO delegated, to a host of public relations consulting agents and individually contracted consultants and report writers, the task of mapping public concerns and demands. The public was invited to submit position statements on a range of issues.

Guston's principal-agent theory focuses on aspects of the general problem of delegation, which includes that of adverse selection (how does the patron select an appropriate agent? Which agents most share the interests of the patron?). In regards to the NWMO, the problem of adverse selection points to the multiple levels at which the public credibility of science is negotiated. The NWMO inherited key aspects of the Government response to the Seaborn report, which were reflected in the NFWA, namely the presumption that technical matters were on a sound footing and that what remained was public acceptance as the problem to solve. OPG, which contributes the bulk of the NWMO's funds, foreshadowed this assumption in Phase 1 of the public inquiry, when it had argued the technical matters were resolved and that what remained was "society must now decide what it wants to do."[35] One means the NWMO used to tackle the adverse selection problem was thus to adopt a research stance aimed at confirming the science. Research divisions within AECL and OPG were contracted to prepare reports on the three approaches to disposal set out in the NFWA: storage at reactor sites, deep geological disposal, and central storage (above or below ground). The NWMO represented such delegations as fulfilling its "responsibility to review relevant new knowledge," with all previous knowledge deemed a

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[35] Ken Nash (Ontario Hydro), 11 March 1996, *HT* [Vol. 1], 46 and 42-43.

"benefit" (NWMO 2003b). Below I discuss the content of these presentations of what science was, but here note that, as an aspect of delegation, the NWMO constructed the task of technical research as an unproblematic continuation of already well-established research.

Confirming the science means Government and industry share the goal of an economic presentation of technical options, building on a shared assessment of the technical soundness of the previous work. Selecting an agent is solved at the managerial level by successive manifestations of principals delegating to research bodies already familiar with previous bodies of work, and professionally interested in solidifying that body of work as technically sound. If delegations concerning technical work were unproblematic, because that work was continuous with the past, the same could not be said for the task of securing public acceptance. Such acceptance was acknowledged as lacking, and was thus a new task. Different kinds of delegations were going to be needed to enact a break from the past, and here the NWMO advertised itself as committed to integrity and accountability. In effect, the NWMO sought to combat the high level of distrust of AECL and Ontario Hydro, noted in Chapter 3 in historical context and much discussed during all Phases of the public inquiry. The NWMO thus described its intended study process as "not a journey that can be undertaken by a small, elite isolated group", and they acknowledged they "must consult the general public, and in particular Aboriginal peoples" (NWMO 2003f, 10 & 13). The NWMO also noted that "our work must be firmly rooted in the values Canadians hold dear" (NWMO 2004b, 2), and that the NWMO "seeks to earn Canadians' trust and confidence" (NWMO 2003f, 20). If public acceptance was defined as a problem to overcome, then part of the solution involved inclusion rather than exclusion.

Inclusion is a difficult task to manage, given that public groups were not defined as a stakeholder in the NFWA (only waste owners and producers). The NWMO thus tackles this

adverse selection problem by substituting diversity of input for stakeholder status. The solution

to the technical problem of disposing of nuclear waste involved solving the social problem of a

lack of public inclusion in high-level technical decision-making. If the public were not to be

direct stakeholders, the NWMO had to create transparent mechanisms by which public voices

could be represented as having been listened to. The NWMO tackled this task of 'listening' by

delegating a number of survey and consulting tasks to a loose coalition of interested parties. This

demonstrates the integrity of the organization to a principal concerned with creating a trusted

public face. Simultaneously, it demonstrates integrity to a public critical of a previously

unresponsive nuclear industry. Yet acts of delegating can also be associated with acts of control,

especially where agents are granted authority to produce results but the principal retains the

power that comes from discretion over their interpretation.[36] For instance the NWMO

organizational structure preserves 'waste owner' discretion, in part because while review efforts

are centralized at the Advisory Council level, synthesizing information and making decisions

remain at Board level. Diversity of input and delegating thus allows the NWMO to be

transparent to the Government principal and the first principal of the electorate, by supporting

claims of broad public inclusion, yet also to retain control over the process of incorporating and

synthesizing the diverse interests solicited.

The NWMO also represented the public in particular ways, what I call a process of

'inscribing' the public. If public acceptance of waste disposal approaches is the key problem,

then the public literally must perform the task of acceptance. The first principal ultimately

becomes the final agent. Getting public agents to perform the task of acceptance is facilitated by

atomizing the public. The public is reduced to malleable entities that can accept or reject, have

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[36] Following the definition of power as "authority plus discretion", in contrast to authority as "power minus discretion" (Barnes 1988, 55-94). Also see Barnes (1995).

specific knowledge or not have specific knowledge, be aware or unconcerned, and act reasonably

or just emotionally. The primary tool for atomizing the public is quantitative surveys that build

binary categories into distributions of social attitudes and competences. Below I discuss such

atomization in terms of Hilgartner's notion that particular images are brought to the front-stage

in order to persuade audiences, but here I wish to point to how quantification fits into acts of

delegation. Critical analysis of quantitative public surveys has consistently shown that such

methodologies normally measure public appreciation of science. Such methodologies are

premised on a model of the public as deficient in knowledge and unable to adequately engage

'correct' science, ultimately prescribing an implicit act of deference to authority. This kind of

approach is referred to as a 'deficit model'. Critiques of this model claim such approaches are

more about generating appreciation of science rather than understanding. Recent public

understanding of science generally consists of ethnographic research on the nature of public

methods of evaluating science as a social and institutional entity. Older public understanding

literature appeared to be about dispensing cognitive messages (for discussion of the new and old,

see Wynne 1992b, 1995).

Inscribing the public helps solve the adverse selection problem by transforming

potentially troublesome agents into inscriptions: colorful columns and neat sections in bar and

pie graphs, statistical representations of distributions of knowledge and awareness, sources of

representative comments about public wants and fears. This kind of approach was utilized by

Navigator Ltd., which was selected as an independent public opinion specialist to conduct

national surveys and focus groups based on survey-identified population sub-sets (cf. NWMO

2003d).[37] As an act of delegation, commissioning quantitative work implicitly inscribed and

controlled the public, by turning the public into little units of analysis that can be mobilized into

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[37] The 'independence' of Navigator is not at issue here, only the research methodology.

generalizations about projected future public behavior. The power of inscribing the public surely

factors into the selection of public research methodology, embodied in the professional skills of

Navigator. Inscribing the public is also one means to show the productivity of research, for

overcoming public opposition is part of the NWMO mandate. Successful efforts toward mapping

the potential for opposition or appreciation among the public is part of achieving a solution to the

social problem of credibility.

Guston's principal-agent theory also discusses a second problem of delegation, the

problem of moral hazard, which points to a dual incentive inherent in acts of selection (to

perform tasks, but also to engage in various forms of misconduct). How does the principal ensure

its goals are pursued after delegation? Public demands for accountability and openness were

codified into specific legislative requirements within the NFWA. From a 32 section document,

sections 9, 10, 11, 17, 21-23, 25 and 27 of the NFWA set out the financial accountability of

nuclear energy corporations. Such organizations must submit to specific financial commitments

(depositing in to and maintaining a trust fund for the purpose of financing future waste disposal

research, development, and siting). Sections 12, 16, 18 and 24 set out requirements for tabling

annual reports. Summaries of three-year periods and five-year projections must be submitted to

Parliament. Both trust fund maintenance and reporting activity stand as metonyms for

accountability and openness. The NWMO is able to display the integrity of its operation via such

metonyms. The Government principal is able to point to such metonyms as evidence that its

delegated agent is being both productive and acting with integrity. Such metonymic relations are

used as a public check on misconduct, managed by making transparent what public opposition

groups had argued was always an opaque aspect of the nuclear industry (its level of

accountability and accessibility).

Accountability and openness are paramount moral hazards for the trivium of inter-

locking major principals (public, Government, NWMO), but also for lesser agents. Thus, how

does the NWMO ensure its consultants perform their task of public inscription and diversity

mapping? Following the path of delegations means problems of adverse selection and moral

hazard can be broached as analytic issues for each and every delegation. Part of the solution to

problems of moral hazard resides in the NWMO Advisory Council and its monitoring functions.

The Advisory Council acts as a conduit between principals and agents within NWMO paths of

delegation. Advisory Council expertise constitutes an independent source of guidance, such as

translating the work of delegated agents into policy questions for the NWMO Board. Again,

there is a metonymic relation involved, as the Advisory Council stands as an independent but

internal monitoring agent. Several different goal-dimensions are served by the Advisory Council.

The Advisory Council is an internal check on Board activity. The Board can increase its own

legitimacy by referring to (independent) Advisory Council guidance. Yet the power of the Board

is affirmed because the discretion of synthesis is reserved to the Board alone.

Yet the NWMO is a public entity, performing its tasks in a public forum where credibility

is on the line. The NFWA makes evidence of public consultation a key indicator of whether the

NWMO is acting as an appropriate public entity for a hoped-for new nuclear age. With 'next

generation' CANDU reactors part of a fleet of potential nuclear development in Canada, the

discretion of the NWMO is bounded by federal public policy concerns to fashion a persona for a

21st century nuclear industry. The NWMO Mission Statement thus refers to a collaborative

project that is "socially acceptable, technically sound, environmentally responsible and

economically feasible" (NWMO 2004). Evidence of public consultation is a procedurally

codified means of ensuring persona boundaries are productivity goals for the organization itself.

Regardless of what form the results of public consultation take, or in what form the public is consulted, efforts at public consultation filter down through successive acts of delegation. Each link in the chain of delegations directly or indirectly contributes to persona construction. Evidence of public consultation could be dismissed as mere public relations, disconnected from any significant public policy issues. The advantage of viewing delegation relationships as sites for problems of adverse selection and moral hazard is that even (mere) public relations can be viewed as vehicles through which multiple principals are being satisfied. As such, public relations are sites for the negotiation of science-politics boundaries.

The boundaries between science and politics, fuzzy and subject to contestation as they are, never actually have to be solidified. Problems of moral hazard can thus fruitfully be solved by leaving the boundaries between science and politics unresolved. The NWMO has commissioned several dozen consultants reports, on everything from wildlife management, to groundwater migration rates for radioactive particles, to ethical concerns about competing waste management options (disposal, storage, recycling). Ensuring subsequent agents (consultants) pursue the goals of the NWMO is enabled by a disclaimer ethos. An NWMO disclaimer, to the effect that the report in question does not necessarily reflect the views of the NWMO Board or Advisory Council, accompanies each report. Such disclaimers are standard parts of commissioned reports, but principal-agent theory casts them in a specific light. Disclaimers are fudge factors that allow an organization to contract out for independent advice, thus increasing their own legitimacy in environments of intense public scrutiny. Simultaneously the organization is not directly responsible for, or to, each and every viewpoint expressed. To the extent science policy is defined by acts of delegation, adaptable and successful science policy combines diversity and disclaimers. The message becomes 'many views deserve a hearing, and we should

tolerate them as democratic expressions'. Productivity is thus ensured, as diversity of viewpoints reflects the view of public opposition groups that the nuclear industry must broaden its scope of involvement. Integrity is ensured because diversity of selection breeds a multiplicity of views and a displacement of responsibility from the NWMO Board to the consultants themselves. All relevant social actors express and assume responsibility for position statements. Many problems of delegation can thus be solved by the public justification that delegation is required, and demanded by a concerned public.

