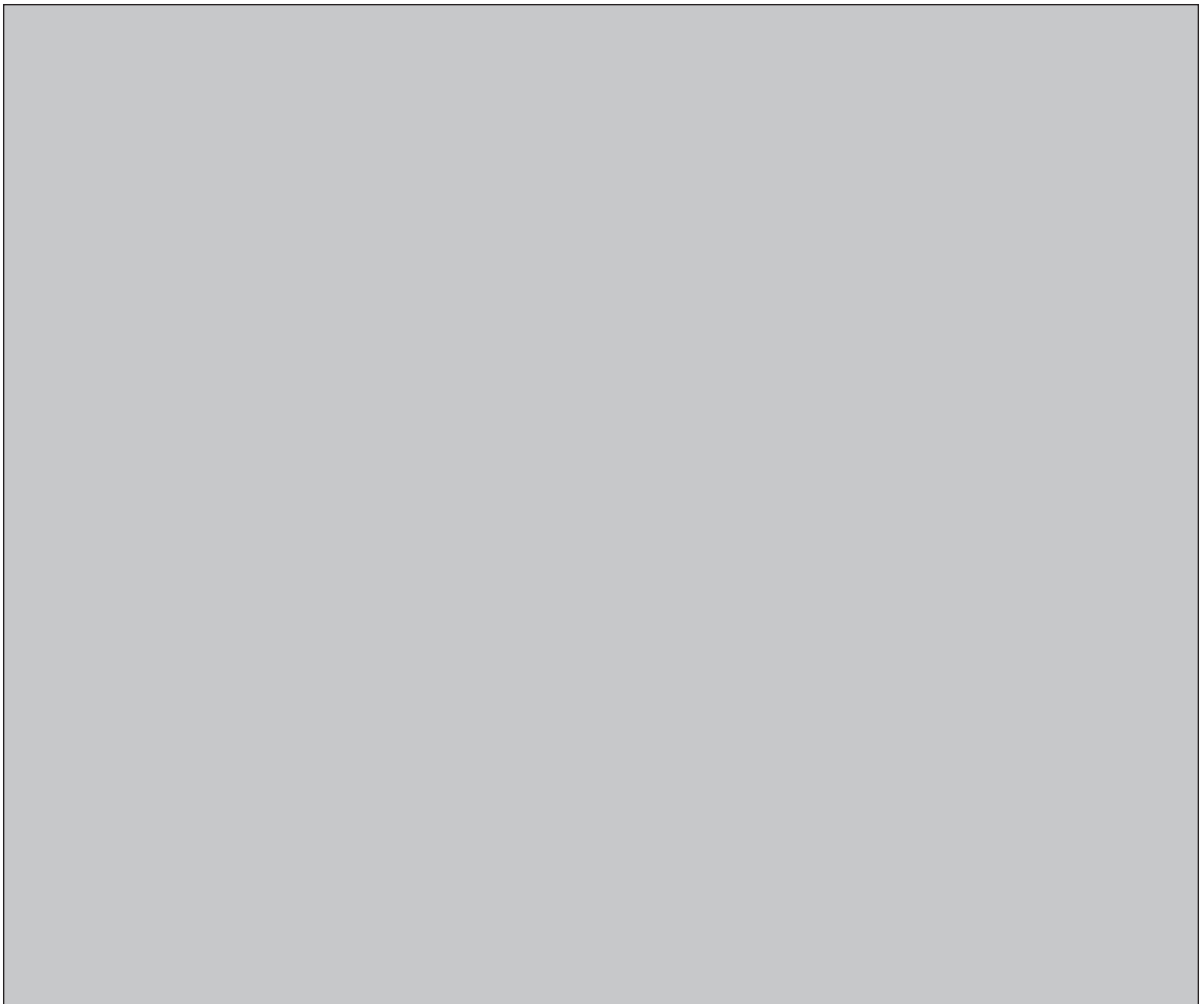


NWMO BACKGROUND PAPERS**2. HEALTH AND SAFETY****2-6 A REVIEW OF WASTE FACILITY SITING CASE STUDIES APPLICABLE TO
SPENT NUCLEAR FUEL MANAGEMENT FACILITIES AND ASSOCIATED
INFRASTRUCTURE**

**Jim Micak, Sergey Tkachev, Amanda Kennedy, Laurie Bruce
DPRA Inc.**



NWMO Background Papers

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

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

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

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**A Review of
Waste Facility Siting Case Studies
Applicable to Spent Nuclear Fuel
Management Facilities and Associated
Infrastructure**

**Submitted to the
Nuclear Waste Management Organization**

**By
DPRA Inc.**

**Prepared by:
Jim Micak
Sergey Tkachev
Amanda Kennedy
Laurie Bruce**

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Table of Contents

<u>1.0</u>	<u>Introduction</u>	1
<u>2.0</u>	<u>Part One: Assessment of EA and Siting Processes</u>	2
<u>2.1</u>	<u>Determining What to Site – Selecting the Right Alternatives</u>	2
<u>2.2</u>	<u>How to Site – The Advantages and Disadvantages of Alternative Approaches</u>	12
<u>2.3</u>	<u>Public Consultation</u>	21
<u>2.4</u>	<u>Drivers of the Site Selection Processes</u>	23
<u>2.5</u>	<u>Fairness in the Siting Process</u>	25
<u>2.6</u>	<u>Managing Risks and Impacts – Balancing Benefits and Costs</u>	27
<u>3.0</u>	<u>Potential Guiding Principles for the Implementation of the NWMO Used Fuel Management Approach</u>	30

Part Two: Appendices – Profiles of Case Studies

Appendix A:	Ontario Waste Management Corporation
Appendix B:	Interim Waste Authority
Appendix C:	Alberta Hazardous Waste Management
Appendix D:	Siting Task Force for Low Level Radioactive Waste
Appendix E:	United States Department of Energy Nuclear Waste Repository
Appendix F:	INCO Voisey’s Bay project

1.0 Introduction

This is a review of waste facility siting case studies, intended to identify and assess some of the experiences and lessons learned by others, which might be applicable to the planning for, and siting of facilities for the long-term management of Canada's spent nuclear fuel.

In total, six case studies are examined. Five case studies represent attempts to establish necessary - but potentially unwanted facilities - for the management of solid, hazardous, low level radioactive and nuclear wastes.

Two of the case studies profile traditional site selection processes that were designed with an emphasis on meeting the tests of technical and regulatory acceptability. These two case studies are the *Ontario Waste Management Corporation (OWMC) Environmental Assessment* for the establishment of hazardous waste treatment and disposal facilities, and the *Ontario Interim Waste Authority's (IWA) Environmental Assessment* for the establishment of solid wastes landfills for the Greater Toronto Area. The OWMC proposal was reviewed by a regulatory tribunal and was not approved; the IWA environmental assessment was stopped by a new provincial government. Both projects generated considerable public and stakeholder opposition.

Two other case studies profile voluntary or participatory approaches to siting waste management facilities. The first case study examines the successful approach used by the *Government of Alberta* to identify and select a willing host municipality for the location of hazardous wastes treatment and disposal facilities. The second case study describes a similar process developed by the *Government of Canada's Low-Level Radioactive Waste Siting Task Force* to identify a willing host municipality for the establishment of low-level radioactive waste management facilities.

The fifth case study describes the approach and the key decisions of the *United States Federal Government* program to site a nuclear waste repository at Yucca Mountain, Nevada for the long-term management of high-level nuclear wastes.

The last case study examines the approach employed by *INCO Ltd.* to obtain approval to develop its new mining operation at Voisey's Bay, Labrador.

This paper is presented in terms that will be understood by and relevant to the general public and stakeholders that may be interested in developing a better understanding of the key features of past waste site selection studies. It is not an academic or practitioner's analysis of the theories, concepts and principles that are profiled in the literature on site selection. The analysis reflects a profile of the case studies and an expression of the opinions of the author on these experiences and to highlight lessons from the case studies that may be instructive for future siting purposes.

This paper is structured in two parts:

Part One focuses on an assessment of case study environmental assessment (EA) and siting processes and attempts to identify what worked well, what did not work, and what the implications might be for the future planning and siting of facilities for the long-term management of spent nuclear fuel.

The presentation of lessons learned is provided under the following six themes:

- Determining What to Site – Selecting the Right Alternatives
- How to Site – The Advantages and Disadvantages of Alternative Approaches

- The Role of Public Consultation
- Key Drivers of the Siting Processes
- Fairness in Siting
- Managing Risks and Impacts – Balancing Benefits and Costs

Part Two presents each of the case studies profiled as follows:

- Introduction and Background to the project
- Understanding the Need or Purpose of the project
- The Consideration of Alternatives
- The Site Selection Process
- The Form and Nature of Public Involvement
- How Risks and Impacts are Managed
- Key Strategies, Arguments and Drivers
- Consensus
- Project Outcomes

For greater detail on any of the case studies, the interested reader is referred to the project specific source documents.

2.0 Part One: Assessment of EA and Siting Processes

2.1 Determining What to Site – Selecting the Right Alternatives

All siting processes for controversial projects are likely subject to the requirements of governing environmental assessment (EA) legislation. Inherent in EA is the need to identify and assess the alternative ways to solve a problem or take advantage of an opportunity.

One significant reason for siting process failure is that public and stakeholders will sometimes take issue with the type of facility being sited. Often the public expresses frustration over not being involved in selecting the appropriate alternative to respond to or manage a defined problem. For example, if a proponent is attempting to site an incinerator to destroy solid wastes and produce energy as a by-product, those opposed to incineration might express concern over air emissions and the potential impact on public health and safety. This leads to a questioning of the appropriateness or the acceptability of the selected alternative and demand a consideration of the benefits of other alternatives. In this case, alternatives to incineration might include waste reduction, landfilling or export.

Within all EA legislation, there is a requirement that proponents identify alternatives to the project that is proposed. Evaluation of alternatives generally occurs at two levels.

The first level pertains to the identification and evaluation of the alternatives to the undertaking. These are alternatives that are fundamentally different ways of solving/managing a problem or taking advantage of an opportunity. The consideration of these alternatives should include any action that is technically and economically feasible and within the ability of the proponent to implement. Each alternative should be evaluated using comparative criteria to determine the potential for environmental effects. A proponent provides a rationale for selecting a preferred alternative, based on an assessment of the advantages and disadvantages of each alternative on the environment.

In the OWMC case study, the preferred alternative was to establish and operate hazardous wastes treatment and disposal facilities. The alternatives to this project included the possible exporting of wastes to other jurisdictions or waste avoidance/waste minimization or management of these wastes by the private sector.

Once a preferred undertaking or project is determined, a proponent is then required to identify and assess the alternative methods of carrying out the preferred undertaking: this is the second level. Alternative methods will vary as a result of the nature of the selected undertaking, but can include assessments of system configuration options, technology options, siting options, site development options, haulage and access road options, and operating procedure options. The process of evaluation is similar to that for the alternatives to the project: a range of reasonable, technical and economically feasible alternatives is identified and a criteria-based assessment is completed that allows a proponent to understand and compare the potential effects of each option on the environment. The proponent selects a preferred option(s) and provides a rationale for its selection in an environmental assessment document.

The case studies reveal that in three cases – OWMC, IWA, and Yucca Mountain – that the way in which alternatives were selected resulted in serious public concern and opposition to the siting processes.

The following are some of the key observations identified from the case studies pertaining to the consideration of alternatives and are presented under the following headings:

- (a) Political Direction Precluding the Consideration of Alternatives
- (b) Political Interference Within Site Selection
- (c) Premature Rejection of Alternatives
- (d) Lack of Public Involvement in Selecting the Alternatives to a project

Each is described below.

(a) Political Direction Precluding the Consideration of Alternatives

In some of the case studies, legislative direction to preclude a proponent from considering alternatives was a significant cause of public opposition to the siting processes.

Usually, when a legislative direction is provided to remove or scope the analyses of alternatives, it is made for one of two reasons:

- (a) on the basis of a need of urgency to solve a problem; and/or
- (b) as an attempt to minimize or avoid public opposition.

The IWA EA for the siting of landfills within the Greater Toronto Area (GTA) is an excellent illustration of both reasons. With a new provincial government in place (1990), new legislation - the *Waste Management Act* (WMA) - was introduced that was designed to: establish the *Interim Waste Authority* (IWA); advance the government objectives for waste management including waste reduction; and to facilitate the establishment of landfill capacity within the GTA. The WMA specifically scoped the reach of the IWA EA by requiring it to focus only on siting landfills designed for those residual wastes not managed through various wastes reduction initiatives.

The WMA specifically removed incineration and the export of wastes as alternatives to be considered. Incineration, even though widely used, was removed essentially as a matter of public policy; the new provincial government was opposed to incineration as an acceptable means to manage wastes. The export of wastes was also eliminated on what were ostensibly policy grounds. It was the government's intent to place landfills within the municipal boundaries of the three municipal areas requiring additional landfill

capacity. Even though approved capacity in areas outside the GTA might be available, the IWA was precluded from considering these areas on the basis of an equity and fairness consideration. It was the government's position that the municipalities that generate the wastes should assume responsibility for managing the residual wastes.

Three observations are made with respect to this legislative direction regarding alternatives and the implications for the success of the IWA EA.