Guston's principal-agent theory also utilizes the concept of boundary organizations, which are considered to both provide objects of social action but also ways of engaging with that object. Boundary organizations act as one route to stabilizing the politics/science boundary. Wherever one finds actors negotiating a boundary between politics and science, one could conceivably imagine boundary organizations straddling that boundary-in-the-making. The key characteristic of the boundary organization is that it internalizes the negotiations that go into maintaining the provisional and ambiguous boundary. A successful boundary organization will satisfy two sets of principals, scientific and political. It draws its stability, not from isolating itself from external political authority, but by making itself accountable and responsive to external authorities. I suggest the NWMO is a boundary organization, and that it internalizes the science/politics boundary by transforming 'social acceptance' into a technical problem. Inscribing the public and redistributing responsibility transforms a fractured public into a body of quantified data. The public also becomes a resource that has been given the opportunity to state its position and have it recognized within an institutionalized means for policy formation. In effect, the NWMO absorbs public complaints about the proactionary framework adopted by waste disposal proponents and their supporters, for the NWMO absorbs what it can of the critical

precautionary framework without thereby losing its discretion. I return to this theme in Chapter 8 when discussing APM. The NWMO acts as a boundary organization in that it internalizes such polarized frameworks, seeking to negotiate both social and technical order as a means to synthetic policy making. As Guston makes clear, boundary organizations do not derive their authority by isolating themselves from external political authority. Rather, boundary organizations obtain stability by making themselves accountable and responsible to external authorities. We thus have an internal negotiation of the boundaries between politics and science, in order to be externally indistinguishable from either politics or science.

At this point we can fruitfully turn to Hilgartner, for the question arises as to how potential struggles over the enclosure and disclosure of information both shape NWMO reports and reflect the delegated boundary organization status of the NWMO. With the NWMO, a backstage is created via a clear separation between the NWMO Board and the Advisory Council. The Board is legislatively bound to seek open and transparent communication with all interested parties, while the Advisory Council is legislatively bound to comment upon waste management approaches proposed by the Board. Yet the Advisory Council excuses itself from designated sections of Board meetings. This symbolizes how the NWMO preserves a sphere of autonomy in which the Board can act, with guidance, but autonomously. The Board also proposes, while the Advisory Council offers guidance and review. Board proposals are thus uni-vocal. Yet it is not necessary that proposals be products of consensus, nor that heterogeneous input be homogenized for annual reports. As acts of information control, such Board/Advisory Council bifurcation is managed by presenting this legislated machinery of operation as a smoothly flowing process. The process is a co-operative venture where all views are aired in a collaborative and supportive fashion. The individual opinions of Board or Advisory Council members are not reported, nor

have significant differences between the two groups emerged. Differences may emerge over time, but the current public persona is one of consensus and smooth flow.

Public access to the very possibility that deliberations may not be consensual and smooth behind the scenes is also difficult to obtain. This lack of evidence can indicate either that the phenomenon does not exist (deliberations are in fact smooth and consensual), or that it does exist but the inquirer lacks evidence to prove it thus far. Either way, the public view of interaction between the two bodies is achieved by carefully stage-managed information disclosure. Glossy pronouncements and reports have presented schematic views of how the analytic framework for studying management approaches was developed (NWMO 2003e). This framework (discussed below) appears premised upon close co-operation between the Board and its independent monitor, the Advisory Council. The smooth and consensual front stage performance may conceal fractious and uneven backstage performances, but this is a persona not in direct public view. A collaborative process befits a collaborative goal, and a consensual process befits a goal of consensus.

Further back-staged than the possibility of friction between Board and Advisory Council is the professional work of the nuclear corporations. Discussion documents indicated that new work on waste disposal is to be reviewed, but previous work on a waste disposal concept is to be consulted. In no current NWMO document is there an explicit statement to the effect that previous technical work is to be seriously questioned, doubted, or outright rejected. As noted above, as a problem within acts of delegation, this emphasis upon technical review shifted to the front-stage the 'real task': public acceptance (thereby constructing what the task was). In Hilgartner's terms, stage managing the information presented on the front stage is a matter of constructing the character of that information. Thus, in the most technically oriented document

designed for wide public consumption, an assessment team (A Team) evaluated three approaches

to the management of nuclear fuel waste (NWMO 2004a). The 'A Team' evaluated reactor-site

extended storage, centralized storage, and deep geological repository. The assessment

methodology incorporated technical, social and ethical objectives. The A Team concluded that a

deep geological repository scored better in every category. Although the NWMO departed from

this assessment when it made its final report, concluding that deep geological disposal lacked

adaptability if it did not incorporate monitoring and retrieval (NWMO 2005b, 31), the outlook on

technical matters has remained oriented toward preserving as much of the original deep

geological disposal concept as possible.

Hence satisfying external demands for the possibility of public input (see below for more

discussion on this point) has always been balanced with the goal of preserving established

technical preferences for passive disposal. As the President of the NWMO (Elizabeth

Dowdeswell) noted in the NWMO's first annual report, previous work would be consulted,

international experience would be drawn upon, and the possibilities of future research would be

identified and commissioned where necessary (NWMO 2002, 10).[38] Nevertheless review of

technical work has remained the primary focus, although this can also be represented as an

artefact of 'waiting for siting'. While Guston's principal-agent theory suggests any future acts of

delegating technical work would face the problems of adverse selection and moral hazard,

Hilgartner's dramaturgical perspective suggests the partitioning of information flow is a means

to backstage particular organizational tasks. The task of confirming the science is a technical

matter, performed with professional autonomy. While social acceptance is a problem to be

managed on the front stage, the technical side of waste management can be safely situated

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[38] Ken Nash, who attended most of the public inquiry as Ontario Hydro's (now OPG) representative, was appointed President of the NWMO on 30 June 2006.

behind closed professional doors. In that space, scientists and engineers can do their work. The objects produced are black boxes for the NWMO to adopt and present to the public. They form part of technical ensembles, to be placed in socially acceptable socio-technical packages. Moreover, acts of apparent quiet agreement between scientific practitioners are often a public face, one that over-lays micro-level acts of negotiation about fact construction. Yet NWMO reports do not report this level of fact construction. Rather, information about the construction of the black boxes that will one day comprise waste management options goes systematically under-reported. One has no need of conspiracy theories or sociologies of error in order to understand this process. The NWMO reports are analogous to standard journal articles in the sciences and engineering, which generally present results that work and provide recipes that attempt to reconstruct how the work can be replicated. It is immaterial whether or not such formats actually (re)present research-as-it-happened. It is doubtful whether any finite formalization can act as a recipe, in the absence of tacit knowledge and agreed upon criterions of when something in fact works. The format itself is part of a social institution for presenting an image of knowledge as codified, successful, shared and progressive. In similar fashion the NWMO back-stages the black boxing of waste management technical knowledge. This is part of an organizational culture in which technical issues are already on a sound basis, the problem being social acceptance of sound science.

In an NWMO document setting out the analytic framework that would guide the development and assessment of waste management approaches, the key principle was that "[w]ithout a . . . societally [sic] directed framework, implementation of any management option will be extremely difficult" (NWMO 2003e, 2). The first phase of the analytic process was projected as beginning with the definition of concepts, alternative perspectives, and possible

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futures. Next, broad questions would be articulated: processes of engagement, sensitivity to local traditions, and the well-being of social and environmental systems. Criteria for exploring each question would follow, concluding with discussion of the relative importance of each question. This would be followed by a third phase, in which a recommendation would be made, and in which the various options would be considered via comparison with each other and the social-ethical framework that had been developed. Inter-posed between each stage was dialogue. The phased approach itself was said to be subject to social learning at each and every stage, as dialogue with the public and experts in a wide variety of fields fed into the discussion process. The technical soundness of competing waste management options was reviewed. This analytic framework unfolded over the 2002-2005 period, and was reported as: the NWMO first asked the Canadian public which questions they wanted answered (NWMO 2003f), as well as how they understood the range of choices relevant to choosing a waste management approach (NWMO 2004b). The questions and objectives arising from this process had been used to form an assessment framework (NWMO 2004a). Along with an effort to incorporate the results of the public inquiry into NWMO deliberations (NWMO 2005a), this framework was used to evaluate waste management options and thus recommend APM (NWMO 2005b).

Hence issues that were raised in the public hearings, international experience, and any new research, were taken into account in NWMO deliberations. Significantly, such work formed but a small part of the analytic framework. In no way does this suggest the technical soundness of waste management options did not receive due consideration. Rather, it is to suggest that technical soundness has been taken for granted as a public display. The analytic framework problematizes social, ethical, and economic issues: each has to be established, learned about, modified via dialogue, subjected to analysis in terms of individual versus collective concerns,

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benefits versus costs. Yet the basic AECL disposal concept, what the NWMO would begin to refer to as Option 1 (in NWMO 2005b), has not been significantly problematized; rather it is presented as technically sound, even if not publicly acceptable. According to the NWMO analytic framework, that soundness can be assumed. The public hearings are presented as having established soundness, but not social acceptability. Hence, the job is to confirm the science, a task facilitated by back-staging the production of that science. Technically speaking, the NWMO confirmed what was previously established. This has meant what was not established, social acceptability, has been the NWMO's primary task.

In terms of stage management, information control is built into texts presented on the front stage. Noticeably, waste management science has enjoyed a unitary voice (see Chapter 8 for further discussion). Reviews of the relevant research literature have been presented as building upon each other. The NWMO has operated according to a legislative mandate that specifically narrowed the presentation of approaches. The NFWA specifies that a recommended approach must be based on just one waste management method. The scientific voice of any recommended approach will always be unitary by virtue of being solitary (and black boxed). Contrast this situation with the diversity of consultant reports. These have been directed toward clarification of key questions, setting criteria for answering them, and debating relative importance. Consultant reports have effectively been part of the preparation process for site selection. Possibly this means the Government believed focusing on a concept alone during the public inquiry was a mistake (cf. Wilson 2000, 8). Consultant reports as a body of information have thus been multi-vocal, yet no effort has been made to backstage this multi-vocality. Indeed, the multiplicity of opinions is positively valued by the NWMO, as it reflects the diversity demanded by the public.

In NWMO presentations the public is thus multi-voiced. Yet what is 'the public', and

what does it 'want'? The process of inscribing the public facilitates the multi-vocality of the

public, but information about the public is explicitly brought to the front stage in a particular

fashion. Consider that group of reports commissioned by the NWMO, along with discussion

documents and annual reports in which the NWMO interprets those findings. The NWMO has

referred to particular research groups in order to construct 'the public and its wants'. For instance

Navigator Ltd. conducted surveys, public opinion polls, and focus groups (NWMO 2003a,

2003c, 2003d). The Canadian Policy Research Institute (CPRN) has held citizen dialogue groups

(Watling *et al* 2004). The Public Policy Forum (PPF) has led focus groups with opinion leaders

(Public Policy Forum 2004). The public that is brought to the front stage in these forums of

information is coherent in one sense, but importantly fractured in another. In the Navigator Ltd.

reports, the coherence comes from a model of the public as largely apathetic and thus "soothed

by the facts". The public apparently wants "sound bites", as opposed to comprehensive

information programs. The public is "grateful for the NWMO" when informed of its existence.

Thus, results from discussion groups were presented as showing that "for many participants, the

facts only went so far. Thinking about the issues caused more worry" (NWMO 2003a):

> Overwhelmingly participants preferred communications . . . delivered as bite-size
> messages in reader or user-friendly language through a range of accessible media
> (2-3) . . . A sense of concern tended to rise slightly during each group as
> participants searched among themselves for basic facts about nuclear waste. As
> they filled in their own facts, that concern continued to increase. The moderator's
> mention of the several facts tended to calm many participants (NWMO 2003, 11).

Navigator Ltd. later quoted survey data to present the public as largely unconcerned with nuclear waste management, preferring scientists to be left in charge and satisfied with "passive" sources of information (NWMO 2003d).

In contrast to the Navigator Ltd. results, the CPRN presented the public as dissatisfied with passive communication. According to results from focus group research (conducted between Jan-March 2004, across 12 cities, and involving 462 citizens in focus groups of 40), CPRN concluded that

> ...while receiving information helps, one-way, passive communication is not enough. Citizens must be given a legitimate and active role supported by effective mechanisms to feed their voices back into decision making (Watling *et al* 2004, 41).

However, although CPRN found much consensus regarding demands of democratic inclusions and an open debate about energy policy, the CPRN still interpreted the responses of dialogue group participants through the dominant framework of a deficit model of public understanding.

Specifically, deficit models of public uptake of science assume science is unitary and coherent, so that understanding can be measured by the degree to which the public is knowledgeable about acknowledged scientific facts. Public understanding of science thus involves the dissemination of genuine scientific and technological knowledge, from the upstream research base, to the downstream publics. Ignorance is thus a cognitive deficiency. Educating the public is the goal, and that public is conceived as a *tabula rasa*. The public absorbs technical wisdom but has no autonomous meanings of its own with which to evaluate science. Finally, the deficit model presumes the public is concerned only with propositional questions and the instrumental consequences of technical activity, rather than with the human purposes driving

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technical activity in the first place (Wynne 1992b, 1995, 2005). The operation of the deficit

model can be seen, for instance, when CPRN equates level of information with degree of

awareness:

> Canadians know very little about the radioactive waste being produced by their
> electricity systems. Participants were taken aback by their own lack of
> information. They immediately realized the lack of public awareness as a serious
> handicap to responsible decision-making... [Thus the dialogue process should]. . .
> proceed from technical analysis to public education . . . (Watling *et al* 2004, iv-v).

In contrast to Navigator Ltd., but consistent with CPRN, the PPF presented the public as very

much concerned about the issues connected to nuclear waste management. The issue was of such

salience that PPF regarded one of the challenges facing the NWMO to be the "political

dynamite" factor.

> This issue is so unpopular that some politicians might have to sacrifice their
> political careers for action to be taken in this area (PPF 2004, i).

As a solution to the problem of political dynamite, PPF recommended the NWMO "separate the

debate about waste management from power generation" (PPF 2004, ii).

Yet the public inquiry clearly showed that separating waste disposal from energy policy

had not only created intense distrust of the policy process, but clearly lacked legitimacy for a

very large body of public opinion. That is, there was clear consensus about the need to have a

full and open discussion. Nevertheless in successive Discussion Documents the NWMO

encapsulated the reports of its consultants in the repeated presentation of a fractured and difficult

to satisfy public. Thus, even if the public may agree on broad societal goals, "disagreements are

exposed when we chart a path to implement these goals" (NWMO 2003f, 4). Interpreting "social

acceptability" to mean "public confidence" (NWMO 2004b, 32), the NWMO argues the

common ground revealed by the CPRN report parallels "a diversity of perspectives too" (21).

The picture of the public that ultimately makes the covers of the NWMO public communication

focuses upon this diverse public, but utilizes the boundary between diversity and common

ground. Following Navigator Ltd., the public is presented as significantly more concerned about

issues such as health care, rather than nuclear waste disposal. However, the public also holds a

multiplicity of views on what constitutes social, environmental, and economic soundness. The

public is a pluralistic entity, defined by internal differentiation and unresolved conflicts. In

contrast to the reliability of univocal science, the public is difficult to reliably map. Except, that

is, for the coherent set of characterizations related to a general lack of knowledge and a psycho-

social inference to the effect that the introduction of facts tends to calm an emotional public.

Hilgartner's analysis of science advice as stage management characterizes the textual movements

of back-staging some things, but front-staging others, as part of the stabilizing and destabilizing

both the texts themselves and the knowledge they contain.

7.6 Discussion

The discussion of the NWMO presented here indicates how boundaries between science and

politics can be used as a resource in battles for credibility. The crucial democratic point appears

to be, not necessarily where the precise boundaries are drawn, but whether powerful actors doing

the drawing can be held accountable for the boundaries so drawn. Although CPRN reported that

an absence of trust in Government and industry generated demands for an independent watchdog

agency (Watling *et al* 2004, xiii), in NWMO documents the ability of AECL and the nuclear

corporations to provide sound science has been taken for granted on the front stage. One could

say this repeats one of the key democratic deficiencies that bedevilled the public inquiry, in that

the waste disposal proponents (AECL and Ontario Hydro) took for granted their own status as

trusted to oversee waste disposal research. The knowledge and practices associated with waste

disposal science and engineering have thus been further stabilized in the work of the NWMO,

but it is a stability purchased without seriously questioning whether those technical bodies are

best placed to bring forth waste management options.

Although the NFWA established the NWMO as a separate legal entity from existing

industry bodies, no public critic takes seriously that a legislative act suddenly divorces the new

entity from its parent forms. Significant material links remain, such as AECL and OPG

conducting the actual technical research, providing the NWMO with its funds, and constituting

the NWMO Board. Although the Seaborn panel had recommended against an industry-

dominated agency, and had recommended that safety and acceptability meant particular criteria

of public acceptance helped constitute what technical safety ought to mean and how to assess

safety, the NWMO currently neither satisfies the independence clause nor enacts the social safety

perspective. In NWMO presentations the public is destabilized to such a degree that tremendous

discretion is available to the NWMO to assert what the public considers acceptable. Moreover,

the Seaborn panel had recommended an independent agency not just because *representation* by a

broader public was desired. Democratic involvement was not envisioned as solely an issue of

representation, which unfortunately can be the implication when the focus is turned toward the

abilities and capacities to directly contribute to technical research is elevated to great importance

(as do Collins and Evans 2002, 2007). Rather, democratic involvement for the Seaborn panel

also meant accountability, transparency of decision-making, and responsiveness to different

framings of what was at stake. This is why the formation of the *Policy Framework for*

Radioactive Waste, formed out of public view and involving just Government and those directly

involved in producing the waste in question, seriously undermines the democratic credentials of

nuclear waste policy-making. Not only did this policy framework provide the guidelines for

which public concerns would be followed and which would not, but it pre-empted one of the

salient questions at the public inquiry. Participating in deciding *who* should rule is a vital part of

constructing accountability relations, and the Government response to the Seaborn panel and the

subsequent NFWA essentially channelled industry preferences arrived at without public review.

This ought to undermine any ability of the NWMO to claim its narrow remit – just waste

management and not energy policy – is not of its doing. Its parent organizations directly

contributed to setting this limitation.

Given that the NFWA followed on from a federal Government commitment to not curtail

the discretion of waste owners, it is not surprising that those waste owners have utilized that

discretion to strategically control the boundaries between science and politics. Sometimes this

has been explicit in public performances, for instance in the implicit representation of geological

disposal solving a social problem of potential political instability. On the CBC Radio program

'Quirks and Quarks', Elizabeth Dowdeswell (then-President of the NWMO) and Lawrence

Johnson (two decades with AECL) debated Norm Rubin (Energy Probe). While Dowdeswell

emphasized the pressing need for a socially responsible solution to accumulating waste,

Lawrence gave public voice to expert distrust in 'the social'. Lawrence argued that

> . . . society is not stable, but geology is . . . our experience has been that in society
> things don't go on forever . . . Social scientists often look at our business and say,

well, they don't trust geological disposal; and we look at society as scientists and say we don't trust social stability.[39]

For the NWMO, social acceptance is thus an arena of 'problems'. Multiple voices and interests are normalized as 'to be expected'. The public relations goal is also quite a normal goal for boundary organizations, that of getting the public to understand. As noted, understand often translates into appreciate. From a dramaturgical perspective, where boundary organizations make choices between different systems of stage management, such choices shape audiences, experts, and displays of science on the front stage. As discussed in Chapter 8, the NWMO has strategically absorbed public demands in a fashion that does not significantly affect long-standing industry preferences for permanent disposal. Adaptability, for instance, has been converted from technically redundant to socially responsible.

Thus CPRN had reported that the most prominent citizen-generated waste management scenario involved the concept of adaptability: the provision for monitored, retrievable storage (MRS). CPRN noted that 77% of discussants favoured MRS (Watling *et al* 2004, xi, 19, 29-30). Nevertheless, MRS was absent from initial NWMO options (NWMO 2004b, 42-52), in fact it was subsumed under deep geological disposal:

> One could argue that flexibility is really only important when it is necessary to ensure safety. A geological repository may be less flexible, but flexibility may be less needed given its lower susceptibility to surprises (71).

Consistent with Berkhout's (1997) suggestion that the role of science in the history of nuclear waste disposal has been to authorize a boundary between science and politics, the NWMO used a

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[39] Quirks and Quarks, CBC Radio, "Nuclear Waste - Burying a Problem, or a Solution?" Broadcast September 18, 2004. The full debate can be accessed via the CBC website: http://www.cbc.ca/quirks/archives/04-05/sep18.html#top (the relevant interview quotations are at minute 8:20-8:25 and minute 16:10-17:05).

technical characterization to authorize how social acceptability should be evaluated. A sixty-year period of flexibility (due to construction, emplacement, and closure), coupled with a technically-imposed safety estimate, effectively defined what social acceptability ought to mean. Yet the NWMO soon altered course, with APM (NWMO 2005b) incorporating adaptability. Clearly the NWMO does not see adaptability as a technical requirement of safety. In effect, APM grafts a political element of adaptability onto the technical element of Option 1 (deep geological disposal). For the NWMO, sustaining this distinction between politics and science is part of efforts to enhance their credibility, because having constructed MRS as a political feature of waste management, technical options can thus be presented as sensitive to democratic concerns. Chapter 8 thus reflects upon what NWMO activities imply for the general notion of social responsibility.