First, as the IWA siting process progressed and, as more communities were identified as possible locations for landfill sites, the interest in incineration as an alternative to landfill became significant. Throughout the site selection public consultation program, incineration became a major point of discussion that preoccupied many of the consultation events. The IWA had no effective response as to the merits of incineration other than to say that a policy decision had been taken removing incineration from further consideration. The lack of technically substantive answers undermined the ability and therefore the credibility of the IWA to respond to public concerns. While the policy decision to remove incineration and export was based on the government's interpretation of the public's environmental values, these values did not reflect those held by many of the residents living near potential landfill sites. As a result, significant public opposition to the siting process occurred. This was in part caused by the lack of comprehensive assessment of the advantages and disadvantages of the possible alternatives to landfilling.

Second, the elimination of incineration (and, to a lesser extent, export) did not make the IWA site search more efficient. Based on a review of the IWA's EA documents and its record of public consultation, it is clear that considerable time, effort and money were spent to address the many public concerns regarding the rejection of incineration. Whether or not this need to respond to public inquiries on incineration resulted in a significant delay to the IWA site selection process is difficult to determine, but it is clear that incineration-related inquiries were more than a simple distraction.

Third, even though the government did conduct legislative committee hearings into the Waste Management Act, there was limited participation by the residents of the communities that ultimately appeared on the IWA list of landfill sites. As with many traditional siting processes, many residents and stakeholders do not become involved until faced with the reality of a project being sited. Many residents expressed frustration over not being able to comment or participate in and influence decisions regarding the selection of alternatives. Notices of legislative committee hearings are too far removed from the average resident without accessible opportunities for communities to comment and influence. Decisions that are viewed by the public as being arbitrary or made for political reasons, often lack credibility in the eyes of those affected by the decision. Whether or not a full assessment of possible alternatives would have reduced the public opposition to landfilling cannot be determined. What is known is that the absence of a rationale for rejecting alternatives casts suspicion and doubt on the site selection, in particular, whether the right alternative is being sited.

(b) Political Interference Within Site Selection

The review of the *U.S. Department of Energy* (DOE) High Level Nuclear Waste Repository case study provides an illustration of political interference in EA processes that ultimately worked against a successful outcome. This project has a 30-year history with debate continuing as to whether the selected site is both technically appropriate and socially acceptable. Political influence played a key role in establishing the conditions for this debate.

In 1972, the U. S. Academy of Science conducted an assessment of alternative ways to manage nuclear wastes. Risk, environmental and socio-economic assessments were conducted on a range of options that included deep geological disposal, disposal in ice sheets, islands, oceans or space. The Academy identified deep geological disposal as a preferred alternative. In 1979, a second assessment conducted by a Federal Interagency Review Group (IRG) also recommended geological disposal (in salt deposits) over all other alternatives. In that same year, President Carter announced as national policy that nuclear wastes would be managed in geological isolation. A decision was also made to search for potential sites on U.S. Federal land holdings. The nuclear waste management geologic repository project was also to be subject to the requirements of the National Environmental Policy Act (NEPA, 1969).

As the site search proceeded, it was determined by DOE that none of the federal land reservations being considered were located over salt deposits. The result was that DOE would have to consider other lands either private or state. This complicated matters for DOE, because it now meant that DOE would have to consider for issues and concerns of state governments and wider public interests regarding repository-siting decisions. As a result, DOE requested that the U.S. Congress support the repository program by providing legislation to allow DOE to assert rights over that of the States. In 1982, the *Nuclear Waste Policy Act (NWPA)* was passed providing these rights to DOE.

The NWPA had a profound impact on the repository EA and siting process. The Act exempted DOE's site selection process from the requirements of NEPA, DOE no longer needed to consider alternative courses of actions. The Act also specified that deep ground burial was the desired means to dispose waste. It also required DOE to use only available data for its environmental studies and not acquire empirical information for the evaluation of sites. The legislation also required DOE to identify two repositories - one in the east and one in the west - and to recommend three potential sites in both the western United States (by 1985) and three potential sites in eastern United States (by 1989) for full site characterization. The evaluation and selection of the sites was, however, to include opportunities for public involvement.

Despite these exemptions, the DOE site selection process fell behind schedule for both technical and political reasons. The draft Environmental Impact Studies (EIS) produced by DOE for the nine potential western sites were soundly criticized by the public and state authorities. Criticisms focussed on the adequacy of the scientific risk assessment processes, the scope of the analyses, lack of public involvement, the criteria used within the EIS, methodologies, the quality of data collection and the conclusion reached. It was also evident that the required scientific investigations of a preferred site - necessary to meet a legislated date for the opening of the repository - would not be completed in time.

In the east, the site search experienced similar criticisms and became highly political. In 1986, DOE announced twelve candidate sites spread across nine eastern states. The public outcry and opposition to the announced sites was politically overwhelming. In May 1986, Energy Secretary Herrington announced that he suspended DOE's search for a repository in the east, indicating that a single repository would meet the country's need. No substantive rationale was provided for this decision. The decision to abandon the second repository was widely viewed as an attempt to enhance the re-election prospects of several senators from the eastern states and to diffuse political opposition to the repository in the more populous states.

As a result of continuing controversy over the repository siting process, schedule delays and escalating costs, Congress for a second time took action and passed the *Nuclear Waste Policy Act Amendments (NWPAA)* in December 1987. This new Act mandated that only one repository be constructed instead of two and that Yucca Mountain, Nevada be the only site to be characterized for suitability as a repository. Finally, under the NWPAA, no other site could be substituted without the clear demonstration that the Yucca Mountain is unacceptable for compelling scientific reasons.

The controversy over the selection of Yucca Mountain continues. In 2002, the President and Congress approved the site as the permanent national repository for nuclear wastes. Nevada, having been outvoted in the political arena is now seeking relief from a U.S. Federal Appeals Court to block the U.S. government from proceeding. The State of Nevada alleges that the other 49 sites have violated the U.S. Constitution by arbitrarily imposing on the state “this universally unwanted burden.”

In addition to the legal actions by the State, the City of Las Vegas has enacted an ordinance making it unlawful to transport any high level nuclear waste through the city for delivery to a repository for nuclear wastes. The state water agency is also denying the Federal Government the water needed to operate the repository, saying that to do so would be detrimental to the public interest. The U.S. Government is proceeding with a suit to obtain the water.

The state of Nevada, Clark County and the City of Las Vegas brought separate legal actions challenging the DOE, the Nuclear Regulatory Commission (NRC) and the EPA on several aspects of the Yucca Mountain Project as well as constitutionality of forcing one state to take all the nation’s nuclear waste. The U.S. Court of Appeal for the District of Columbia Circuit opted to combine all the cases into one due to the complexity of this issue.

In July 2004, the court in its unanimous ruling rejected the constitutional claims and dismissed the challenges against the DOE. The following are some of the claims rejected by the court:

- DOE’s Yucca Mountain repository site criteria were improperly set;
- DOE’s Final Environmental Impact Statement was inadequate;
- DOE’s secretary’s recommendation of the site to the president was invalid;
- The president’s recommendation of the site to Congress was unlawful;
- Congressional approval of Yucca Mountain in 2002 is inconsistent with the U.S. Constitution, including the Property Clause.

The only argument upheld by the court was EPA’s inadequate radiation safety standard at 10,000 years for the site. As the court ruled, the *Energy Policy Act* requires that the EPA’s determination of public health and safety standard for Yucca Mountain must be “based upon and consistent with” the NAS’s study commissioned by Congress. The Academy’s recommendation is that compliance period should extend through the time of the peak risk for radiation doses from the repository, which studies show will likely to occur in 300,000 years or more. In this regard the court found that the EPA ignored the findings of the NAS.

“It would have been one thing had EPA taken the Academy’s recommendations into account and then tailored a standard that accommodated the agency’s policy concerns. But that is not what EPA did,” the court wrote in its ruling. “Instead, it unabashedly rejected NAS’s findings, and then went on to promulgate a dramatically different standard, one that Academy had expressly rejected.” Judges concluded that “it entirely unreasonable for EPA to have acted inconsistently with NAS findings and recommendations.”

The Nuclear Energy Institute (NEI) argued that, despite the court’s ruling, compelling reasons exist for upholding the EPA’s radiation standard, because it is consistent with all other hazardous waste management practices, and no legal or scientific precedent exist for implementing a longer-term regulatory compliance period at any nuclear material disposal facility.

In its decision, the court offered two alternatives for implementing its mandate:

- EPA can work with the NRC to revise regulations to extend the compliance period beyond 10,000 years, or

- Congress can enact legislation empowering EPA to deviate from the radiation standard recommended by the NAS.

After the NEI's appeal to the court's July ruling was denied in September 2004, the Institute issued notice of their intent to ask the U.S. Supreme Court to reverse the July ruling. The DOE and EPA indicated that they will not join NEI's appeal and will comply with the ruling from the U.S. Court of Appeals.

The next step in the repository's development is for DOE to submit a license application to the NRC, which is the licensing and regulatory agency that will make the final decision on whether the DOE is allowed to proceed with construction and subsequent licensing to operate the repository.

Remaining Areas of Controversy

The following areas of controversy were identified during the public interaction processes. Many of these are not resolvable because they reflect either differing points of view or irreducible uncertainties in predicting the future.

Native American Viewpoint

Disagreement exists about the nature of the repository as it might impact elements of the natural and cultural environment that are of concern to Native American tribes.

Perceived Risk and Stigma

Disagreement exists concerning whether the perception of risk and stigma cause behavioral changes, the ability of researchers to predict future human behavior based on perception of risk and stigma, and the capability to reliably predict economic effects of any such stigma.

High-Level Radioactive Waste—Equivalency of Metric Tons of Heavy Metal

Disagreement exists about the method for calculating the amount of metric tons of heavy metal (MTHM) in a canister of high-level radioactive waste. This would affect the number of canisters that could be disposed of under the Proposed Action.

Engineered Barriers

Disagreement exists about how much reliance should be placed on engineered barriers versus natural barriers to achieve waste isolation in a geologic repository.

Transportation

Disagreement exists regarding factors relevant to the analyses of the potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste including for example, the need for community- and highway-specific information, and assumptions and input information used in the analyses.

Evaluation of Long-Term Performance

Disagreement exists regarding the ability to predict long-term performance for 10,000 years or more. Uncertainties associated with complex natural systems and engineered barrier behaviors and the use of computer models that are unable to rely on the results of long-term testing raise questions about the ability of the Department to predict repository performance.

The actions of the U.S. Congress sharpened public opposition to the selection of Yucca Mountain. The State of Nevada, stakeholders and the public view the selection of Yucca Mountain as arbitrary and reflect a decision that takes the path of least political opposition. Nevada is a state with a relatively small population with equally small representation in the U.S. House of Representatives. Many people in Nevada feel that the state lacked the same political influence of others who were able to successfully

remove their states from consideration. The public opposition is further enhanced by what many consider to be inadequate environmental studies on the candidate sites. Opponents argued that had the provisions of NEPA been applied, that more comprehensive environmental impact studies would have shown that Yucca Mountain, as a national repository for nuclear wastes, possessed several disadvantages. These disadvantages include unstable geologic settings, significant transportation risks, potential impacts on tourism and an incompatibility with Indian lands and culture. It was felt that these shortcomings - when fairly compared with the advantages and disadvantages of other possible sites - would eliminate Yucca Mountain from consideration as a preferred site for the repository. The rationale provided for selecting Yucca Mountain was widely viewed as being flawed. Even a Congressional Committee, upon review of the actions of Congress, found the basis for its decision to be confusing. The argument continues that because of political interference, no full and fair comparison of sites was completed, and the decision to select Yucca Mountain lacks legitimacy.

(c) Premature Rejection of Alternatives

The premature rejection of alternatives by proponents is related to the preclusion of the consideration of alternatives. In the OWMC case, the premature rejection of an alternative ultimately resulted in the OWMC EA not being accepted by a Joint Board.

OWMC's preferred alternative was to establish its treatment and disposal facilities in an integrated way on one site in the Township of West Lincoln in the Region of Niagara. The facilities would consist of various physical/chemical treatment, rotary kiln incineration and landfilling of treated waste residues. These are the facilities that were initially proposed by the Government of Ontario for the previously abandoned South Cayuga site.

Early in OWMC's Facilities Development Process, and prior to the selection of a preferred site, the OWMC examined the possible use of other types of treatment technologies and other types of disposal methods. These early studies assessed the environmental, technical and cost advantages and disadvantages associated with the different methods. The disposal methods included placement of residues in deep wells, above ground storage (warehouses), different types of landfill, geologic isolation (in bedrock and salt deposits), and placement in mined-out space. While the assessment of the disposal options identified possible advantages with disposal in mined-out space and salt mine deposits, these options were subsequently rejected by OWMC as not offering significant advantages over the disposal of residue in landfill within consistent and deep clay settings. It is important to note that the evaluation of the disposal options occurred in parallel with the site selection process and prior to the application of the Environmental Assessment Act to OWMC. The site selection process quickly focussed on siting facilities within the Golden Horseshoe Region of Ontario, since this region also possessed the large majority of hazardous waste generators and also the appropriate hydrogeologic settings deemed by OWMC as suitable locations for treatment facilities and landfill. The Golden Horseshoe region did not possess any mined-out space or salt deposits and as a result, these disposal methods were not considered within OWMC's site selection process.

When OWMC was placed under the Ontario Environmental Assessments Act, it was required to conduct a comprehensive assessment of alternatives. This comprehensive assessment took place after the selection of a preferred site in the Township of West Lincoln.