Chapter 8

Implementing

8.1 Introduction: a democratic turn?

Canada's Nuclear Waste Management Organization (NWMO), established in 2002 to investigate approaches for managing used nuclear fuel, proposed Adaptive Phased Management (APM) in November 2005 (NWMO 2005b). APM recommends permanent geological disposal but allows for optional management methods, including monitoring, retrieval and storage (MRS). APM also leaves open the precise duration of associated activities and the outcome of decisions about which options to take and when. Public consultation and formal political decisions are required to move the process from one phase or activity to another. The federal Government accepted this proposal in June 2007 (NRCan 2007). The NWMO now operates as the implementing agency for APM, and is currently consulting with a broad base of stakeholders regarding the design of a site selection process, which is envisioned as taking up to 10 years, with site selection within 30 years. The NWMO seems the model reflexive institution: it claims to have developed its approach in collaboration with Canadians (NWMO 2003f, 6), and to have unearthed common values amongst public and experts (NWMO 2004b, 3). The NWMO claims APM is grounded in a process of continuous learning, an acknowledgment of inevitable technical uncertainties, a commitment to allow citizens an active role in decision making, while neither promoting nor penalizing decisions about the future of nuclear power (NWMO 2005b, 4 and 20).

This chapter offers a critical analysis of the NWMO's democratic turn. Given that the focus of this work has been the public inquiry process, what I offer here is an opinionated

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comment. I do so by briefly outlining (Section 8.2) how the terms of debate and assessment have changed over time, citing significant Government and industry pronouncements that capture the flavour of how the nuclear waste disposal issue was framed at particular historical junctures. These pronouncements are set in their political-economic and historical contexts by briefly reviewing some of the findings of Chapter 3, where I showed that nuclear waste disposal proponents increasingly lost their ability to act like a status group (which can profitably practice exclusionary social action). Control over the terms of assessment and debate was never entirely lost, but it became progressively weaker as the political-economic support for continuing expansion of commercial nuclear power wavered and then halted. This loss of control over the terms of debate culminated in the Seaborn panel's rejection of AECL's nuclear waste disposal concept (CEAA 1998). As noted in Chapter 7, both with the Government response (which utilized a policy framework built from industry-Government discussion to inform what to accept or reject in the Seaborn panel recommendations) and the way the NWMO set about problematizing public knowledge, nuclear industry actors have sought to re-establish control over the terms of debate. In Section 8.3 I update the political-economic analysis of Chapter 3, fitting nuclear waste into the structural dynamics of the nuclear industry and the political field of the period 1997-2007. I show that a possible nuclear renaissance is taking place, with an upturn in the domestic reactor industry since 2006 reinforcing the upturn in foreign reactor sales since 1990. This nuclear renaissance has taken place within a context of both attempts to restructure the electrical industry and the perception that the nuclear waste disposal problem has been solved. In the former, reform efforts aimed at reducing electrical industry monopoly largely failed, with the result being a continuation of managed competition. In the latter, APM reinforces the nuclear renaissance by shifting attention to good management practices as a means to cope

with technical and political uncertainties. Significantly, both nuclear waste disposal and a potential nuclear renaissance are linked by an emphasis upon socially responsible management.

In Section 8.4 I turn to an analysis of the NWMO's APM proposal. The NWMO and its supporters claim APM resulted from a successful process of social learning, made possible by listening to Canadians, and as such is both discontinuous with the past and not intended to influence energy policy futures (NWMO 2005b). Critics respond that APM is a repackaging of deep geological disposal, made possible by powerful elites successfully pursuing an agenda without significant resistance, while being designed to perpetuate long-standing interests in expanding nuclear power (cf. Edwards 2005). I suggest both accounts over-emphasize success as the driver of change. Neither account illuminates the extent to which APM is a pragmatic response to failures within the political field, specifically that pro-nuclear elites developed new ways of public interaction and entertained different technical options as their institutional influence became attenuated and subject to higher standards of democratic accountability (see Chapter 3 and Section 8.3, and as implied by the negative conclusion of the Seaborn panel discussed in Chapter 7). I suggest the NWMO's APM constitutes a sophisticated means by which public dissent is marginalized. Concerns about the origins of options and the durability of prior commitments are being translated into questions about the consequences of chosen actions and the representative characteristics of current and future political constituencies. I thus advance a critical interpretation of NWMO public engagement efforts and of the way the NWMO claim technical decisions are related to political decisions. In Section's 8.5 and 8.6 I thus explicate some of the grounds for this normative position.

In Section 8.5 I outline a sympathetic way of looking at the NWMO's APM plan. I suggest that nuclear waste disposal proponents have sought to reconfigure the moral context of

technical research and political decision-making, from a focus on actors and actions, to a focus on the action-situation. In a sympathetic vein, this reconfiguring could be read as an attempt to grapple with a context of low trust, and uncertainties and ignorance, but also where planning for the long-term is desired. That is, how do institutions with poor track records attempt to build trust in such situations? I thus suggest the Canadian nuclear waste management case highlights how contemporary discussions of public consultation could do with an infusion of old-style moral philosophy (specifically, Hume's (1740) discussion of the obligation to keep promises). To adapt Hume for contemporary times, we can say that only in action-situations in which (powerful) actors can lose freedom of action can consultations with the public carry real meaning. Yet following from this deployment of Hume, the question arises as to the extent to which APM allows for the possibility that key nuclear industry actors and their bureaucratic supporters could lose their freedom of action. In Section 8.6 I thus conclude with a more critical interpretation of APM, suggesting that it tends to maximize citizen involvement in choices that do not fundamentally impact upon the commercial interest of securing a solution to waste disposal in aid of nuclear expansion. I thus suggest APM maps the public with a view to counteracting dissent. Such processes need to be interrogated if public participation is to have any meaning at all, as has been argued by Cooke and Kothari (2001), and which is consistent with Wynne's call to analyse the "unacknowledged political-economic dimensions of today's techno-sciences" (Wynne 2007, 109).

8.2 The Evolution of Nuclear Waste Disposal

Previous to the NWMO, Government policies stated solutions to waste disposal were required to

support nuclear power, regarded technical problems as mostly resolved, and identified public

dissent from expert opinion as causing delays in repository siting (cf. Aiken 1977; EMR 1982,

1988a). Similarly, industry groups once chastised the public for its irrational beliefs about

nuclear projects, regarded technical problems as resolved or surmountable, and blamed delays in

repository siting on unnecessary public consultation (cf. CNA 1976b, Siddall 1987, AECL

1995). The NWMO dispenses with such adversarial constructions of the public, with exuberant

technical confidence, with impatience about the policy process, and with direct links between

waste disposal and nuclear power. The following selections illustrate this shift in approach:

> Despite repeated assurances that nuclear waste disposal presents no insoluble
> scientific, engineering, or environmental problems, the issue remains in the mind
> of the public and some members of the scientific community as a serious
> unresolved issue associated with the development of nuclear energy. In several
> countries (Sweden, Germany, and the United States) public concern over long
> term waste disposal has become a major factor cited in opposition to nuclear
> power (Department of Energy, Mines and Resources, 1982 (EMR 1982)).

> The Panel [RDAP] is frankly disturbed by the extraordinarily prolonged character
> of the decision process. Merely to obtain federal acceptance of the concept of
> deep geological disposal will have taken nineteen years since its formulation in
> 1977. Site screening for a possible repository cannot even begin until the basic
> concept is accepted . . . [RDAP] is disturbed at several aspects of the slowness of
> the proposed action [an operating repository 2025-2065, with closure in 2065]. . .
> First of all, the Panel is persuaded by the research already conducted . . . This
> issue is an example of the indecisiveness of public policy within which Canada's
> nuclear power industry has been compelled to do its work (Research and
> Development Advisory Panel (RDAP) to the Board of Directors of Atomic
> Energy Canada Limited, 1995 (AECL 1995, 3-4)).

> In recommending an Adaptive Phased Management approach, we propose a
> responsible path forward that intends to meet rigorous standards of safety and
> security for people and the environment. It embraces the precautionary principle.
> It is grounded in concepts of continuous learning and adaptive management. We
> believe this is the strongest possible foundation for managing the risks and
> uncertainties that are inherent in the very long time-frames over which used
> nuclear fuel must be managed with care. In a fundamental way our proposal
> advances a collaborative process in which citizens always play a legitimate role in
> making decisions, while at the same time creating conditions for productive
> movement forward. The nature of the waste, the inevitable uncertainties about
> performance years into the future, and the care that will be required over many
> generations, strongly suggest an ethical approach that integrates a continuing
> understanding of values (NWMO 2005b, 4).

As noted in Chapter 3, pro-nuclear elites within Government bureaucracies and industry lost

formal parliamentary support, and the ability to control the agenda, at crucial junctures in the

development of nuclear waste disposal policy. General support for nuclear projects never entirely

receded, but federal-provincial governments became less receptive to expanding the nuclear

option and more responsive to demands for democratic accountability. The first juncture was the

1981 halting of siting assessment work of 1978-81. Elites failed to translate arguments in support

of nuclear power into arguments to accept a geological repository. The second juncture was

1989, when the public inquiry mandate limited discussion to a concept for waste disposal,

excluding considerations of a site, energy policy or implementing agency. Although such de-

couplings were supported by nuclear elites, they also reflected federal-provincial unwillingness

to intervene in energy policy. Elites thus failed to sustain a protective energy policy environment

that could shield nuclear waste disposal discussions from democratic processes. The third

juncture was 1998, when the Seaborn panel (CEAA 1998) concluded that AECL's proposed

waste disposal concept lacked social acceptance. Elites had thus lost control of the terms of

assessment of nuclear projects. Each of these junctures constituted points of failure because

waste management proponents neither achieved success within the terms they set out with nor did they repackage waste management in terms entirely of their own choosing.

As discussed in Sections 8.4 and 8.5, waste management proponents have absorbed demands of critics that in fact limited elite discretion and authority. Thus elites accepted limits to prediction and control capabilities and to the legitimacy of risk-benefit analysis, they have endorsed the making of provisions for direct public influence, while relaxing their aversion to institutional controls in repository design. Just as matters are more ambiguous than the critics' image of an 'unperturbed nuclear juggernaut' suggests, so too they are more ambiguous than the NWMO's image of 'benevolent social learning'. Waste management proponents seem to have played the critics at their own game. The notion of inherent uncertainties in deep geological disposal science has been deployed to argue that only repository siting can resolve them. Attributions of 'hidden political agendas' have been addressed by deferring decisions about options to future political constituencies. Repository siting is thus advanced, despite critics offering the arguments in order to complicate siting. Critics also note the continued decoupling of waste management from the fate of nuclear power is an illegitimate separation.

8.3 The Political-Economic Context

The process of industry reinvention alluded to in Section 8.2 is being conducted by the NWMO, in part, because the NWMO inhabits a different political-economic situation than AECL and Ontario Hydro had become accustomed to by the mid-1980s. When the Darlington Generating Station completed the process of coming on-line in 1993, this was accompanied by 30% rate increases in electricity, while its capacity was already surplus to Ontario's needs (Doern and

Gattinger 2003, 36). The failure of the commercial nuclear power monopoly was evident in the

1990s as 35% of Ontario Hydro's electrical revenue was being put toward debt repayment,

courtesy of nuclear over-expansion and cost-overruns. This perception that monopoly practices

had been a failure is shared by both critics of nuclear power (cf. Swift and Stewart 2004) and

supporters of the nuclear option (cf. Trebilcock and Hrab 2005). Indeed the retail price of

electricity had been frozen by the Ontario government in 1993, and this freeze remained in place

until rates were opened to competition in May 2002. Situating nuclear waste disposal in the

context of commercial nuclear power conflicts with the NWMO's preferred context, which is a

continuation of the proactionary framework discussed in Chapter 6. Just as technical and

bureaucratic elites had sought to emphasize the urgent technical problem that was nuclear waste,

rather than any associated decisions tied up with solving that problem, the NWMO divorces

APM from energy policy questions by saying APM carries no implications for choices about

energy options (NWMO 2005b, 20). Yet the fact the federal Progressive Conservatives (under

Stephen Harper, elected in 2006) identified APM as part of "steps toward a safe, long-term plan

for nuclear power in Canada" (NRCan 2007) suggests the folly of accepting the NWMO's

apolitical version of context.

Indeed, history indicates the public inquiry process 1989-97 was an anomaly in terms of

the context within which nuclear waste disposal has been situated. Solving the nuclear waste

disposal problem was continually advertised as a means to secure a future for nuclear power, up

until 1989 (see Aiken 1977, 6; EMR 1982, 1; EMR 1988a, 15, EMR 1988b, 4). In internal

Government-industry documents during the public inquiry, this was again the case (see NRCan

1995d, 1-2). When the Government responded to the Seaborn panel report (CEAA 1998), the

Government returned to linking solutions to nuclear waste disposal to ensuring a future for

nuclear power (NRCan 1998, 6). NRCan also reiterated to a nuclear industry audience, at a

Canadian Nuclear Association (CNA) meeting in March 1995 (prior to APM being released in

November 2005), that it was committed to nuclear expansion and that it saw solving the waste

disposal problem as a vital component of that commitment (NRCan 2005). As noted above,

NRCan reiterated this link when accepting APM (NRCan 2007). Hence I submit that there is

little reason to divorce nuclear waste disposal from discussion of commercial nuclear power.

Nevertheless the specifics of the political-economic situation have changed. Following on from

the federal Mulroney Government's shift to deregulation and decentralization during its time in

power 1984-93, similar trends would take place within Ontario. When the Progressive

Conservatives were elected to Ontario office (1995-2003 under Mike Harris and then Ernie

Eves), they set in motion plans to restructure the Ontario electricity market. Such moves had

already been undertaken in California and the UK most prominently (Doern and Gattinger 2003).

Ontario Hydro was split (in April 1999) into Ontario Power Generation (OPG), with ownership

of generation assets, and Hydro One, with ownership of the transmission grid.

Yet electricity market restructuring, which initially prompted suggestions that

monopoly's moment might have passed (Daniels 1996), ultimately failed (Pembina 2004, 1-4;

Thomas 2004, 5-6; Swift and Stewart 2005; Trebilcock and Hrab 2005; Iacobucci, Trebilcock

and Winter 2006, 29-48). Prior to the market being opened to both wholesale and retail price

competition on 1 May 2002, the potential monopoly power of OPG was curbed by legislative

mandates that OPG would pay a rebate to consumers where its wholesale price exceeded 3.8

cents per kWh. OPG also had to divest itself of a significant portion of its generating assets in

order to reduce its market share to 65% by 2004 and 35% by 2010. OPG thus leased the Bruce A

and B generating stations to a consortium in 2000, which originally had British Energy with over

80% shares and the Canadian Mining and Energy Company (CAMECO) with 15%. Yet when British Energy went bankrupt CAMECO, in 2004, increased its stake to more than 30%. Note here that CAMECO is an amalgamation of the crown corporation Eldorado Nuclear Limited (ENL), which had been privatized in 1988 and amalgamated with the Saskatchewan Mining Development Corporation. CAMECO thus 'consumes' its own product (uranium).

When the electricity market did open in May 2002, it only remained so until November 2002. Soaring electricity prices led to a freeze on retail rates, while in the same month the market opened the courts had blocked the privatization of Hydro One. Some argue that the history of electricity privatization and deregulation (for instance, running through Chile, the UK, US, and Canada) *inevitably* witnessed such problems (Hampton 2003). Others note that the short-term "market power" of OPG was not changed by restructuring (Dewees 2001, 169). Those supportive of privatization, and opposed to monopoly, have claimed the failed restructuring means costs will be filtered through to general taxpayers, via subsidized electricity prices and Government debt, and thus the perpetuation of market distortions created by established, monopolistic, interests (cf. Trebilcock and Hrab 2005). Public utilities in Ontario, which is Canada's nuclear province, thus remain part of a system of "managed competition" – indeed this is generally applicable across Canada (Doern and Gattinger 2003, 5).

A future area of contention is likely to be the extent to which the public utilities might continue their historical role as virtual extensions of provincial government public policy. Concerns about the environment now seem to act as vehicles for both promoting the nuclear option and as a Government rationale for supporting nuclear power. The CNA thus champions nuclear power as the means to both generate electricity and combat global warming (CNA 2007). The National Energy Board suggested various scenarios to describe Canada's energy future, and

in the 'techno-vert' scenario, nuclear reactors were regarded a suitably plausible technology in a

scenario where Canadians embrace both advanced technology and environmental conservation

(NEB 2003). Such claims of 'clean nuclear' have not gone unchallenged. Some NGOs (cf. Sierra

Legal 2006) have challenged the legality of such claims (whether they breach the *Competition*

Act by making misleading claims). Others have disputed their veracity in general, arguing they

ignore known environmental impacts by selectively focusing on reactor output and not the full

nuclear fuel chain (Pembina Institute 2006). Moreover, failed electricity restructuring seems to

have given more impetus to long-standing critiques of the economic merits of nuclear power,

which are now coupled to claims about mismanagement of nuclear facilities (cf. Pembina

Institute 2006, 75-78 and 94-96; Arai 2001, 416-21). Indeed, an important cloud hanging over

nuclear power is whether it can survive without Government subsidies and support. Bratt's study

of CANDU exports, for instance, concluded that not only has every AECL foreign reactor sale

been accompanied by scandals about 'payments' to the buyer (loans, bribes), but in general the

federal government heavily subsidizes each sale (2006, 216 and 227). Subsidies for domestic

reactor projects have come under fire since commercial nuclear power commenced (cf. Jaccard

1995; Martin 2000, 2003).

Despite failed electricity restructuring, the contemporary situation in Canada with regard

to further nuclear expansion is that a nuclear renaissance is distinctly possible. Canada's

domestic nuclear industry slumped in the 1980s, but since APM was announced OPG and Bruce

Power applied (in 2006) to build more reactors and refurbish existing reactors (OPG 2006, Bruce

Power 2006). As of 2008, 18 of Canada's 22 reactors are operating, but if current applications to

refurbish existing reactors and build new ones are approved, then by 2025 there may be 26

operating reactors in Canada (OPA 2007). This potential renaissance builds upon the embedded

commitments of nuclear utilities, a thriving uranium industry, efforts to curb greenhouse gases and encourage sustainable development, and perceptions of an imminent solution to waste disposal. Nuclear generation accounts for 16% of Canada's electricity (Hydro is 62%), but 55% in Ontario. The nuclear industry itself is estimated to be a 5 billion a year industry. Canada is the world's largest supplier of natural uranium, rendering fuel-recycling non-pressing (CANDU reactors are natural uranium fuelled). Canada also supplies half the global supply of medical isotopes for nuclear medicine, and a significant portion of Cobalt-60 for instrument sterilization (CNA 2007). Canada's nuclear export industry experienced its renaissance earlier than the (potential) domestic upsurge, with AECL having secured foreign reactor sales to South Korea, Romania and China since the early 1990's (Bratt 2006, 174-96). Finally, the Ontario Power Authority (OPA), established in 2005 to forecast supply and demand and contract with the private sector for new generating capacity, has treated nuclear power as the prime means of increasing electrical capacity. The OPA recommended refurbishment of existing nuclear reactors and new builds in early 2005 (OPA 2005, 24-27), prior to APM being released. In August-September 2006 OPG and Bruce Power thus applied to refurbish existing reactors and build new ones. By late 2007 (after APM was accepted) the OPA was treating new builds as a *fait accompli* (OPA 2007, 7-8, 16 and 20). As noted above, NRCan has remained supportive of the nuclear option, noting to industry insiders (just prior to APM being released):

> . . . dealing effectively with issues such as nuclear fuel waste will go a long way toward dispelling outdated perceptions that impede public acceptance of nuclear energy as a viable option (NRCan 2005).

8.4 Adaptive Phased Management (APM)

As noted in Chapter 7, the NWMO conducted what amounts to a rather impressive public

consultation program 2002-2005, in part due to some measure of financial independence and

staff members willing to initiate broad public consultation (Johnson 2007). This consultation

program involved 'conversations' with groups largely uninvolved with nuclear issues (NGOs

with long-standing engagement with nuclear issues were marginalized in the process), as well as

opinion polling, focus groups, 'dialogues' with selected communities, and workshops. Several

different consultancy firms were engaged to conduct the consultation exercises (as noted in

Chapter 7). The NWMO thus mirrored the Swedish approach to nuclear waste management,

emphasizing openness to citizen input (cf. Lidskog and Sundqvist 2004; Sundqvist 2002, 2004),

though the NWMO consultation program has been more extensive.

The NWMO advertises APM as continuous with this consultation program in the sense

that APM incorporates *public* preferences (NWMO 2005b, 23). Yet a critical look at how public

preferences were uncovered and mapped raises some questions about the NWMO approach. The

NWMO first asked the Canadian public which questions they wanted answered (NWMO 2003f),

as well as how they understood the range of choices relevant to choosing a waste management

approach (NWMO 2004b). The questions and objectives arising from this process formed an

assessment framework which was then used to evaluate waste management options, leading to

the APM recommendation (NWMO 2005b). I suggest the NWMO's implicit role in these

participatory exercises has been to contain tensions discovered at the intersections of technical

and policy social worlds. Moreover, in aiming to have different communities work together the

NWMO retains its own autonomy about the objects of social action. Thus the reports noted

above evinced a distinct theme. First the NWMO (2003f) described how it had initiated

discussions with a view to identifying areas of both social consensus and contention. Second the

NWMO (2004b) articulated the results of these discussions, arguing that greater concern was

displayed for more personally pressing issues (i.e.: health care) than nuclear waste. Where

consensus existed it was about values such as environmental safety and generational equity. Yet

this consensus paralleled divergences of opinion about how to implement those goals, including

differences regarding waste management methods, energy policy preferences, and implementing

agencies. The NWMO implicitly divided findings that could directly inform policy making (the

common ground of social consensus) from findings that could only be considered indirectly

policy-relevant (social values and perspectives strongly held but not universally so).