OWMC's earlier decision to confine its site search to the Golden Horseshoe was reviewed on two occasions: in the Candidate Region Review (CRR) in 1987/1988 and the Canadian Region Review Refinement (CRRR) in 1990/1991. These reviews were conducted as a result of public, ministry and

agency comments on the draft environmental assessment, particularly the need to revisit the earlier siting decisions as a result of new information regarding the volumes and distribution of wastes generation.

The purpose of the CRR was to address the question of whether there were siting opportunities outside the Golden Horseshoe Candidate Region that may be better than West Lincoln. Using the same siting approach as that for the identification of candidate areas in the Golden Horseshoe, OWMC identified six "Opportunity Areas" outside the Golden Horseshoe that appeared to hold promise for the siting of a facility. These opportunity areas were compared to West Lincoln by conducting multiple criteria (risk, environmental and costs) qualitative and quantitative evaluations. The results of the evaluation identified a potential site in the St. Thomas area as possessing characteristics that were very close to West Lincoln.

OWMC's conclusion was that none of the siting opportunities identified ought to be pursued. It was felt by OWMC that while the St. Thomas site was similar to the West Lincoln site, there was no evidence to suggest that it would be better from either risk, environmental impact or cost perspectives.

The CRR (1987/1988) was superseded by the CRRR (1990/1991). OWMC undertook this study because of further public review and ongoing comments on the Environmental Assessment. The CRRR was a similar exercise to the CRR, but there were a number of modifications, the most significant of which was that more specific hydrogeology criteria and updated transportation analyses were used in the evaluation of the opportunity areas. The hydrogeologic assessment of the St. Thomas area gave St. Thomas the lowest suitability assessment possible. This assessment by OWMC was challenged by the parties opposed to OWMC at the regulatory hearing. The Joint Board, in its reasons for decision, also expressed concern about the fairness of the OWMC assessment, but ultimately accepted OWMC's position as it related to the acceptability of a fully integrated facility at St. Thomas over a fully integrated site at West Lincoln. The Board found that it was unlikely that one could find a better site for an integrated facility outside of the Golden Horseshoe Candidate Region.

Significantly, the Board's reasons for decision went on to consider whether the CRRR established a basis for reconsidering the assessment of OWMC's alternative waste management system evaluations: in particular, a partially integrated or dispersed waste management system involving disposal in an existing salt mine. The Board, using the analysis provided by OWMC in its EA, found that the potential existed for an acceptable alternate system with treatment facilities at several sites in Southwestern Ontario. The Joint Board concluded that there was a reasonable probability that a better system might exist over that preferred by OWMC.

The reasons for the Board not accepting OWMC's EA relate to the assessment of alternative systems, site selection and the fact that the disposal of treated residues in a landfill would ultimately result in high levels of chlorides in underlying groundwater aquifers. When the effect of treated residue disposal on groundwater was factored into the Board's conclusion on alternative system, the Board concluded that the OWMC proposals were not to be preferred. The details follow.

OWMC at the time of its EA submission had not completed all laboratory studies regarding the potential effects of landfill leachate. Once available, the results confirmed that residue organics and heavy metals would be captured by underlying clays and would not contaminate groundwater. However, because most of the treated wastes were to be solidified in a cement process, landfill leachate would over time (but not for at least 600 years) enter the groundwater. In 600 years, the leachate would contain high levels of chlorides which would make the bedrock aquifer unusable for drinking water purposes. Further, the levels of chlorides in the aquifer would exceed the MOEE Regulatory Requirement for Reasonable Use of groundwater resources.

As a result, OWMC was required to identify and assess other methods of managing the landfill chlorides. OWMC, after evaluating 10 options, decided that the preferred alternative was to extract the chlorides before entering the landfill and to reuse the extracted salts in various commercial processes and/or deep well injection disposal of the remaining salts.

The OWMC's decision to extract and manage the chlorides had a significant impact in the mind of the Joint Board. The fact that the landfill disposal could not contain the chlorides, and the additional cost associated with the extraction of the chlorides, provided a basis for re-considering or revisiting the disposal of waste residues in mined salt deposits. It was the Board's finding that when the chlorides problem was factored into the comparison of relative advantages and disadvantages of disposal in salt mine vs. disposal in landfill, that the potential existed for salt mine disposal to be preferred to landfill. With this as a possible preference, the assessment of the alternative waste management systems by OWMC was considered to be deficient and as a result, the OWMC EA was not accepted by the Board. The Board's findings on the most promising alternative to the OWMC proposal appeared to be disposal in salt mines at Goderich, Ontario with treatment facilities at the most promising location(s) in southwestern Ontario. However, the Joint Board found that the EA did not provide a comprehensive comparative evaluation (i.e., an evaluation that took into account all of the relevant factors of both "systems" and "siting") of the most promising alternative(s).

This example of the evaluation of alternatives demonstrates two important points. First, early in the site selection process, OWMC significantly narrowed its search for landfills to the Golden Horseshoe based on the best available information on the volume and locations of waste generation and related transportation risks. OWMC's rationale was that there was an advantage to locating its facilities close to the source of generation, thus minimizing transportation risks and costs. By making this decision, OWMC closed off any consideration of salt mine disposal since no mines exist in the Golden Horseshoe. As the EA process proceeded, new information with respect to transportation and the location of sources of waste generation became available that cast doubt on the reasonableness of its earlier siting decision to site within the Golden Horseshoe. As the new information became available, OWMC assessed the implications for its site selection and was satisfied that its rationale was still strong. However, the parties opposed to OWMC argued that the assessment of alternatives was deficient: therefore the siting process was flawed. Significantly, the Joint Board - using OWMC's own analysis - agreed that the assessment of alternatives was deficient. In its decision, the Board expressed concern over the fairness and accuracy of OWMC's analysis of revisiting of the earlier decisions to reject certain alternatives. The Board implied that OWMC was not comprehensive in its assessment of alternatives and the implications of the results.

The second important point is equally significant and reflects an alternate view. It has been suggested that after more than 10 years of study and more than \$100 million dollars of cost, that OWMC would be characterized as being irresponsible to abandon its preferred site and begin studies anew on facilities at other locations utilizing salt mines as the preferred disposal method. It has been implied by some that OWMC may have recognized that its assessment of alternatives in the EA was flawed, but given the need to solve the problem and the time and money already spent, left OWMC with no choice: it had to proceed with its preferred alternative and supporting rationale.

Whether or not the OWMC's evaluation of alternatives was flawed or unfair is not the point to emphasize; rather the example demonstrates the dilemma often faced by proponents. Does a proponent continue to spend time and money on a wide range of potential options, or make decisions to focus efforts and reduce costs? Does it continue to spend time and money revisiting past decisions as new information warrants? The answer can only be determined by the facts of the situation. The key point to take from this example is that only with a clear, strong and obvious rationale should alternatives be abandoned: otherwise, the alternatives should continue to be assessed until a proponent has confidence in making a decision.

(d) Lack of Public Involvement in Selecting the Alternatives to a project

Directly related to the previous points is the noticeable lack of involvement by the public and other stakeholders in evaluating alternatives to the project. This is evident in all of the case studies profiled.

It has been demonstrated that there was little opportunity for the public to participate in the selection of IWA's preferred alternative. While Legislative Committee hearings into new legislation does provide opportunities for the public to comment on proposed actions, it does not allow for a thoughtful and meaningful exploration of the advantages and disadvantages of alternative actions.

Beyond the legislative scoping of alternatives, few proponents spend as much time, energy and effort to involve the public in the evaluation of alternatives. Generally, proponents feel that the public will not have an interest or take the time to deal with broad and potentially abstract assessments after these assessments are viewed as being irrelevant. While OWMC did conduct workshops on alternative treatment and disposal technologies for the West Lincoln site, the amount of information, the number of opportunities for public input on criteria, the weighting of their significance and discussions of the trade-offs paled in comparison to that offered for matters pertaining to site selection. In the case studies of IWA and Alberta (provided later in the review), there was no formal assessment of alternatives to the project. In the U.S. DOE repository siting, it appears that only scientists and other experts participated. In the Ontario SPTF process (provided later in the review), alternatives to the project were only briefly assessed after the emergence of Deep River as a possible host site.

In all five of the waste management siting processes, there is a little evidence on the public record to demonstrate that the public had any opportunity to participate and influence the evaluation of alternatives. With the exception of OWMC, none of the public consultation records identify opportunities for the public to identify potential alternatives to the project, propose and discuss the appropriate evaluation criteria, and participate in the assessment of trade-offs.

The evaluation of alternatives seems to be the exclusive purview of technical experts applying technical, regulatory and economic criteria. As a clear example, in the U.S. DOE nuclear waste siting project, the assessment of the alternative methods was conducted by the U.S. Academy of Science. While the evaluation frameworks for alternatives to a project often consider social and cultural considerations in a summary way, there is usually no demonstration of the public's values in selecting, weighting and applying criteria and making decisions.

While it is important that these evaluations be technically correct, there also needs to be a way to introduce and incorporate the public perspective into the evaluation. Designing public engagement opportunities that balance technical as well as public values and public perspectives in the assessment of alternatives to a project will assist in legitimizing the selection of alternatives as well as the subsequent siting process.

Summary of Lessons and Proposal to Consider

Four key lessons can be learned from the case studies regarding the selection of site alternatives:

- 1) Governments may limit or scope the consideration of alternatives to either quickly solve a problem and/or avoid public opposition. However, individuals affected by legislation or policy direction will want to be satisfied that the elimination of any alternative is justified.

Proponents should consider full and complete assessment of all reasonable alternatives to a project. Strong rationale in the form of a statement of the advantages or disadvantages of each alternative will help to ensure better understanding of the selected course of action.

- 2) The premature rejection of alternatives can undermine the success of a siting program. The assessment of the alternatives should consider all relevant information regarding facility characteristics and public interests. Alternatives should only be abandoned after full consideration of all the potential advantages and disadvantages are known. A proponent should have confidence in the rationale for rejecting an alternative: this confidence needs to be tested and shared by regulatory interests and community interests.
- 3) Proponents generally do not actively engage the public in the evaluation of alternatives leading to a selection of a preferred project. While comprehensive public consultation programs support site selection and evaluation of alternative methods at the selected site, there are few examples of widespread public engagement in identifying alternatives to a project, evaluating and selecting the project. Future proponents of environmental assessments should consider earlier and active involvement of the public on these matters.
- 4) Several of the case studies demonstrated the impact of political interference within EA and site selection processes. OWMC's exemption to Environmental Assessment was removed after the selection of its preferred site; the IWA process was stopped after the election of a new Provincial Government; and the U.S. Congress relieved the Department of Energy from conducting comprehensive Environmental Impact Studies for the purpose of evaluating sites. All three political actions resulted in upsetting the processes underway.

While it is difficult for a proponent to control and influence the political agenda of government, there is value in proponents attempting to establish conditions to avoid political interference. Providing complete and timely information to political organizations and the bureaucracy is important to establish understanding and awareness of a proponent's planning objectives and approach. To the extent possible, a proponent needs to secure a commitment from all political interests to allow a process to run its course to a logical end point. Politicians should be informed of the consequences of any political interference in a siting process. Governments need to provide leadership and not abdicate responsibility. Proponents can assist by ensuring that the consequences of any action are communicated to government in an open and in public way.

2.2 How to Site – The Advantages and Disadvantages of Alternative Approaches

The case studies are instructive in that different approaches to siting are profiled. The literature (*Briassoulis, 1989*) provides guidance on the different types of planning models and the general theories that often guide planning processes. Briassoulis profiles six theoretical concepts, three of which are relevant to the six case studies. These are:

- 1) The Rational Comprehensive Model (Traditional Model) employs a staged or phased approach to siting that includes a description of environmental conditions, examination of alternative solutions, and identification of a preferred solution, all through the use of multi-disciplinary evaluation criteria.

This is the foundational model that many environmental assessment processes are developed. This was the approach used by the OWMC and IWA.

- 2) The Incremental Model is characterized as developing a policy response to a specific need or crisis situation. This approach is generally highly political and direction is set to meet a political need.

This approach was ultimately employed by the United States Federal Government in selecting Yucca Mountain, Nevada as the preferred location for a nuclear waste repository.

- 3) The Participatory Model provides a high degree of direct public involvement and direct public influence in site selection decision-making.

This approach was used by the Government of Alberta in successfully selecting a site for treatment and disposal facilities and the Federal Government of Canada's Siting Task Force for the management of low-level radioactive wastes.

[For information on the three other approaches – Adaptive (Modeling), Contingency and Advocacy, see Briassoulis, 1989]

The traditional and participatory processes are briefly profiled below; the incremental approach used by DOE has already been presented.

(a) **The Traditional Siting Process**

The traditional site selection approach used by both OWMC and the IWA followed similar stepwise processes. Each is briefly discussed: more detail is provided on each site selection process in *Part Two*.

The first step of the OWMC process was to identify a region that offered opportunities for siting physical and chemical treatment, incineration and landfill facilities. In the OWMC case, an inventory of the best hydrogeologic settings in the province was prepared. In parallel, OWMC conducted waste generation studies and determined that the majority of wastes were generated in the Golden Horseshoe region of the province in an area encompassing the west part of Lake Ontario. Based on this information, OWMC decided to focus its study to the Golden Horseshoe for three reasons: the region generated the majority of wastes that would require treatment; the region possessed the desired hydrogeologic setting; and the location of treatment facilities in this region would minimize transportation risks and costs in hauling wastes from the generator to the facilities.