Lest it go unsaid, according to the NWMO everyone wants things like safety and equity,

but differences exist in regard to which option is best, which energy option is the wisest, and

who should be an implementing agency. Despite the Seaborn panel noting that one had to be

specific about topics like safety and acceptability, in that because the two were inter-connected

neither might be amendable to being treated as a quantifiable entity, the NWMO utilized a more

abstract notion of safety as a 'value'. These values were seemingly universal, as opposed to

opinions, which were far more heterogenous. Hence making choices was constructed as about

maximizing areas of consensus (about values) while remaining sensitive to areas of divergence

(opinions). The advantage to basing decisions on consensus about values, I suggest, is that values

can be constructed as abstract enough that many different decision-paths can be made compatible

with them. Notably, as well, the areas of consensus were those areas where social values and

perspectives reinforced, or at least did not disrupt to the point of halting, the technical

preferences of pro-nuclear industry and bureaucratic elites. This happy coincidence of

preferences was elevated to the lofty status of "Canadian wants". Thus Canadians want

adaptability, phased decision-making, robust governance, and opportunities for citizen

involvement (NWMO 2004b, 9). Despite the language of 'wants', implying citizen demands are

being met, I suggest a general rule in NWMO work is that eligibility for the class of 'Canadian

wants' is a function of whether the preference or value or goal is *not* fundamentally incompatible

with what had been the operating mantra of AECL and Ontario Hydro since 1981: that

something needed to be done about nuclear waste, that whatever was to be done should

commence soon, and that a chosen course was not to be confused with decisions about the waste

generating industry. The NWMO thus tacitly reproduced the normative commitments implicit in

AECL and Ontario Hydro's institutional activities, but did so by reinventing them as a

(imagined) publics' convergence with authoritative expertise. The fact that the public that

surfaces in the NWMO documents is a prescribed and imagined public is somewhat obscured

because the NWMO stance is so outwardly deferential. Thus the NWMO acknowledged that it

must approach its task "with humility in the face of uncertainty and complexity, but also fortified

by the inherent wisdom of citizens" and with the commitment not to "pretend that we have all

the answers for all time" (NWMO 2003f, 13 and 18).

Turning to APM proper, APM is both a technical method and a management system

(NWMO 2005b, 23-29 and Chap 6). APM proposes that used fuel be centrally stored or

permanently disposed of in a geological formation (most likely the crystalline rock of the

Canadian Shield, but possibly Ordivician shales and limestones). APM also proposes that a

flexible and step-wise implementation be conducted, in which voluntary hosts are sought and

stakeholders are defined as self-declaring (and self-constituting) communities of interest. The

NWMO identified the relevant phases as selecting a site suitable for storage or disposal (first 30

years), demonstrating relevant technology at the site (next 30 years), and then implementing

either storage or disposal at site (beyond 60 years). Because of provisions for Monitored

Retrievable Storage (MRS), even if permanent closure of a repository is selected this may not

happen for up to 300 years. Each phase would involve important activities and decisions, though

the NWMO leaves open what the precise duration of the activities will be and what the outcome

of decisions about the approach will be. APM is geared toward creating concrete decision points

in the public policy making process, and to articulating a political environment of dispersed

power. This dispersion is accomplished by widening the scope of political influence. APM is

thus said to constitute a "pragmatic" way to provide "Canadians with genuine choice with

respect to how we arrive at the end point" (136) while a "critical success factor" of APM is that

it allows for "public stakeholders to influence the process" (216). APM also incorporates

epistemic charity, or inclusiveness about types of relevant knowledge, as the NWMO claims

"each step [will be] informed by the latest understanding of science, engineering [and] social

sciences" (303). Finally, APM is specific about some things but not about others. APM is

explicitly and specifically divorced from energy policy options, with the NWMO declaring that

APM "neither promotes nor penalizes" (20) future decisions about nuclear power. By contrast

APM continues the flexibility in the concept displayed during Phase 2 of the public inquiry, and

does not specify precisely things like canister material, vault geometry, projected rock

permeability, and so forth (cf. NWMO 2005c).

The salient point about this whole approach is ultimately that decision-making power is

deliberately dispersed across communities in time and space. For instance, the extended time-

frame (300 years) of implementation is not some kind of accidental by-product of engineering

complexity. Rather, it (deliberately) more than triples previous industry and government

preferences regarding either the possibility of waste retrieval or monitoring. Moreover, it involves different engineering commitments, for initial engineering specifications involved immediate re-saturation of the disposal vault (cf. AECL 1994a, 265-270). Hence the extended time-frame involves a reversal of earlier reluctance to incorporate institutional controls. The NWMO final report also oscillates between no definite entity at the helm, thus distributing decision-making power and avoiding the impression of top-down decision making, and *public* preferences at the helm. The NWMO notes vaguely that "dialogue with Canadians has highlighted that an optimal balance must be found" between near term flexibility and long term permanent isolation (NWMO 2005b, 32), that a need exists to "balance competing objectives" (33), and that APM is fair to "this generation and across generations" (221). Given that critics during the public hearings frequently questioned AECL and Ontario Hydro's avoidance of MRS, it is significant that the NWMO is at pains to stress that APM in fact represents an incorporation of *public* preferences for MRS (23). Yet during Phase 2 key industry actors had embraced MRS because of the potential for retrieval of waste for commercial reasons,[1] leading to NGOs (who did in fact favour MRS) being very skeptical about the "sudden change".[2] The key point to understand about APM, as it is presented in NWMO (2005b), is that industry and Government elites are largely absent from the pages of the description. References to the public are the main ways in which an 'agent' emerges into a semi-defined group in the NWMO document; the only real group apparently granted power to move the APM approach through its phases. Thus the NWMO argues that a "critical success factor" of APM is that it allows for "public stakeholders to influence the process" (216). From the situation in the public hearings that clearly enraged opposition groups, in which technical and political elites seemed to hold all the decision making

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[1] Murray Stewart and Ian Wilson (CNA), 19 November 1996, *HT* [Vol. 28], 226-34.
[2] Cf. Anne Coxworth and Graham Simpson (Saskatchewan Environmental Society), 20 November 1996, *HT* [Vol. 29], 103-12.

cards, the NWMO has reconfigured the situation to one in which the discretion of those groups is

limited, indeed fractured through public stakeholders.

8.5 Penultimate Discussion: APM as social responsibility?

The final two sections ask about the big picture. One big picture evident in the history of

Canada's nuclear waste disposal debates involves competing framings and thus competition over

what the issue is in dispute. Disposal proponents have framed the problem of nuclear waste

disposal in two different ways.[3] Until the early 1980s nuclear waste disposal proponents framed

the problem as a puzzle to be solved in the ongoing effort to secure a future for commercial

nuclear power. Disposal concept supporters framed the problem in the same way. Yet from 1989

to the present disposal concept proponents have framed the problem quite differently, arguing

that nuclear waste disposal is just a pressing industrial waste problem warranting a solution

regardless of any other concerns or issues. This second framing was always a part of the first

framing, for proponents, but after 1989 it became the only framing. By contrast disposal concept

supporters have always maintained both framings of the issue, using them in a mutually

supportive fashion.

Public critics have never accepted either framing. Critics have framed the issue as a

problem within industrial planning, in which an energy option that had never been subjected to

democratic scrutiny all of a sudden had to solve a foreseeable problem in order to continue.

Critics have never accepted that decisions about waste disposal are not inter-connected with

broader decisions about energy futures. Critics have also always framed the issue as raising

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[3] Disposal concept 'proponents' refers to AECL, Ontario Hydro (OPG), and now the NWMO. The term 'supporters' encompasses those technical and bureaucratic groups supporting deep geological disposal but otherwise not the actual proponent (they are not responsible for bringing forth plans and implementing them if they are accepted).

points about the democratic accountability and transparency of decisions about important social

choices, which is what choices about energy options are. The public inquiry demonstrated the

conflict between these different framings of the nuclear waste disposal concept. For proponents

and supporters, because of the salience of a proactionary approach, deficiencies in AECL's

demonstration of safety and acceptability could be marginalised as not affecting either the need

to act or the fact that the concept was both viable in principle (in the future) and likely to be

improved at the siting stage. Critics found their preferred democratic framing threatened by this

approach, and their responses highlighted how critics framed the problem as one that ought to be

debated and tested within the public forum of the inquiry and not the more uneven political

terrains of future siting locales. Hence accountability mattered for critics, especially given

critic's scepticism about the future representativeness of decision-making bodies and contexts.

The other big picture is that nuclear waste disposal proponents made a decisive shift in

strategy, a shift mediated by a failure to have a disposal concept gain social acceptance at the

public inquiry. This failure forced repository proponents to publicly grapple with a context of

low trust, resulting in a new kind of question framing the debate. Repository proponents initially

framed the question as whether institutional actors and actions could be trusted and relied upon,

with the corollary technical position - a position deemed separable from broader issues of value

assessments and judgments of trust - being that deep geological disposal without provision for

institutional control was the only sound option. There was, in other words, always an implicit

distrust of the role of society in general, coupled with an effort to make elites out as more

trustable than society might think. For instance the possibility of social collapse, neglect or

inability to care was always used as a basis for recommending 'passive' disposal methods.

Society could not be trusted, but engineering and geology could be. The fact that any

implementing agency would have to comply with or be guided by implementing principles – a kind of social contract – simultaneously advertised the trustworthiness of elites and frailties of society. That is, an implementing agency would be bound, constrained, and effectively monitored and possibly amenable to sanction, with reference to 'the rules'. Proposing a rule book to ensure the integrity of an implementing agency also meant that the principles guiding that agency, though of course representing a distilled form of social science recommendations, were agency generated principles nevertheless. This presumes, in a wholly tacit and prescriptive way, that the polluter is in the best position to know how to behave and is the best candidate to understand what should guide its actions. Society cannot be trusted to formulate such valuable guiding principles.