Once the preferred region was identified, OWMC progressively narrowed its site search through a series of constraint mapping processes and multi-disciplinary comparative evaluations of potential sites. A detailed comparative evaluation of eight candidate sites resulted in OWMC selecting a site in a rural setting in the Township of West Lincoln in the Region of Niagara. OWMC was guided by a series of site selection principles and three site selection goals. The goals were prioritized in the following order: Minimize Risks to Human Health and the Environment, Minimize Environmental Impacts and Minimize Costs. The comparative evaluation criteria were developed from these goals. In making site selection decisions, OWMC had regard for this priority ranking of goals; it would select the alternative that best minimized risks.

The IWA process was similar to that used by OWMC with one significant difference: while OWMC's initial step was to identify a preferred region that represented the best opportunity for a site, the IWA's initial step was to identify and exclude areas that offered significant risks and environmental constraints to landfill siting. Once all constraint areas were removed from further consideration, the narrowing process was essentially the same as OWMC's - a series of steps designed to identify a long list of sites, the application of multi-disciplinary comparative criteria to narrow to a short list, and a more detailed

comparative assessment on the short list resulting in the selection of a preferred landfill site. Not only were the steps of the site evaluation process similar to OWMC, but also many of the same comparative criteria were used within both studies.

In both cases, public input was sought at key points in the process, but the public did not have any active role in making site selection decisions. Both OWMC and the IWA processes experienced significant public opposition.

Specific details on both site selection processes are provided in *Part Two*.

(b) The Participatory/Voluntary Siting Process

During the 1980's, as a result of public opposition to the traditional approach to site selection and the specific failures of these processes to secure sites for facilities, some governments opted for a more participatory approach to site selection. The concept driving this approach was to give more power to the public, including the power to make decisions on site selection.

The Alberta Experience

The Province of Alberta was the first jurisdiction in Canada to employ a willing host/participatory approach to site selection. After failed attempts to develop hazardous wastes treatment and disposal facilities, as a result of public opposition to the proposals, the government established a *Hazardous Waste Management Committee*. The committee was given a number of responsibilities including the responsibility to identify a siting process that would result in public acceptance of sites.

The committee developed a stepwise process that was designed to identify a willing host municipality for treatment and disposal facilities. The process consisted of the following steps:

- (1) An invitation was issued by the Alberta Government to all municipalities, regional planning commissions and interest groups to attend information sessions on the proposed siting process. The information sessions outlined the nature of the problem, the types of facilities to be sited, the desired characteristics for sites and the benefits associated with the establishment of the facilities.
- (2) An interested municipality could request the completion of a constraint mapping study to determine whether that municipality possessed areas that might be suitable for siting facilities. Any potential site needed to meet specific technical and regulatory requirements.
- (3) Based on the results of the constraint mapping, municipalities would need to decide if they wished to proceed to the next step or to drop out of the process.
- (4) For those municipalities remaining in the process, citizens advisory committees were formed to participate in the preliminary site assessment studies.
- (5) After preliminary assessments (drilling) of site areas, a decision was required by the municipality whether to proceed to more detailed site assessment (more detailed drilling as well as environmental and socio-economic studies).
- (6) For those sites that passed the requirements of the detailed assessment, there would be a vote by municipal residents whether the establishment of a site in the municipality was acceptable.

(7) Final selection of the willing host site was to be made by the Alberta Government.

In total, 52 Alberta jurisdictions out of a possible 70 jurisdictions requested the constraint mapping study to determine whether potential suitable areas existed.

Upon completion of the constraint mapping, fourteen municipalities requested further consideration as a host community. Nine of these communities were eliminated from further consideration for either environmental suitability reasons or as a result of public opposition. Five communities remained. The more detailed studies were completed and plebiscites were held. Ultimately, the Town of Swan Hills was selected by the Government of Alberta as the willing host community. 69% of Swan Hills' residents voted in the plebiscite with 79% of all votes supporting the establishment of the facilities.

The town of Swan Hills was selected by Alberta Cabinet as the site of a comprehensive waste facility in March 1984. In the Environment Council of Alberta final report that recommended Swan Hills, the number one criterion under "Essential Criteria" was: "There must be a substantial degree of public acceptability..."

Another community from the "final five" – the town of Ryley – voted seventy-seven percent in favour of hosting the facility. Community leaders from the town of Ryley were very outspoken in vocalizing their disappointment in not being selected as a site host. They believed that Ryley was a better site physically and closer to waste generators and that the decision came down to political favouritism. The difference in the percentage of support between Swan Hills and Ryley was, in the opinion of the Town, not significant and should not play a role in the final decision.

The voting outcome was not the sole reason for the government's selection. Swan Hills proved attractive to provincial policy makers because it was relatively close (209 kilometers) to Edmonton and linked to it directly by a provincial primary highway. At the same time, unlike Ryley and other candidate sites, Swan Hills had no immediate neighbouring communities, so its acceptance of a facility did not require garnering the support of any nearby towns.

A source of potential opposition was also missing from Swan Hills situation. Whereas conflict between farmers and non-farmers was a feature of the facility siting debate in other Albertan would-be host communities, there was little such division in Swan Hills. The combination of poor soils in the region and its harsh northern climate inhibit agriculture. Consequently, there is no farming around Swan Hills: indeed, there is no farm within 50 kilometers of the town.

As for the town of Swan Hills, it was eager to diversify its economy, which was previously reliant on oil and natural gas extraction, and attract investment of long-term economic development. Like many small Albertan—and Western Canadian—towns of this period, the Swan Hills' unemployment and bankruptcy rates increased rapidly in the late 1970s and early 1980s. The other four communities that held plebiscites over siting were also eager for economic development and diversification, but were not in as serious an economic down-swing as Swan Hills.

A community is highly unlikely to volunteer unilaterally to host a treatment or disposal facility in the absence of tangible economic rewards and clear assurances of long-term safety in facility management. Market approaches to siting with their primary emphasis on the attractiveness of compensation packages, frequently are dismissed by public as bribery and fuels strong animosity toward facility proponents. (*see the Ontario experience below*)

In the Alberta case, most of the communities that stayed in the process did so in part because of the perceived economic benefits of hosting the facility. However, it should be stressed that other than the

promise of new local jobs and a significant tax assessment that would result directly from the facility development, the government made no explicit offers of community compensation. Therefore, the strongest expression of interest came from smaller communities, where the benefits per capita were magnified.

Benefits to the town of Swan Hills commenced with plant construction when some 150 construction workers were housed and fed locally. Various other benefits have been realized by the town including: economic diversification, increased population (approximately 120 new residents), increased local employment (60 positions at the treatment center); construction of new homes (18 houses, 17 townhouses), increased tax base, upgraded local utilities, and improvements to the local tourism industry.

In addition to above mentioned benefits the province has established a fund, held by an independent third party, to assure perpetual care of the landfill site following its eventual closure and to cover twenty years of monitoring.

The Ontario Experience

Building on the success of the Alberta experience, the federal government in the late 1980's decided to employ a similar approach for the development of management facilities for low-level radioactive wastes. There was a need to manage LLRW produced at refineries at Port Hope Ontario, and other smaller amounts of LLRW. Earlier attempts to manage these wastes in Port Hope failed in part due to local public opposition to proposals.

In 1986, the Federal Government announced the appointment of *The Siting Process Task Force* (SPTF) on Low-Level Radioactive Waste Disposal. The Task Force was made up of a cross-section of practitioners, academics, interest groups and citizens at large. Their mandate was to design and advise on an alternate, less confrontational and a more collaborative approach to site selection. The SPTF recommended the Cooperative Siting Process, 'Opting for Cooperation'. This process consisted of five phases and sought a participatory decision-making process to site LLRW management facilities.

In developing its process, the SPTF identified 5 public concerns that need to be addressed in the siting process. These included understanding and appreciating the significance of perceived risks associated with LLRW and its management, inequity in the distribution of costs of hosting a facility and receiving the benefits of a compensation package, the general public stigma attached to a radioactive waste facility, fear of public loss of control in a siting process, and lack of trust between authorities and local stakeholders. As a result, the SPTF determined that voluntary consent in the form of municipal plebiscites at crucial stages in the process would be a basic procedural principle. As such, the Siting Process would have five separate phases:

- > **Phase I: Establishing Guidelines** - this would include setting out the basic ground rules of engagement with communities and getting the process under way.
- > **Phase II: Regional Information Sessions** - the Siting Task Force (SPTF) would hold regional information sessions for interested municipalities throughout Ontario.
- > **Phase III: Community Information and Consultation** was focused entirely on public information and consultations, and establishing the Community Liaison Groups (CLGs) in municipalities that had expressed interest to continue in the process. CLGs were to ensure that decisions made in the siting process would reflect the interests of the communities involved. The responsibility of the CLGs was to serve as representatives of the process in front of town councils. At the end of *Phase III*, after the extensive community consultations, CLGs would provide recommendations to Town Council.

- > **Phase IV: project Assessment** was intended to undertake extensive analysis of the technical, safety and environmental components to the requested town's proposal to host a LLRW facility. In *Phase IV*, there would also be negotiations regarding the benefits that would go to the municipality, the compensation packages and mitigation programs. At the end of this phase, there would be a local vote on the conditions of an agreement in principle.
- > **Phase V: Implementation** was the last step in the siting process. Here the negotiations would be put into a legally binding agreement. If there were options, the Federal Government would make the final decision.

Each of the two voluntary approaches is profiled in more detail in *Part Two*.

The SPTF LLRW siting process was considered to be both a success and a failure. The details on this follow below.

Both siting approaches - traditional and voluntary - offer advantages and disadvantages. What follows is a description of the case study experiences for both approaches, describing some of the limitations with each approach.

The Limitations of the Traditional Process

The traditional (rational) siting approach has, as a key driver, the need to meet all the technical and regulatory tests for acceptability. While public acceptability is also strived for, it is not a required outcome. Public acceptability is only determined within the context of a regulatory review or at the political level. In both the OWMC and IWA cases, comprehensive stepwise criteria assessments were conducted to identify a preferred site that would best minimize risks to human health, environmental impact and to a lesser extent costs associated with the development and operation of the preferred facilities. While conventional environmental assessments now include the considerations of social and cultural criteria in the assessments, there is no specific requirement to address these considerations within EAs.

In these two cases, both proponents expressed confidence in the strength of the assessments, the rationale for making site selection decisions and defending the rationale. Because the public and many stakeholders fundamentally objected to the imposed location of these facilities, significant and vocal public oppositions ensued.

Within the IWA process, because three GTA region landfills were to be sited (Durham, Toronto/Region of York and Peel), the nature and extent of public opposition is particularly noteworthy. At the time of the announcement of the long list of potential sites for all three study areas, more than 40 potential sites were identified. Immediately, close to 40 communities mobilized in opposition to the IWA with many of the communities establishing an organized network across the northern part of the GTA opposed to any landfill siting by the IWA. The intensity of the public opposition was so significant that the siting process became a significant political issue in the next provincial election. As a result, the two opposition parties pledged to disband the IWA, if elected.

The traditional siting process, as it was applied to these two waste management EA projects, was also expensive and time consuming. The OWMC EA was completed over a 12-year period at a cost in excess of \$100 million; the IWA process required approximately 4 years at an approximate cost of \$70 million.

In both cases, the siting processes were viewed by many residents as an imposition of government will, and as potential direct threats to their health, community well being and personal wealth. Many residents

experienced heightened anxiety associated with a process over which they felt they have little or no influence over in terms of an outcome.

The Limitations of the Participatory Process

The participatory (voluntary/willing host) approach is viewed by some, in the literature and proponents of siting projects, as the preferred method for siting controversial facilities. The advantages are well known:

- Direct community involvement and influence over decisions and actions;
- No imposition on a community;
- Less public opposition and public anxiety; and
- A willingness to accept proposed sites.

The Alberta case study is widely considered as a successful implementation of a voluntary/willing host siting process. Facilities have been established, wastes are being treated, and the community of Swan Hills receives associated economic benefits. The process produced as many as five willing host communities, requiring the Government of Alberta to select one community. The rejected communities in fact protested the selection of Swan Hills.

The participatory approach can best be characterized as being a high reward process but it also shares some similarities with the traditional approach in that it too can be high risk, if it fails.

As the LLRW Siting Task Force case study demonstrates, there are a few potential disadvantages with the participatory approach that proponents need to be aware of and to understand.

First, for the participatory approach to succeed, it needs to ensure that all those directly affected by a proposed facility are accommodated within the process and need to have a voice in the decision-making. The LLRW SPTF process ultimately failed because of perceived unfairness by downstream residents and stakeholders outside the Deep River municipal boundary. These residents argued that because they lived outside the willing host municipality, they did not have the same decision-making rights and access to benefits as those provided to the residents of Deep River. The Deep River site was to be close to the municipal boundary. Residents of nearby communities protested that the establishment of a facility in Deep River would result in the municipality receiving all the benefits associated with the LLRW management facility, while their municipality -being downstream - would be exposed to potential risks of facility failure.

Similar views were expressed by other surrounding municipalities in Renfrew County. When asked to be provided with the same rights and equal access to similar benefits as those potentially offered to Deep River, their request was ultimately rejected by the Government of Canada. This resulted in regional public opposition to the site and the erosion of support within Deep River as a host for the LLRW facility, even though the majority of residents voted to accept the establishment of a facility. The town eventually withdrew from the process over the issue of regional concern and the form of community benefits guarantees. Since Deep River was the only community that progressed to *Phase IV* of the process, the SPTF was left with no potential host for a facility. It was not until the communities of Port Hope and Clarington - the source communities for the majority of LLRW - agreed to reconsider establishing facilities for LLRW, that a potential solution became available.

The lesson to be learned is that for a voluntary approach to succeed, the process needs to specifically accommodate the interests of those that may also reside outside the interested municipality. Provision should be made to include the interests of those that may be affected downstream, downwind, downgrade or along access roads to the same extent (decision-making and benefits) as that for the host municipality.

A second potential limitation is how to ensure that all potential interests (for and against) participate in the process. Again in the LLRW SPTF process, it has been suggested that some organized stakeholder interest groups (not members of a particular community) deliberately did not participate in a process, potentially seeking a regulatory review of a selected host municipality. This raises two possible issues: it is not clear how a voluntary process will align with the legislative requirements for environmental assessment; and, while one might expect that through EA scoping and project specific guidelines this matter could be easily addressed, it is not yet evident that this procedural matter has been fully resolved.

The associated issue is more significant and potentially complex: that is, whether a voluntary siting process produces a result that is environmentally beneficial. Again, the LLRW SPTF process is instructive. If one assumes that the Deep River expression of interest was ultimately accepted, then the extraction, hauling, transport and disposal of LLRW to a site close to 400-km removed from the source of wastes would result in risks, impacts and costs associated with the transportation of wastes. While these risks, impacts and costs might be considered acceptable in the context of willing host program, it might not represent the most desirable site from an environmental effects perspective. As matters unfolded after the withdrawal of Deep River, the municipalities of Port Hope and Clarington agreed to reconsider establishing facilities for the LLRW. As a result, the risk impacts and costs associated with the long haul to Deep River are now to be avoided, resulting in a possible net environmental and economic benefit to the province. How is this type of potential outcome to be factored in the determination of the acceptability of a willing host site? (*also see premature rejection of alternatives discussion*)

The final potential disadvantage with the participatory approach is found in the criticism that such processes may be questionable on the grounds of fairness in the context of environmental justice. The literature has presented some criticism that voluntary processes are likely to entice disadvantaged communities to accept risks and impacts in return for economic benefits. This was evident in the SPTF LLRW case with the majority of *Phase III* communities being small northern Ontario communities. This notion of potentially “buying” the acceptance of a community raises the concern that communities might not be objective in assessing the advantages and disadvantages of facility siting and end up accepting long-term risks for short-term economic benefits.

In the SPTF LLRW case study, four potential communities remained at the end of *Phase III* - Geraldton, Hornepayne, Port Hope and Deep River. The first two are northern Ontario communities much farther removed from the source of the LLRW than even Deep River. Both municipalities were subsequently eliminated from further consideration on the basis of transportation concerns and costs and/or local public opposition. Both municipalities are experiencing economic challenges and saw the establishment of a LLRW facility as one way to stimulate economic growth. While not necessarily a bad reason to be seeking the establishment of a facility, it does raise the question whether the local communities were objective in their assessment of risks and benefits.

While a participatory approach to siting clearly offers several advantages, there are potential issues that need to be addressed within such an approach. Failure to not address these matters may result in outcomes similar to the more traditional siting processes: that is, after considerable investments of time, money and effort, there is no acceptable site for the required facilities.

One last point deals with the application of voluntary siting process. As demonstrated in the SPTF LLRW case study, only one community proceeded to *Phase IV* of the process. Negotiation with Deep River regarding the terms of an agreement-in-principle unravelled, and Deep River subsequently withdrew from the process; no sites for LLRW facilities were therefore available. This result, unlike the Swan Hills case study, left the proponent with no immediate options.

With only one site remaining prior to reaching an agreement, a lone host community can apply considerable leverage in negotiations. Knowing that it is the only game in town, that municipality can be aggressive in negotiating terms and conditions on all matters including economic benefits. It would seem that there is potential value in negotiating agreements-in-principle with more than one community to ensure that the scope of possible terms and conditions of an agreement are reasonable. There also seems to be merit to replicate the Alberta experience where a handful of communities “competed” against each other to become the host of the management facility.

Summary of Lessons and Proposals to Consider

Based on the case studies, it is clear that the siting of waste management facilities can be difficult and often fail. Two siting processes have been profiled: the traditional approach and the participatory or voluntary approach. Both approaches have advantages and disadvantages; however, the voluntary approach - if properly implemented, may offer the greatest potential for success. Because the approach allows communities to make decisions within the site selection, the likelihood of public acceptance of a proposed facility becomes greater.

The voluntary approach - while potentially providing a high reward for proponents - can also be high risk. If the process fails, there is no site available. Considerable time, money and effort will have been spent with no solution to the defined problem.

Proponents of future voluntary siting proposals will need to consider strategies to address some of the shortcomings of the approach. Strategies will need to include:

- Defining the relationship of the process within Environmental Assessment, proponents should confirm that the approach and legislation are compatible.
- Consideration should be given to balancing the advantages of selecting a willing host community with the potential impacts to the environment. In addition to establishing siting criteria to meet regulatory requirements (e.g. air emission) considerations should also be given to establishing minimum expectations for the suitability of sites regarding other factors such as transportation risks, impacts, costs and benefits.
- Voluntary processes should find ways to accommodate the interests of all residents, municipalities and other interests in the region who would be directly affected by a project. In addition to seeking the acceptance of a host municipality for a project, as demonstrated in the Deep River case study, regional interest need to be included within the siting process and, if possible, at earlier point in the process. Methods need to be developed and explained that will be used to determine the legitimacy of regional participation and what rights are available to these interests within the process.
- Future voluntary processes should strive to replicate the Alberta experience by having the ability to make a choice from among a group of willing host communities. By having a choice, environmental suitability, contingency or fallback sites will be available and the negotiation of benefits can be kept in balance.
- Voluntary processes will need to ensure that all interested communities have a full understanding of the process and the associated risks and benefits. It may be necessary to provide some communities with financial and technical support to effectively participate in the process.
- Given the potential that a voluntary approach may not be successful in the near term, proponents will need to consider whether a contingency process for selecting a site is worth pursuing. If a contingency process is to be used, its form, implementation and rationale will need to be presented and understood at the beginning of the process.

2.3 Public Consultation

All the case studies provide a range of opportunities for public information and public involvement in the site selection processes. As already discussed, the provision of information and the degree of public involvement in the identification and assessment of the alternatives to the undertaking were generally little and few. As demonstrated, the implication of the public not participating in these assessments can result in suspicion and questioning of the alternatives to be sited.

Once again, the siting processes for the four case studies (OWMC, IWA, Alberta and SPTF LLRW) all were designed and implemented to provide comprehensive public information and public consultation opportunities to support the site selection process.

(a) Early Involvement

The IWA, at the outset and prior to its site selection process beginning, developed a *Draft Approach Criteria (DAC)* document, designed to present its proposed approach to site selection and its public consultation program. The DAC document itself was the subject of extensive public consultation across the GTA. Based on comments received, the DAC was revised and essentially served as blueprint for the site selection process.

The SPTF also issued a document at the outset of its process – *Opting for Cooperation* – that informed all of Ontario on its approach to identifying a host community for LLRW. Both the DAC document and the *Opting for Cooperation* document set a new standard for public input into the design of process. This standard has now become common practice in EA and waste management siting.

(b) Content of Public Consultation

The public involvement programs for all case studies essentially consisted of three similar components: (i) provision of project information at key points in the processes to inform on project progress and future activities; (ii) a public consultation component to provide opportunities, input and advice at key site selection decision points; and (iii) a public outreach program designed to build awareness and understanding across the project.

In most cases, the public consultation component was carried out by the project proponent using proponent staff and consultants. In the SPTF, as the process proceeded, the local community liaison committee played a key role in providing information, building awareness and implementing consultation.

Both of the traditional siting processes used a variety of methods for providing information, including press releases, public notices, phase specific progress reports and providing copies of technical reports. The outreach programs consisted of meetings with municipalities, service organizations, community groups, members of the Federal and Provincial legislatures, business interests and environmental organizations and ministries and agencies. The consultation activities consisted of open houses, information centres, library days and public meetings. A series of multi-stakeholder workshops were held to obtain input on the type of criteria to be used in evaluation and their relative significance. In-home interviews and key table meetings for both IWA and OWMC were held with residents in close proximity (up to 3km of the site) to gather socio-economic and agricultural information and to identify impact assessment issues and potential impact management measures.

Both proponents provided funding to assist communities with their review of technical documents and participation in some consultation events.

A few of the consultation methods might be considered as innovative and creative. OWMC conducted walking-tours of the selected site and surrounding areas. The IWA established a *Regional Consultation Network* (RCN) that provided advice to the IWA throughout the site selection process. The RCN role was not as comprehensive as that of the SPTF GLC.

Specific details on the methods used can be found in *Part Two*.

(c) Information and Trust

One of the significant problems within EA and site selection of controversial facilities is the lack of public trust in both the proponents and the supporting technical experts. Often the criticism is levelled that science and engineering is prone to failure and that one should not accept at face value the pronouncements and conclusions of technical experts. Throughout the OWMC process, the failures of technology (the explosion of the Challenger Space Shuttle, Chernobyl and Bhopal) were cited as examples. This criticism was often linked to the safety of rotary kiln incineration. Even though OWMC committed to peer review, elaborate risk and hazard analysis and use of only the best available technology, the distrust and suspicion remained high. This would often frustrate the OWMC technical experts who had difficulty accepting the significance of fear of risks to human health by the public. In response to this concern, efforts were made to present risk assessment and anticipated performance standards of technology in terms that were relevant to the public and responsive to their needs. The lesson for future proponents is to accept as a starting premise that the fears and uncertainty regarding the performance of certain technologies is well founded and must be addressed. Some of the more effective response strategies can include well designed and easily understood risk communications, the use of peer review, and open and honest sharing of experiences of comparable facilities. This advice applies equally to both the traditional and voluntary approaches. The provision of such information in both the Swan Hills and SPTF processes are good examples of effective risk communications.

It is also important that the site selection process evaluations be presented in a way that people can understand, can easily trace the steps, and could - if desired - be able to replicate the evaluation. The OWMC site selection process used three different techniques: qualitative assessment, quantitative assessment, and sensitivity analysis. The IWA used qualitative and quantitative techniques. While each on their own was complex, when the presentations of results are combined, understanding often becomes difficult.

Generally, proponents initiating siting programs understand and appreciate the need to actively engage stakeholders and the public in site selection. For consultation process to succeed, there is a need to provide appropriate events that are responsive to the needs of the public to participate and to influence outcomes. Siting processes need to demonstrate the role public input played in arriving at a decision. This builds credibility and trust with participants. The voluntary approach has this as a fundamental driver of the process and - if implemented well - accommodates this need. The traditional approach leaves the issue of control over the site selection decisions in the hands of the proponent. If there is a difference in values, assessment of significance and balancing of burden with benefits, the result will usually be conflict over the decision. While the voluntary approach has many challenges, as discussed elsewhere in this analysis, the engagement of the public, as designed, may well offer the best opportunity to minimize conflict in the siting of controversial facilities.

Summary of Lessons and Proposals to Consider

Within all profiled site selection processes, comprehensive public information and public consultation programs were designed and implemented. The more effective programs are characterized by the following:

- Timely and comprehensive project information provided to all interested parties.
- The more effective information was provided in terms that were easy to understand; excessive use of technical concepts and terms need to be translated and presented in ways that are responsive to the participants' needs.
- Risk communication is particularly important for the siting of waste management facilities. Risk associated with technology should be presented in relation to situations recognizable by participants.
- All project information should be available and shared with participants. Any attempt to hide or modify information will cast doubt and suspicion as to the proponent's motives.
- Regardless of the siting approach, participants should be given opportunities to participate in the evaluation of all options under consideration. The application and outcome of evaluations need to demonstrate the influence of public input and should be presented in terms that are understood by the public.
- The case studies identify several effective information sharing and consultation activities. Future proponents should review these methods and assess their value and relevance. In particular, consideration should be given to establishing local citizen committees, meeting with participants in smaller groups to develop face-to-face dialogue and sharing information on comparable facilities.

2.4 Drivers of the Site Selection Processes

In reviewing the case studies, it is possible to arrive at some conclusions as to the key drivers or the guiding considerations of the site selection processes. Some of the drivers discussed are common to all case studies: these are presented below. Those drivers that are unique have been discussed above.

(a) Meeting Environmental Requirements

The first significant driver is that all six case studies were guided by the need to site facilities that would meet or possibly exceed all applicable regulatory requirements. All six case studies were highly visible public processes and each established either siting principles and/or evaluation criteria that demonstrated a commitment to achieving regulatory acceptance.

Within the voluntary process, all sites that met specific hydrogeological, hydrological, biophysical, and socio-economic requirements would be considered for further studies and analyses. If the regulatory or prescribed siting standards could not be met, the site was eliminated from further consideration.