Nevertheless, that was then. The question that now frames the debate appears to be whether the action-situation - the range of technical and political actions and choices available and capable of being amenable to persuasive intervention - is a moral one. If to treat an individual as a moral agent means the extent to which the individual is amenable to reason, or is persuadable, for instance to alter a chosen course, then by analogy an action-situation can be considered moral to the extent choices within the domain of that action-situation are made visible as available and amenable to alteration. Here I am putting to empirical use the argument of Loyal and Barnes (2000) who, similar to Hume's (1740) argument that there is no fact of the matter constituting duty, argued that there is no fact of the matter allowing the identification of an action as chosen or determined. Identifying an action as involving choice is, in the last analysis, to designate situations in which persuasion and modification are possible. Deploying the discourse of the institution of responsible action, they argue, orients to a theory of when, where, and to what degree actors, actions, and situations are amenable to persuasion and modification.

Drawing from Hume, and from Loyal and Barnes, one can thus argue that nuclear waste disposal proponents have sought to combat the low trust displayed toward the actors and institutions conducting research on, and making policy about, nuclear waste disposal, by constructing a *situation* dependent upon social, political, and value *choices*. I suggest this is one way in which to read APM in a relatively sympathetic but nevertheless analytic light. The *situation* is capable of accommodating persuasive modification, in other words, even if no one believes for a moment that dominant technical and policy *groups* are amenable to altering their preferred course of action.

Below I outline a more cynical view, but this cynical view does not undermine the analytic point that constructing moral situations involves designating situations in which persuasion and modification are possible. Thus it has to be admitted that APM promotes the need for political and value choices and discussion as well as choices and discussion about risk estimates and consequences. Hence in the interests of stimulating reflection about how relations of trust may be built out of situations in which little trust exists, which is the situation within which the NWMO operates, I develop here a Humean account of APM. My suggestion is to begin with a query about what it takes to be under an obligation and to make a promise. Promises and obligations are especially pertinent for many contemporary institutions, which must plan for the very long-term while also providing room to adapt to changes in social preferences, goals, and values. Nuclear projects are a case in point here, be they building new reactors, constructing underground repositories, or even just centralized storage facilities. These projects are capital intensive, with relatively fixed operating costs, and require institutional commitments of some durability. Making these commitments has implications for the future, often constraining implications, and thus natural tensions arise once one agrees (as the NWMO does) that planning

and regulating will and must take place in a context of coping with uncertainty, ambiguity, and possibly changing social goals and values. Some would argue this kind of situation is a peculiar affliction of modernity, where the term modernity acts as segue to the now appropriate ritual of nodding analytically to Beck's risk society thesis (Beck 1992a, 1992b) and typical addendums about deliberative democracy. Yet whether the issue is that of encouraging modern institutions to be more reflexive, or calling for meaningful provisions for public deliberation about policies involving technical matters, such discussions can often be (mis?)read as implying that sincerity, transparency, and the stated resolve to be under an obligation *creates* an obligation.

As noted in Chapter 2, boiler-plate references to the virtues of public consultation can have the opposite of their intended effect. Rather than justify broad participation, they may undermine it by suggesting a too-romantic view of public capacities. In some senses, this is one way to interpret the intent of Collins and Evans (2002, 2007). Without an adequate sense of possible limits to public participation in policy-making involving expertise, technical and bureaucratic elites may avoid any broadening of debates for fear of encouraging completely impractical deliberation incapable of reaching resolutions (Collins and Evans 2002, 237). Similarly, there is a need to temper recommendations about public participation with the reality-check that public consultation efforts might function as mere window dressing (Cooke and Kothari 2001). My point in these cautions is to note that statements to the effect that public consultations will and must take place are not the same as actually creating a situation within which one could be subject to what arises in such consultations. During Phase 3 of the public inquiry a line of critique arose that was similar to this point. One Seaborn panelist (Dougal McCreath) expressed severe frustration that proponents' repeated talk of keeping the public informed and involved amounted to a "paternalistic" attitude, for their *talk* could not ensure the

public was "fundamentally and inherently and deeply embedded and a part of the decision-making process".[4] Some technical groups claimed this paternalism was at the heart of the AECL EIS itself, due to its assumption that technical issues would drive concept assessment and implementation.[5]

Hence, because talk of the virtues of public consultation always raises the question of whether it is window dressing or paternalistic, I want to eschew the idiom of modernity and its problems for the present. I wonder if the nuclear waste disposal problem, and many other such problems where public policy issues involving technical expertise are intimately connected to calls for democratic decision-making, is not in fact another version of a very old problem in moral philosophy. In Book III of Hume's *Treatise of Human Nature* (1740), Hume considered two farmers, one whose corn is ripe today and another whose corn is ripe tomorrow. Neither farmer particularly likes the other, so the problem arises as to what might move one farmer to help the other, given that reciprocity is not assumed because of lack of mutual confidence. Hume argued that a bargain can only be struck when one or both groups have an interest in reciprocating. Hume noted the dominant group must be able to demonstrate it will have something to lose by defaulting. Even if just one such bargain succeeds, argued Hume, such successes are built into future bargaining exchanges, so that trust can emerge out of successful exchanges not built on trust. For Hume, *promises do not cause obligations; rather, promises presuppose obligations, so that if one cannot possibly lose one's freedom of action, then one cannot be under an obligation.* The central task of promise-making, especially where one must build relations of trust from contexts in which none exists, was for Hume the building up of a *situation* where people *can* bind themselves by their words, from *situations* where they cannot.

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[4] Dougal McCreath (Seaborn panel member), 15 January 1997, *HT* [Vol. 33].
[5] David Smith (The Royal Society of Canada and the Canadian Academy of Engineering Joint Committee on Nuclear Waste), 15 January 1997, *HT* [Vol. 33].

Looked at from this old-style Humean point of view, the strategy of the NWMO is to make itself a responsible actor, not simply by reinventing itself, but by reinventing the situation within which it operates and is perceived to operate. Of course the NWMO is self-interested and calculative in its actions, which for some are sufficient grounds to impeach the NWMO as an untrustworthy actor. Yet for Hume self-interested and calculative actions, performed by interacting parties to a dispute, are the very grounds out of which patterned behavior arises, in which it is then possible for those parties to make utterances that can perform as promises. Moreover, APM embodies a situation containing definite moments of decision and clear sticking points, which in Humean terms constitute possibilities for the loss of institutional freedom of action. Being dependent upon future bargains was, for Hume, the mechanism for potentially incurring costs and thus part and parcel of creating obligations. That is, obligations come from groups either striking bargains or being placed in a position where bargains will have to be struck for action to take place, and in these bargaining exchanges the groups must have something to lose. What the NWMO's development of APM suggests, when viewed through a Humean lens, is that the moral framework of the nuclear waste management debate has been flipped on its head. This is not because top-down decision making has been replaced by a more consultative style, although this is true in itself, but more importantly, because the consultation itself has been given meaning. The flexibility in the process gives meaning to the public having a voice; that is, having a voice is meaningless without that flexibility and the possibility of alteration. It is worth pointing out here that much public distrust of technical and political elites in this nuclear waste disposal case was caused by both the lack of adequate public consultation in early nuclear waste disposal decision making, and the rather inflexible posture of decision-makers. Thus NGOs repeatedly claimed most decisions were already made, so that consultation was merely window

dressing. APM allows for the possibility of alteration and persuasion, and it is this possibility that constructs a moral identity for the NWMO, as amenable to influence. Yet it also creates obligations, which is to have come some way from the obligation obfuscation evident during the public inquiry. Of course, whether the kinds of promise-making implicit in APM signal more responsible institutional action or savvy political machination remains to be seen. Although a bit of moral philosophy may not be able to answer that question, at the least the turn to Hume suggests that when institutions make promises, analysts should scrutinize the action-situation for evidence that the promise-making institution can demonstrate the cost of non-compliance.

8.6 Concluding Discussion: APM as social management

But, quite possibly, a bit more cynicism is warranted. Hume certainly continues to offer valuable insights into the institution of promise-making; a neglected resource that can illuminate how to critically interrogate public consultation programs. Moreover, deploying Hume certainly allows for some sympathetic scope to be extended to modern institutions faced with advancing complex and contentious projects in a context where very high demands are made regarding public participation, accountability, and transparency. This has been known for some time as the democratic dilemma, in that broadening debate may result in under-estimating risks and problems to satisfy the largest number of possibly skeptical voices, whereas narrowing the debate to interested coalitions may eliminate the possibility of sufficient public acceptance (cf. Kay 1994). Nevertheless the question remains of whether or not the NWMO is or has been able to demonstrate the cost of non-compliance. At present answering this question may have to wait until siting and an analysis of future bargaining exchanges. In the meantime, the political-

economic dimensions of this techno-scientific project recapitulate some of the questionable

separations of the past. Possibly, old habits die hard. It is certainly true that APM suggests what

will happen with nuclear waste is amenable to public influence, as all decision steps are

apparently open to public scrutiny and require active choices. This accountability and openness

to persuasion is meant to make institutional action visible as responsible action. Yet is this

simply rhetoric? Reconstructing institutional goals might be one way to broach the question, but

doing so is notoriously difficult. This is so for obvious pragmatic reasons, but also for conceptual

reasons: motivations and intentions are either inaccessible 'psychological states' or, at best, they

are often 'occasioned'. As Mills argued, explanations for actions are used to justify actions,

either by reconciling them with expectations or presenting them as normatively acceptable. To

function in this way, the account must be acceptable to others, and thus will be relative to

institutional context (Mills 1940, 907).

     Some evidence exists to suggest the parent entities of the NWMO, primarily Ontario

Hydro (now OPG) and AECL, had thought about applying a rhetorical gloss to their deep

geological disposal concept if it was not accepted. Again referring to the documents pertaining to

the development of the 1996 *Policy Framework for Radioactive Waste* (discussed in Chapter 7,

Section 7.4), obtained under the *Access to Information Act*, it appears technical and bureaucratic

groups had considered what might be required if the disposal concept was rejected. In a 1995

letter to NRCan as part of that 'insider' consultation, Ontario Hydro speculated about what

would happen if the Seaborn panel rejected the deep geological disposal concept. Although

regarding such a rejection as being at the "low end of probability," Ontario Hydro noted that it

would necessitate some "rethinking" of how the concept should be "defined" (Ontario Hydro

1995). For its part the AECB indicated that the policy should avoid the term "disposal"

altogether, and focus on the words "waste management" or "storage" (AECB 1995). One could

thus argue that these early thoughts about re-packaging the disposal concept were built into

APM, in response to the low probability event actually occurring. Indeed, the most readily

accessible description of APM is found in NWMO (2005b). This was effectively a report to

parliament and, while outlining APM, there is also an extended discussion of how a social and

ethical framework of assessment had been created from public consultation and, when applied to

the various options under consideration, revealed that the NWMO ought to propose a fourth

option. Rather than the three options the NWMO was mandated to investigate (deep geological

disposal, at reactor site storage, and centralized underground or above-ground storage), the

NWMO claims it created APM because it possessed the flexibility and adaptability the other

options did not but which the public desired (NWMO 2005b, 133-37). Nevertheless the technical

description of APM, found in an NWMO background paper freely available but not acting as the

'spokesperson' for APM, refers to the NWMO achieving its goal of managing nuclear waste in

the long-term by "implementing an adaptive *risk* management approach" (NWMO 2005c, 1;

emphasis added). Significantly, it is then stated "the NWMO has developed a high-level

description of a Fourth Option which is called Adaptive Phased Management" (2).