Likewise, in the traditional siting processes, a similar high standard for environmental compliance and health and safety was demonstrated in the site selection criteria. In both the IWA and OWMC cases, exceptionally high standards for hydrogeologic and hydrologic suitability of the sites were established. If sites could not meet these standards, they were eliminated from further consideration.

In addition to ensuring that all regulatory requirements are met, some of the case studies were driven by a commitment to exceed the regulatory standards. In the OWMC case, it committed to only use the best available and proven technologies in use at any place in the world, regardless of the regulatory standards in Ontario. This was done in part to demonstrate a responsiveness to public interests and concerns

regarding health and safety matters, but also to ensure that facilities and sites would be able to meet future new regulatory requirements. Similar commitments are evident in the IWA and LLRW case studies with sophisticated engineering back-up systems as contingency in the event of facility breach or failure.

(b) Transportation

A second significant driver within the site selection process was the importance of transportation of wastes to management facilities. As demonstrated earlier, the OWMC site search was narrowed in part to minimize the risks, impacts and costs associated with the transport of wastes over long distances. In the IWA case, preference was given to sites that were close to freeway systems, thus minimizing the number of trucks and their associated noise, air quality and congestion impacts on regional and local roads. Transportation considerations were also important in the SPTF LLRW process and was one of the key reasons for eliminating northern sites during *Phase III* from further consideration: again the rationale related in part to minimizing transportation risks and costs. Further, one of the reasons of not being able to reach an agreement with Deep River was the expression of concern from communities outside of Deep River over the movement of LLRW through towns and villages. Although not explicitly stated, it appears that the part of the rationale for selecting Swan Hills as the preferred site for Alberta's hazardous waste treatment and disposal facilities was the town's relative proximity to Edmonton - the major source of waste generations.

Finally, one of the most significant issues of public opposition to the U.S. DOE Nuclear Repository is concern by the state, municipalities and residents over the transportation of more than 70,000 tonnes of nuclear wastes over long distances from many eastern states to Nevada. Not only have there been concerns expressed over the potential risks of accidents and spills, but also - more recently - concerns have been expressed over the haulage of nuclear wastes being a target of terrorist activity. As expressed earlier, the City of Las Vegas has passed an ordinance prohibiting the transport of nuclear wastes through the city to a repository. The State of Nevada is currently implementing a strategy to lobby Congress to overturn the selection of Yucca Mountain because of heightened risk associated with potential terrorist activity along transport routes (truck and rail).

(c) Avoiding Urban Areas

A third driver in all the site selection processes was the decision to locate facilities in generally rural and sparsely populated areas. Not one of the case studies included potential sites in urban, more densely populated areas. The traditional site selection processes included social and land use criteria that eliminated lands close to populated areas. The Yucca Mountain site was selected in part because it was Federal land with no residences for several miles.

(d) Impact Management Benefits

The last significant driver was a recognition in all case studies that any site would experience some form of perceived and real risks and impacts. As such, benefits needed to be provided to the site community to offset the effects of having the facility. Five of the case studies include a range of impact management measures consisting of mitigation, monitoring, compensation and community benefits. Within the traditional processes, this was provided as a response to predicted risks and impacts and to attempt to secure public acceptance. In the voluntary process, a commitment to benefits was provided at the outset

to offset potential risks and impacts, but also encourage municipalities to consider the advantages of hosting facilities. (See discussions on *Fairness and Impact Management* for more details)

2.5 Fairness in the Siting Process

Much of the discussion to this point has, out of necessity, required reference to matters of fairness and equity. One cannot provide an observation of the strengths and weaknesses of the profiled case studies without touching on these matters.

The literature is heavy with deep analysis of the concepts of fairness and equity within site selection processes. It is not the intention of this paper to summarize the literature regarding theories and concepts. Rather, what follows is an assessment of how the case studies dealt with matters pertaining to fairness.

The traditional siting processes provide several examples of the consideration of fairness. The more significant are presented.

(a) Locational Fairness

In both the OWMC and IWA processes, critical decisions to narrow the site search were made on what the proponents considered to be the basis of fairness. OWMC focussed on the Golden Horseshoe Region of Ontario because this area contained the majority of the provincial waste generators and also possessed the desired hydrogeological conditions to establish treatment and disposal facilities. OWMC thought that it was fair to restrict its search to this area – the area that produced the largest amount of wastes would also have the required treatment and disposal facilities.

In the case of the IWA, in establishing the study areas for landfill, the government restricted the area of search to the boundaries of the regional municipality requiring landfill capacity. Again, the basis of this decision was “fairness” ensuring that the landfill would be placed within the municipality generating the wastes. In this case, no other municipality would have to assume the burden of another. This was considered by the government to be fair.

As both siting processes proceeded, some argued that the siting decisions became profoundly unfair. In particular, it was considered unfair that the selected sites were located in rural areas, removed from the areas of industrial production (OWMC) and removed from the urban areas generating the majority of solid wastes (IWA). It was considered unfair that both OWMC and IWA did not consider alternatives, such as salt mines and already approved landfill capacity in other areas. In both cases, residents and nearby communities argued that these rural areas were being asked to assume an unfair burden - assuming all the risks and impacts of facility location and little of the benefits associated with the economic processes generating the wastes. A similar argument has been made by the State of Nevada with respect to the national nuclear wastes repository, with all of the nation’s nuclear wastes being hauled to one location.

(b) Temporal Fairness

In addition to the concern over locational fairness, the case studies also are instructive on matters pertaining to temporal considerations in particular fairness for future generations.

In the OWMC’s case, the landfill operations as originally proposed would contaminate the underlying aquifers with elevated levels of chlorides but not for at least 600 years. OWMC’s initial position was that

this was an acceptable impact since it would not occur for hundreds of years and anticipated that technological advancements would provide a future solution to the problem.

There were two significant responses to the OWMC position. First, the Ministry of Environment objected by expressing concern that the OWMC proposal would violate the Reasonable Use Guidelines. This action was therefore unacceptable to the MOE. Second, the Board, in its reasons for decision, noted that it would have not allowed OWMC to contaminate the aquifer: it would not approve any action that might compromise the environment for future generations.

Similar arguments have been expressed regarding the Yucca Mountain repository, specifically the burial of thousands of tonnes of nuclear wastes for 10,000 years. Some have expressed concern that this type of management defers ultimate responsibility for the problem to future generations to resolve.

(c) Procedural Fairness

The siting processes also impact on the issue of procedural fairness. Within the traditional siting process, there was both a perceived and real imbalance in information, knowledge and resources. The proponents had siting budgets in the millions, and hundreds of technical experts. The proponents and governments both recognized the existence of this imbalance and provided several remedies. Proponents' experts were made available to present and clarify all technical studies. All analyses and studies were shared with the public and local communities. Funding was provided for the communities to obtain technical experts to review studies and to provide interpretations, comments and advice. Finally, funds were provided for the communities opposed (in the OWMC and IWA cases) to retain lawyers and experts to fully participate in regulatory proceedings. The SPTF process provided funds to support the community of Deep River with site assessment and other studies and negotiating agreements.

In the U.S. nuclear waste repository program, issues with respect to procedural fairness are of great significance. Because of the legislated actions to exempt the U.S. DOE from the requirements of NEPA, the removal of the requirement to site two repositories, and the apparent arbitrary selection of the Yucca Mountain site, the State of Nevada, stakeholders and some members of the public have expressed strong concern that the siting process has been procedurally unfair and they are seeking relief from the U.S. Federal Courts to overturn the siting decision.

Summary of Lessons and Proposals to Consider

The profiling of case studies identifies and assesses the significance of fairness with the traditional siting process. As presented, all three cases: the *OWMC*, *IWA* and *U.S. DOE*, were criticized by some participants as being arbitrary in the decision-making process for site selection. The identification of sites in rural areas was viewed as being unfair when the benefits of the processes generating wastes are in urban areas or other areas farther removed.

Deferring the management or resolution of a problem to future generations was viewed as not only being unfair but also an abdication of the current generation's responsibility for taking effective action.

The imbalance in resources and knowledge between that of the proponent and the community was considered to be procedurally unfair. The power and control rested with the proponents.

In contrast to the traditional siting processes, the participatory or voluntary siting approaches hold significant promise to be both fair and equitable. This process as previously stated was specifically designed to address issues of equity and fairness in siting. The fact that the process allows communities

to decide whether they want a facility or not, addresses many of the fairness and equity issues found within the traditional siting process, particularly regarding locational considerations. There are, however, other issues of fairness that may require attention in future voluntary processes: these have largely been discussed earlier but are summarized here for convenience sake.

- i. **Inclusiveness** – ensuring that the process accommodates the interests and provides rights to any community that might be directly affected by a proposal, including areas that may be outside the host municipality. Voluntary siting processes need to address the matters of who else needs to participate in the decision and the nature of their role and influence vis-à-vis that of the host community. This should be done earlier than the experience of the SPTF process.
- ii. **Balancing Social Acceptability and Environmental Preference** – there is a need to address the issue of balance within the siting process. While the voluntary process has demonstrated that any willing host must meet technical and regulatory criteria, there may also be a need to establish desired minimum thresholds for other environmental, social and cultural considerations. The example of the transportation costs, risks and benefits associated with managing the LLRW at source in the Port Hope area as opposed to transportation of these materials to more remote location is an example of the need to fully consider fairness in addressing the broader and wider public interest in terms of the significance in this example of these additional costs and additional risks.
- iii. **Ensuring Procedural Fairness** – Alberta and the SPTF LLRW set a new standard to ensure that the local citizens liaison committees had complete information on the technologies, site studies and siting process. The standard that was established needs to be maintained in future processes. This is particularly important regarding the potential participation of the smaller, less sophisticated municipalities and the community interests that might participate in the siting approach. To address the concern of taking unfair advantage of certain municipalities, technical information, expertise and funding needs to be provided to ensure understanding and the objective participation in the process.

2.6 Managing Risks and Impacts – Balancing Benefits and Costs

All the case studies with the exception of the U.S. DOE nuclear wastes repository program prepared comprehensive impact management programs. The U.S. DOE is still preparing key aspects of its impact management program. Risk and impact management programs are designed to avoid, reduce or offset the risks and impacts that are potentially associated with the development and operation of a project.

The typical components of *Risk and Impact Management Program* are:

- Mitigation and Contingency Plans
- Monitoring
- Compensation
- Benefits

In three case studies (*Voisey's Bay, SPTF LLRW, and OWMC*), Community Agreements were also developed.

Mitigation of project-associated risks and impacts are standard components of any environmental assessment. For each predicted risk or impact, methods are presented to avoid, reduce or offset the predicted effect. Mitigation happens at the source, at the project site (e.g., sound suppression devices at the facility), as well as occurring at a reception, such as a residence (e.g., triple glazing of windows). All effects that are subject to regulatory requirements will be required to be mitigated. Some proponents –

OWMC, IWA – also were prepared to mitigate many social, cultural and economic effects that are not regulated: examples include assisting with marketing of agricultural products.

Monitoring programs are often included in environmental assessment. Once again, all regulated matters will likely be subject to some form of monitoring to prove or confirm the effectiveness of mitigation in managing predicted effects. Air, water, groundwater, and noise will normally be monitored. Again, several of the case studies proposed monitoring that went beyond the monitoring of regulated matters including bio-monitoring of agricultural crops and wildlife, property values, transportation volumes and community character and cohesion.

The OWMC, IWA and SPTF LLRW also proposed a range of **compensation** measures to offset potential risks and impacts: examples included compensation for any damages caused, tax abatement and property value protection. At the community level, equity related compensation included local purchasing and hiring policies, tax abatement, tipping fees and royalties, co-use of the facility, scholarships, grants to community programs and services and enhancement of local infrastructure, local roads and emergency preparedness and response.

Finally, the Risk and Impact Management Program included a range of community related measures including the establishment of community liaison and monitoring committees, compliant procedures, hotlines and claim resolution.

Community Agreements in Principle (CAP)

In the OWMC and SPTF LLRW, community agreements-in-principle were negotiated between the proponent and the local communities. As already described, neither was implemented since the development of facilities in West Lincoln (OWMC) and Deep River (SPTF LLRW) did not proceed. INCO, through its subsidiary VBCN Ltd., did successfully negotiate a community agreement with Aboriginal communities in Labrador.

The contents of the negotiated Community Agreements are profiled in *Part Two*. While these specifics vary, the agreements generally included provisions on the following:

- > Commitments to Mitigation and Monitoring Programs
- > Economic Benefits
 - hiring
 - local purchasing
 - grants in lieu of taxes
 - community grants
- > Community Relation Measures
- > Royalties or Tipping Fees
- > Dispute Resolution

No details are available as to the terms of the VBCN/Labrador agreement, as it is held as confidential, no details as to the terms of the agreement are available.

The role of benefits in the voluntary site searches is to be noted. Alberta and the SPTF LLRW, in initiating these processes, indicated the prospects of economic benefits for a host community with no or limited determination of the specifics. As the SPTF LLRW progressed through its stepwise process, provided further information on economic benefits, but it was not until *Phase IV* and the negotiation on the community agreement-in-principle that the specifics of the economic benefits were discussed.

The negotiations on the economic benefits for Deep River played a role in the ultimate withdrawal of the municipality from the process. The concerns of the surrounding areas in not having access to the same potential benefits as Deep River has already been discussed and is not repeated. Discussion on this can be found in *Section 2.3* above. The discussion as it pertains to Deep River follows.