   While it thus appears APM, as a high-level description, makes good on Ontario Hydro's

1995 comment about the projected need to rethink the definition of the deep geological disposal

concept, it is also the case that APM is a high-level description of a means to manage 'risks'. As

Wynne has noted, institutionalized risk discourses combine a realist representation of salient

realities (consequences) with a presumption that the salient meaning for publics is predictable

consequences. Moreover, such risk discourses enact a hermeneutic sanitization, deleting

competing public meanings about what the issue might be by presenting purified versions of

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what constitutes the issue in question (Wynne 2002). We can see that APM enacts a series of deletions and purifications by noting what APM in fact inherits from the past. For instance, several features of the public inquiry process seem to have returned in the APM proposal. A third case has now been presented, one which avoids detailing an emplacement method but presents a new canister design, featuring a copper shell on a steel inner vessel (OPG 2004). Thus engineering flexibility has continued to complicate what the concept is that is at issue. This flexible approach appears to have been carried over into APM in quite concrete ways. The APM technical description is advertised as a "general *illustrative* technical description", one that provides an "*indication* of a representative schedule," and a "*possible* activity flow chart" (NWMO 2005c, 2). Crucially, the emphasis is contained in the original. Hence not just the technical description, but implementation itself and how it would be 'managed', is left flexible and thus capable of reserving significant discretion for the NWMO. Finally, repeating the public inquiry approach of treating technical matters as relatively uncomplicated despite deficiencies being identified, OPG's summary of the technical deficiencies identified by the Seaborn panel removes the political import of the panel's conclusion. The important qualifications of the Seaborn report, which noted over 100 technical deficiencies but found things "on balance" to be technically adequate (CEAA 1998, 2), was represented as claiming "found to be safe from a technical perspective" (OPG 2003, 32). Not only does this misrepresent the Seaborn report, but again it marginalizes the import of deficiencies.

I thus suggest that APM is a very sophisticated means for closely aligned (nuclear) industry and pro-industry (including Government) groups to delete from public discussion the normative commitments framing dominant risk discourses about nuclear matters. APM appears to substitute a discussion of the instrumental consequences (i.e.: quantitative risk estimates) of

disposal *versus* storage options, for a broader discussion of the multiple meanings various

publics bring to their understanding of how energy policy involves questions about such

instrumental consequences (such as whether to continue to generate waste in the first place).

More specifically, the NWMO deletes from public debate the political ramifications of

successful waste disposal by treating energy policy questions as separable from decisions within

APM. The duplicity embedded in this decoupling is evident in the way developing trust, in APM,

in fact acts as a surrogate for promoting nuclear power. The NWMO has carefully developed a

responsive persona, claiming to approach its task with "humility", "fortified by the inherent

wisdom of citizens", and without "pretending" to have all the answers (NWMO 2003f, 3 and 18).

Noting that it is "aware of the imperative to earn the trust of Canadians" if APM is to have any

credibility (NWMO 2005b, 5), the NWMO decoupled APM from contentious energy policy

questions. Apparently APM neither "promote[s] nor penalize[s] Canada's decisions regarding

the future of nuclear power", which the NWMO recommended ought to be debated in a separate

forum to waste management discussions (NWMO 2005b, 20 and 72). Yet the NWMO also

identifies abandoning the nuclear industry, because of a "loss of public trust", as a "pessimistic

scenario" (NWMO 2005b, 393). This implicit endorsement of nuclear expansion suggests trust

gained by solving the nuclear waste problem is regarded by the NWMO as one means by which

support for a specific energy policy preference can be achieved. Trust thus does double-time,

being important for securing the credibility of both APM and nuclear power, and pointing to the

implicit political-economic commitments embedded in APM. The analytic claim here is not to

have unearthed anything surprising about NWMO commitments, but to have pointed to how the

NWMO uses the issue of trust as a kind of shell-game in which institutional commitments are

enacted in practice but otherwise deleted from public scrutiny.

To accept the scope of assumptions embedded in APM is thus to fail to subject to scrutiny embedded normative commitments. APM favours nuclear expansion by favouring questions about how to manage decisions already made (or made elsewhere). APM partly accomplishes this by imagining, and implicitly prescribing, the public as ignorant of the rejuvenated managerial competence of institutions involved in running nuclear power. Distrust of the managerial competence and institutional integrity of nuclear elites was a prominent theme at the public inquiry of 1996-97, and also surfaced as the central theme during a September 1997 parliamentary investigation into Ontario Hydro's 1997 decision to lay up 7 of its 20 reactors. At the September 1997 hearings to determine what went wrong, talk of 'management' replaced talk of 'safety'. As Arai (2001, 416-21) has noted, anti-nuclear groups presumed the safety case against Ontario Hydro had already been made, and thus concentrated on problems of mismanagement as cause of the reactor lay ups and reason to label nuclear power uneconomic. Ontario Hydro admitted poor management had created a situation of potential safety problems, yet also claimed independent management consultants identified the problems. Managerial reform would thus ensure safe and economical operation of nuclear units. APM recapitulates Ontario Hydro's 'managerial defence' of the nuclear option, while seeking to address the institutional critique evident at the public inquiry. In assuming the science of waste management was on a sound footing, with the real problem public acceptance of the technology (see Chapter 7), the NWMO elevates the status of management. Evidently good management will turn technology into publicly acceptable technology. This converts disquiet about the very decision to dispose of waste or build new reactors, into concern about how these decisions will be managed, and thus attempts to delete debate about alternatives to the chosen options themselves.

APM further favours nuclear expansion by constructing a political situation in which decision-making about waste management is contingent on social bargaining in the future. The extended dimensions (temporal and geo-political) purport to create political space for broad social values to enter decision-making. Although a Humean perspective suggests deferring decision to the future is going to be a part of any effort to build trust from situations where trust does not exist, Chapter 6 showed how mobilizing the future could also be an aspect of both present power inequalities as well as a 'social bet' that future contexts would be favourable to proposed projects. Thus such amorphous temporal and geo-political dimensions can increase institutional autonomy by allowing organizations to structure science/politics boundaries by reference to what the organization itself can control. For instance, APM essentially constructs an image of power relations as dispersed, or distributed, so that deference to future bargaining exchanges gives the impression of equal members at the same table. But as NGOs noted during the public inquiry (see Chapter 6, Section 6.5), actual siting contests would pit an elephant (the nuclear industry and Government) against a mouse (local communities, NGOs). Moreover, the public that has emerged in NWMO documents, the public that is supposed to be in a strong bargaining position in regard to APM, has actually had its coherence seriously questioned by NWMO depictions. On the surface, public misunderstanding has been replaced by public understanding, in the form of 'Canadians wants'. Yet the quantification of wants, and their treatment as isolated units, prescribes a fragmented public amenable to representation. Representation *per se* is not the problem, just the extent to which representations are accountable to the entities so represented. By treating alternative energy policy choices as isolated wants, not relevant to choices about nuclear waste itself, the NWMO absorbs external stakeholder demands in a fashion that does not fundamentally challenge long-held institutional interests. The real test

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of democratic accountability will be the extent to which APM perpetuates this absorption, and its

accompanying deletion of evident public concerns, during siting assessment.

In summary, AECL and Ontario Hydro gave birth to the NWMO in 2002, and the

NWMO inherited the need to repackage nuclear waste disposal plans in response to repeated

public policy failures by its parents. Nevertheless the NWMO preserved, in its repackaging, what

this work has shown was constitutive of what the nuclear waste disposal issue meant for critics.

That is, the NWMO treats APM as just about solving a technical problem, and as separable from

decisions about energy options. Critics have consistently denied the democratic legitimacy of

both the decoupling of waste disposal from energy policy and the implicit proactionary

framework they faced. In Chapter 3, I showed that nuclear waste disposal proponents and

supporters initially did not make this separation at all, and that this was because they perceived

they were able to profitably act as a status group and exclude their opponents from decision-

making arenas. By the early and mid-1980s it was apparent such an exclusionary strategy was

unlikely to remain profitable. In Chapter 4, I showed that critics felt the boundary itself was

being used to obscure the nature of professional politics. Critics denied that methodological

decisions and judgments about what to do with identified deficiencies were innocent of politics,

for critics identified similar methodological deficiencies as did technical groups but concluded

inadequate rather than adequate. Hence the domain of small-p, intrinsic politics, was not as

harmless or trivial as some would have (i.e. Collins and Evans 2002, 2007). In Chapter 5, I

showed that critics experienced restrictions on the scope of deliberation as effectively

immunizing from scrutiny the science/politics boundary work of disposal concept proponents

and supporters. The boundary drawn between the disposal concept and energy policy was

considered a resource for elites to achieve default success for their broader political-economic

ambitions. In Chapter 6, I showed that critics constructed the public inquiry as the proper testing forum for the disposal concept, indicating that for critics what mattered was to hold science to political account in the present day. Acceding to the future viability of the concept, despite present deficiencies, was considered an explicit attempt to excuse science from political accountability. Technical judgments, about viability, were thus considered political to the core. In Chapter 7 I extended the treatment of science/politics boundaries to show that the NWMO used its position between them to assume discretion over where the boundary in fact was, and to take command over the representation of 'the public'.

To conclude, I suggest that the politics resulting from the decoupling of nuclear waste disposal/management from energy policy, and from current political judgments about how to 'go on' in the face of uncertainty, implicitly circumscribe public rights. In effect, the NWMO's APM converts opposition to political and technical options themselves into a concern about how to manage their consequences. To recapitulate this decoupling, by focusing on waste disposal in isolation of energy policy – even if done in the belief that propositional questions in regard to waste disposal are important and can only be answered via a demarcation between expertise and politics - would be to engage in the kind of abstracted empiricism Mills long ago identified as the most troubling kind of social analysis. As Mills (1959) noted, social analysts that focus on isolated social problems without considering how they are connected to the broader 'system' may simply be providing powerful institutions with practical knowledge useful for quelling dissent. The point of illuminating the extra dimensions to issues ought to be to prevent their deletion. Normatively speaking, an ungracious interpretation of the NWMO approach is that it isolates nuclear waste with a view to marginalizing dissent. This is to suggest the NWMO approach is less inclusive participatory democracy, and more akin to Project Camelot. This was a

project initiated by the US Army in 1964, in which social scientists were asked to participate in an investigation of social change and internal revolution in South America. The project was aborted after critics claimed the project amounted to an investigation of popular dissent (for instance, by communists in Chile) with a view to predicting and preventing it (Horowitz 1967). Interpreted unfavorably, the NWMO approach is a new Project Camelot. If there is a moral to be gleaned from the story told here, it is that where accountability is confused with representation, powerful and entrenched interests can reinvent exclusionary social action in and through apparently participatory democracy initiatives.

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