Disputes emerged in the negotiation of the Agreement-in-Principle over the details of the compensation and employment benefits package that the Deep River Town Council wanted to guarantee in the final agreement. In the negotiation of the Agreement-in-Principle, the section on economic benefits outlined the security of medium and long-term employment. This became an issue of contention since the demands of the town were not in line with that of the federal government and was not able to guarantee that which was requested by the municipality.

The only real example from the case study as to the actual economic benefits to a municipality is the Swan Hills example. In the Alberta case, most of the communities that stayed in the process did so in part because of the perceived economic benefits of hosting the facility. However, it should be stressed that other than the promise of new local jobs and a significant tax assessment that would result directly from the facility development, there was no explicit offers of community compensation. Therefore, the strongest expression of interest came from smaller communities, where the benefits per capita were magnified.

Benefits to the town of Swan Hills commenced with plant construction when some 150 construction workers were housed and fed locally. Various other benefits have been realized by the town including economic diversification, increased population (approximately 120 new residents), increased local employment (60 positions at the treatment center), construction of new homes (18 houses, 17 townhouses), increase tax base, upgraded local utilities, and improvements to the local tourism industry.

In addition to above mentioned benefits, the province established a fund, held by independent third party, to assure perpetual care of the landfill site following its eventual closure and to cover twenty years of monitoring.

Summary of Lessons and Proposals to Consider

There is an expectation that proponents will provide a comprehensive Risk and Impact Management Program to address the potential effects of facility development and operation. The Risk and Impact Management Program normally consists of mitigation, monitoring, community relations, compensation and economic benefits. In the case studies, four proponents negotiated community agreements, two of which were not implemented because the project did not proceed. In one case, the negotiation on the economic benefits of the agreement was the cause of the project failure (SPTF LLRW). In the INCO/VBCN project, an agreement was reached but the details of the program are not available. In the Swan Hills case, the project was implemented and the community of Swan Hills is participating in the economic benefits of facility operation.

As a final comment, a few observations on the SPTF LLRW and Deep River are made below.

Once Deep River was selected as the preferred community, the focus for the SPTF was then on putting together a suitable benefits package to ensure local support for the LLRW facility. As stated, the federal government and local officials were unable to come to agreement on the CAP job assurances in the mid- and long-term. In hindsight, the Task Force recommended that in the early stages of the Cooperative Siting Process, it would have been beneficial if communities had understood what was in it for them at the outset. In *Phases One and Two* of the SPTF process, the equity packages and impact management agreements had not been drafted. It appears that it was difficult to ask curious residents to “trust the process” to develop acceptable benefits packages. Perhaps, if consideration was given in the early stages

as to what communities would want and what the federal government could offer, the result of the SPTF LLRW siting process may have been different.

3.0 Potential Guiding Principles for the Implementation of the NWMO Used Fuel Management Approach

Based on the lessons learned from the review of these case studies, a set of potential guiding principles can be developed to assist the NWMO with the implementation of the selected used fuel management approach.

Siting Process

- NWMO should consider adopting the voluntary siting approach for the implementation of the selected used fuel management approach. The voluntary siting approach is to be preferred to the more traditional siting approach, as it appears to offer the greatest potential for generating community acceptance and potential for a successful outcome. This approach should be fully described and shared with the geographic areas of interest to the NWMO. Communities and stakeholder interests should have an opportunity to review and comment on the NWMO approach at an early stage of implementation.
- The NWMO should also consider establishing a contingency process in the event that the voluntary approach is not successful in the near term. This contingency process should also be shared with the public when the timing is appropriate.

Scope

- In order to help ensure that any voluntary siting approach is designed and undertaken consistent with environmental assessment requirements, discussions should be held with the federal authorities with responsibilities under CEAA, to identify and address legal issues associated with the implementation of the voluntary approach before it is initiated. Once applied, the siting process should be undertaken in a manner that should promote rational decision-making, rigor, and traceability.

Solicitation of Volunteer Communities

- Prior to expressing an interest in being a potential volunteer community, communities across the NWMO geographic areas of interest should be asked to participate in a NWMO outreach program which should provide communities and stakeholders with information on the character of the facility, anticipated impacts associated with the facility, associated mitigation strategies, the type of impact management measures that could be available and roles and responsibilities of the proponent, various authorities, communities and stakeholders.
- Municipalities should be able to indicate an expression of interest in the long-term management facility without binding themselves to ultimately accepting the facility.
- As communities identify themselves as volunteer communities, they may or may not identify specific candidate sites. If no site is specified for a given

volunteer community, a local site selection process should be initiated. This site selection process should be undertaken in partnership with the municipality that has volunteered. The NWMO and the community would then need an agreement to proceed to the next step in evaluating the feasibility of the candidate sites.

***Human Health and
Environmental
Protection***

- Minimal environmental acceptability standards of a management facility should be established which must be met, irrespective of the willingness of the community, in order to ensure the safety of human health and environment. Minimal expectations for the suitability of sites may also be established for other factors such as transportation and cost, as well as social and cultural considerations.
- A community should have the right to have input to the selection of technical alternatives for implementation of the management approach, and impact management measures which meet standards and community expectations.

Technical Support

- The potential host community should not be asked to make a decision about their willingness to accept a management approach until after they have had the opportunity to obtain their own scientific and technical information. Funding should be provided to municipalities, communities and interest groups to hire their own technical advisors to ensure that local interests are protected and to facilitate the development of a relationship between the NWMO and the public that is built on trust.

Consultation

- The NWMO should seek opportunities to maximize the effectiveness of communication with and within the potential volunteer communities.
- The NWMO should assist each of the volunteer communities establish Community Liaison Committees. The Community Liaison Committee should work with the NWMO to help ensure that the principles for community participation are agreed to and the scope of community participation is understood. Therefore, decisions made by both the NWMO and municipality are based on a comprehensive understanding of the issues and interests. The Community Liaison Committee should be expected to develop a decision-making and interest balancing structure through the establishment of guidelines that should govern the functioning of their committee.
- NWMO should coordinate consultation activities through the Community Liaison Committee. Public consultation activities should be carried out in a manner that should provide to interested parties timely, clear, accurate and meaningful project information. While technical information should be available to those who want it, information should be taken out of a technical framework and put into a context that members of the public can relate to. If participants identify specific information needs, there should be sufficient flexibility in the process and schedule to allow unanswered questions to be addressed.

***Determining
Willingness***

- Efforts should be made to communicate risk information in a manner that is understandable to participants (e.g. compared to risks that they are familiar with in day to day life).
- The siting process should consider the interests of any community that might be directly affected by the proposal, including areas that may be outside of the host municipality. NWMO should consider other municipalities that are potentially impacted by the used fuel management approach. This should be determined within the environmental assessment studies.
- Recognizing that the site selection process in and of itself can cause community impacts and division, the NWMO should conduct itself in a manner that does not exacerbate divisions within communities.
- Input obtained through public consultation processes should be documented such that it can be demonstrated how this input has been used by NWMO.
- The NWMO should require a council resolution to accompany an expression of interest to explore consideration as a volunteer community. A second resolution should be required later in the volunteer process defining ongoing commitment to remaining as a volunteer community.
- The NWMO should encourage the community and stakeholders to decide, early in the process, who should participate in the decision on ‘willingness’ and the nature of their role vis a vis that of the host community.
- The community should decide for itself what constitutes “willingness” or community support for the project.

***Risk and Impact
Management
Program***

- Recognizing that a community or communities should be accepting a facility for which benefits should accrue to a larger population, the agreement should allow the imbalances to be redressed. Benefits in the agreement may be in the form of royalties, tax abatement, co-use of facility (e.g. research centre), scholarships, grants to community, economic development, local purchasing and hiring policies, infrastructure upgrades and/or other measures identified by the potential host communities. The discussions on benefits should move from considerations in principle (e.g. providing the community with direction on what can and can not be accommodated) to specifics as the siting process progresses.
- As one or more volunteer sites are selected for further studies and investigations, negotiations should be held on issues such as compensation. The community should decide who should “negotiate” on their behalf as part of a specially constituted bargaining committee, which should include representatives from the municipality and individuals in the affected impact zones.
- The NWMO should put measures in place to facilitate the development and

functioning of a community monitoring committee once the facility is in place.

Final Decision

- Assuming there are multiple volunteered sites, NWMO would need to make a decision as to which volunteered site is most preferred. This decision should be based on a framework that clearly outlines the factors associated with the technical suitability and public acceptability (assuming all sites meet technical and environmental acceptability thresholds).

Part Two: Appendices
Profiles of Case Studies

**A Review of
Waste Facility Siting Case Studies
Applicable to Spent Nuclear Fuel
Management Facilities and Associated
Infrastructure**

- Appendix A: Ontario Waste Management Corporation**
- Appendix B: Interim Waste Authority**
- Appendix C: Alberta Hazardous Waste Management**
- Appendix D: Siting Task Force for Low Level Radioactive Waste**
- Appendix E: United States Department of Energy Nuclear Waste Repository**
- Appendix F: INCO Voisey's Bay project**

Appendix A

**Review of the
Ontario Waste Management Corporation
Environmental Assessment for
Hazardous Waste Management Facilities**



1.0 Introduction

The Ontario Waste Management Corporation (OWMC) was established in 1981 as a Crown Corporation by the Government of Ontario to establish and manage a hazardous waste treatment facility on government owned land at South Cayuga, Ontario. After initial investigation and testing, OWMC rejected the site due to hydrological and hydrogeological deficiencies.

The OWMC then embarked a five-phase Facilities Development Process (FDP). The FDP, which was initially exempted from the requirements of the *Ontario Environmental Assessment Act*, focussed on identifying a preferred site(s) for treatment and disposal facilities. A key component of the FDP was a comprehensive public information and public consultation program.

OWMC focussed its site search for physical treatment facilities, incineration facilities and a landfill to the Golden Horseshoe Region of the province for two significant reasons: firstly, the Golden Horseshoe and surrounding areas possessed approximately 70% of all hazardous waste generation in the province; secondly, it also possessed the desired hydrogeologic setting for establishing treatment and disposal facilities. The site selection process included a series of multi-criteria evaluation steps to progressively narrow the search to a preferred site in the Township of West Lincoln in the Region of Niagara. The evaluation of the potential sites considered the risks, environmental impacts and costs associated with facility development and operations. A comprehensive site assessment was completed for the West Lincoln site and impact management measures consisting of mitigation, compensation and monitoring were developed. A Community Impact Agreement was negotiated with the Township of West Lincoln.

In 1985, the OWMC's exemption from the Ontario Environmental Assessment Act was removed. As such, the OWMC was required to submit a full environmental assessment, including an assessment of alternative means to the undertaking, in 1991. At the Joint Board hearing, the OWMC Environmental Assessment was rejected. In its reasons for decisions, the Joint Board found that OWMC evaluation of alternative waste management systems - in particular the possible disposal of treated waste residues and associated chloride residues in a salt mine at Goderich, Ontario - had the potential to be preferred to the West Lincoln site. As a result, the Joint Board found that it could not accept the environmental assessment and did not approve the OWMC undertaking. Shortly after the Joint Board's decision, the Ontario Government dissolved the OWMC.

2.0 The Proponent and project Background

The proponent, the Ontario Waste Management Corporation (OWMC), was a provincial Crown Corporation, created in 1981 by the Ontario Government under the Ontario Waste Management Corporation Act (the *OWMC Act*).

Under the *OWMC Act*, OWMC's objectives were:

- 3.1 3(a) to research, develop, establish, operate and maintain facilities for the transmission, reception, collection, examination, storage, treatment and disposal of wastes including sewage; and
- (b) to perform such other duties as may be assigned to it under this or any other act.

Although the Act does not refer to the nature of the waste that the OWMC was to concern itself with, it was clear from (among other things, including various Orders in Councils) that the OWMC was expected to manage liquid industrial and hazardous waste.

Section 15 of the *OWMC Act* exempted OWMC from the *Environmental Assessment Act (EAA)* and the hearing requirements under the *Environmental Protection Act (EPA)* and the *Ontario Water Resources Act (OWRA)*. This exemption was important and had a profound impact on OWMC's approach and activities; it also and played a key role in the final outcome of OWMC's efforts.

The *OWMC Act* directed OWMC to follow policies formulated by the Lieutenant Governor in Council. A number of Orders in Council relating to OWMC were made in the early 1980s. Order in Council 87/81 stated that wastes were not being adequately treated because of a shortage of appropriate facilities, that there was a pressing need to establish facilities for the treatment and disposal of liquid industrial and hazardous waste, and that the types of facilities required included storage, physical/chemical treatment works, solidification works, incineration works, and a secure landfill site. The Order in Council went on to direct OWMC to establish waste management facilities at a site in South Cayuga, Ontario, if that was an appropriate site, and, if not, to find another location where facilities could be safely established. A three-person hearing panel was established to consider OWMC's proposed facilities.

OWMC investigated the South Cayuga site, and rejected it for hydrogeological reasons in November 1981. OWMC then began a five-step Facilities Development Process (FDP) to find a safe site and facilities suitable for waste treatment and disposal. It had essentially completed the process of selecting a site for its facility/ies when its exemption from the *EAA* was removed by the Government of Ontario in July 1985.

In September 1985, OWMC announced its selection of a site for its facility, in the Township of West Lincoln, in the Regional Municipality of Niagara.

OWMC's original intention was to submit its environmental assessment in two stages: the "Plan Stage EA" and the "Implementation Stage EA." The Plan Stage EA was submitted to the Ministry of the Environment and Energy (MOEE) Environmental Assessment Branch and Environmental Approvals Branch in December 1986. It was rejected. The MOEE required a full EA submission, rather than not a submission in two parts.

OWMC submitted its revised EA document in November 1988. An Addendum, relating to a planning program for waste collection and transfer facilities, was submitted in March 1989. The government review of OWMC's EA document was released in September 1989. A Joint Board was established to conduct hearings on OWMC's EA.

OWMC sought various approvals under the *Ontario Environmental Assessment Act (EAA)*. There are two steps to an *EAA* approval: the first is acceptance of an environmental assessment. If the environmental assessment is accepted, then a decision whether approval to proceed with the undertaking is required.

In 1985, when the *EAA* exemption was removed from OWMC's activities, it became necessary for OWMC to submit an EA that met the requirements of *Section 5(3)*.

Sub-section 5(3) describes the contents of an environmental assessment:

- 5(3) An environmental assessment submitted to the Minister pursuant to sub-section (1) shall consist of,

-
- (a) a description of the purpose of the undertaking;
 - (b) a description of and a statement of the rationale for,
 - (i) the undertaking,
 - (ii) the alternative methods of carrying out the undertaking, and
 - (iii) the alternatives to the undertaking;
 - (c) a description of,
 - (i) the environment that will be affected or that might reasonably be expected to be affected, directly or indirectly,
 - (ii) the effects that will be caused or that might reasonably be expected to be caused to the environment, and
 - (iii) the actions necessary or that may reasonably be expected to be necessary to prevent, change, mitigate or remedy the effects upon or the effects that might reasonably be expected upon the environment.

by the undertaking, the alternative methods of carrying out the undertaking and the alternatives to the undertaking; and
 - (d) an evaluation of the advantages and disadvantages to the environment of the undertaking, the alternative methods of carrying out the undertaking and the alternatives to the undertaking.

The *EAA* provides direction to the Minister and to the Board about the decision regarding the acceptance of the environmental assessment:

8. The Minister in determining whether to accept or to amend and accept an environmental assessment shall consider the purpose of this Act, the environmental assessment submitted to the Minister, the review thereof, the written submissions, if any, made with respect thereto, any reports required by and submitted to him or her, and any further review that the Minister has caused to be prepared.

Where the matter is referred to a Board for hearing, the Board also takes into account all of the evidence adduced at the hearing. *EAA* hearing panels and joint boards have held that the “environmental assessment” includes not only the environmental assessment document, but also all of the evidence adduced at the hearing.

A Joint Board was established to conduct a hearing on the OWMC EA, whether it should be accepted and whether approval to proceed with the undertaking should be granted. The two-year hearing included interventions from several parties opposed to the OWMC proposal. Those opposed included the Township of West Lincoln, the Region of Niagara and a non-government organization - the Ontario Toxic Waste Coalition. In addition, Laidlaw Wastes Services, a manager of hazardous waste also intervened in the hearing in opposition to OWMC.

The Ontario Ministry of Environment also participated in the hearing.

The Joint Board in reviewing the Environmental Assessment and the evidence presented at the hearing did not accept OWMC’s EA. The Board found that the EA was deficient in its treatment and evaluation

of alternative management systems. With EA not being accepted, the Board did not approve OWMC's undertaking. As a result of this decision, the Government of Ontario dissolved the OWMC.

3.0 The Need for the project

One of the key issues in OWMC's EA was whether in fact a need actually existed for the establishment of treatment and disposal facilities. Considerable research was undertaken to determine how much hazardous waste was generated in the province of Ontario and what amount of the waste would require treatment and/or disposal at OWMC's proposed facilities.

It was OWMC's position that at least initially 150,000 tonnes per year of hazardous wastes may require treatment at its facility. This consisted of 120,000 tonnes requiring physical/chemical treatment and 30,000 tonnes requiring incineration. Evidence submitted by the parties opposed to the OWMC questioned whether there were sufficient wastes to warrant the establishment of facilities. The Joint Board conducting the hearing after reviewing the evidence of all the parties to the hearing found that the wastes likely to require treatment were approximately 60,000 t/a: 30,000 t/a requiring physical/chemical treatments and 30,000 t/a requiring incineration. The Board, however, was prepared to approve the 150,000 tonnes/year capacities sought by OWMC, indicating that the provision of excess capacity did not represent an environmental disadvantage.

The Joint Board also found that there were compelling policy reasons, as submitted by the Ontario MOE, for a publicly owned and operated facility. These reasons were:

- 1) to provide a secure treatment and disposal capacity for the province;
- 2) to protect Ontario from the vagaries of the waste management marketplace;
- 3) to ensure the ability to manage all types of wastes within Ontario; and
- 4) to ensure sufficient capacity to manage contingency/unforeseen wastes.

4.0 Alternative Means to the Understanding and Alternative Methods

OWMC's preferred alternative was to establish its treatment and disposal facilities in an integrated way on one site in the Township of West Lincoln. The facilities would consist of various physical/chemical treatments, rotary kiln incineration and landfilling of treated waste residues. These are the facilities that were initially proposed for the abandoned South Cayuga site (see *Section 2.0*).

Early in OWMC's Facilities Development Process, and prior to the selection of a preferred site, it did examine the possible use of other types of treatment facilities and other types of disposal methods. These early studies assessed the environmental, technical and cost advantages and disadvantages associated with different treatment methods and the disposal of treated waste residues in deep wells, above ground storage (warehouses), different types of landfill, geologic isolation (in bedrock and salt deposits) and placement in mined-out space. While the assessment of these options identified possible advantages with disposal in mined-out space and salt mine deposits, these options were subsequently rejected by OWMC as not offering significant advantages over disposal of residue in landfill within consistent and deep clay settings. It is important to note that the evaluation of these disposal options occurred in parallel with the site selection process and prior to the application of the Environmental Assessment Act to OWMC. The site selection process focussed on siting facilities within the Golden Horseshoe Region of Ontario since this region also possessed the large majority of hazardous waste generators and also the appropriate hydrogeologic settings deemed by OWMC as suitable locations for treatment facilities and landfill. The

Golden Horseshoe region did not possess any mined-out space or salt deposits and as a result, these disposal methods were not considered as potential disposal options within OWMC's site selection process.

When OWMC was placed under the Ontario Environmental Assessments Act, it was required to conduct a comprehensive assessment of alternative means. This assessment took place after the selection of a preferred site in the Township of West Lincoln.

The assessment of alternative means included an assessment of a fully integrated facility with disposal facilities at various site locations outside of the Golden Horseshoe, including disposal of residues in salt mines in Windsor and Goderich. The potential for disposal in salt mines outside of the Golden Horseshoe proved to be the significant consideration in the Joint Boards' decision to reject OWMC's EA (see *Section 5.0*).

Alternatives (both alternative means and methods) were evaluated according to their potential effect on the environment as defined by the *EAA*. Within the Environmental Assessment, OWMC undertook dozens of evaluations of alternative systems and alternative methods including:

- systems configuration;
- physical chemical treatment technologies;
- incineration technologies;
- disposal technologies;
- solidification technologies;
- sites within the preferred candidate region;
- opportunity areas outside the candidate region;
- site specific configurations;
- transportation methods;
- access routes; and
- operating procedures.

OWMC's approach to the evaluations of alternatives consisted of the assessment of potential effects based on a series of criteria linked to one of four goals:

- minimize risk to human health;
- minimize impact to the environment;
- enhance the waste management system in Ontario (the provision of service); and
- minimize financial costs to OWMC and to the people of Ontario.

The goals were ranked in the following order of importance: risk, impact, service and cost. OWMC's evaluation framework used this ranking of goals to assist with the analysis of trade-offs associated with potential effects. Therefore, preference in selecting an alternative would be given to the alternative that best managed risk to human health.

From the goals, OWMC developed evaluation factors, indicators and objectives to use in its evaluation of alternatives. Factors are described as the detailed criteria used to compare options. Within the evaluation framework, OWMC ranked factors to establish their relative importance in the evaluation.

Most of the evaluations within the EA were qualitative assessments of advantages and disadvantages. For more complex evaluations, quantitative aggregation procedures were used as cross-checks of the qualitative evaluation.

5.0 Site Selection

The following is a synopsis of the OWMC site selection process. OWMC used a five-step process to select its preferred site. This five-step process was guided by a number of key environmental assessment principles:

- progressive increase in detail in the decision-making process;
- broad definition of the environment;
- protection of human health and the environment;
- the involvement of those affected;
- efficiency and effectiveness of the process;
- consideration of mitigation at major decision points;
- adequacy of procedures and methods;
- a second natural level of protection of the environment;
- likelihood of suitability;
- maintenance of choice; and
- the consideration of system component failure.

Step 1: Identify a Preferred Geographic Region

The two reasons for OWMC to select the Golden Horseshoe Region of the province of Ontario as the preferred region for treatment and disposal facilities are defined below.

Step 1 identified lands in Southern Ontario where the geological and hydrogeological conditions offered a higher probability of locating suitable sites for OWMC facilities. These lands were termed Zones 1 and 2, and OWMC determined that it would concentrate its search for sites in these zones. These hydrogeologic zones offered the highest level of confidence for placing facilities on deep and consistent clay deposits, which, in turn, offered the highest level of natural protection for groundwater resources from contamination. By focusing on these zones, a second natural level of protection, beyond that provided by engineering features designed in the facilities, would be built into the site search and selection process.

Zones 1 and 2 within the geographic region of the Golden Horseshoe are in an area at the west end of Lake Ontario from Milton to Niagara Falls. This area and surrounding areas were where approximately 70% of Ontario's special waste was generated. These areas were selected as the preferred geographic regions for a site. The combination of the desired hydrogeologic setting and the concentration of waste generation (thus reducing transportation/risks and costs) in the same region caused OWMC to narrow its search for a site to the Golden Horseshoe.

Step 2: Identifying Candidate Areas Within Zones 1 and 2

Step 2 of the site selection process was the identification of candidate areas within the hydrogeologic zones of the candidate region. The intent of this step was to identify areas within the selected region that offered a strong potential for siting the treatment and disposal facilities. The selection of candidate areas was guided by the following siting considerations:

- > **The need for a second natural level of protection of the environment** beyond that provided for by the design and operating procedures of the facility component.
- > **Likelihood of suitability.** Because the risks, environmental impacts and costs factors addressed at this stage were at a broad regional scale, the suitability of a selected candidate area could only be expressed at this stage as providing a likelihood or probability of suitability. Any area selected would be subject to later, more detailed investigations.
- > **The maintenance of choice.** As decisions on exclusion of lands were made, there needed to be an assurance at each step of the process that no significant or unique alternatives were being discarded.

Based on these considerations, OWMC identified a list of twenty candidate areas within the Zone 1 and 2 hydrogeological region settings for the Candidate Region.

Step 3: The Identification of Candidate Sites Within Candidate Areas

Step 3 of the site selection process was the identification of candidate sites.

The Identification of Site Areas

In this step, smaller areas, called site areas, were identified within the larger candidate areas. To identify these site areas, data were first collected within the candidate areas on a long list of risk, environmental and cost factors. Risk factors included hydrogeology, air, surface water and transportation. Environmental factors included agriculture, natural environmental features, social and land use and economic considerations. Certain factors were then identified as “exclusionary” (i.e., factors that should rule out certain areas from further consideration). An example of an exclusionary factor was Class 1 soil capability for agriculture. These exclusionary factors were then mapped and certain areas excluded, and site areas free of those exclusionary factors were identified. This technique resulted in the identification of a large number of potentially suitable site areas for examination in greater detail.

The Identification of Potential Sites Within These Areas

The next stage involved “screening” the identified site areas and further reducing them in size and number using additional environmental, risk and cost factors to identify a long list of potential sites.

Comparison of Potential Sites and Identification of Candidate Sites

The final stage compared the potential sites, using even more factors, and then reduced them to a short list of eight candidate sites.

Step 4: Identification of a Preferred Site

Eight sites were thoroughly studied and compared. Site-specific assessments of each site included hydrogeological drilling, complete biophysical inventories and assessment, air modelling, socio-economic studies, agricultural studies, transportation studies and site-specific risk assessment. A series of detailed comparative criteria and indicators were developed and applied to each site.

OWMC selected the rural West Lincoln site over an industrial site in Niagara Falls. It was OWMC’s position that the risk advantages (hydrogeological and air quality) offset the transportation and environmental impact advantages (social, land use, agriculture) offered by the Niagara site. As a result, the West Lincoln site was identified as OWMC’s preferred site for a fully-integrated treatment and

disposal facility. The West Lincoln site was then subjected to more intensive site-specific studies (risk, environmental and cost) to confirm the technical acceptability of the site.

Reviewing the Selection of the Preferred Candidate Region

OWMC's earlier decision to confine its site search to the Golden Horseshoe was subsequently reviewed on two occasions: in the Candidate Region Review (CRR) in 1987/1988 and the Canadian Region Review Refinement (CRRR) in 1990/1991. These reviews were conducted as a result of public, ministry and agency comments on the draft environmental assessment, particularly the need to revisit the earlier siting decision as a result of new information regarding the volumes and distribution of wastes generation.

The purpose of the CRR was to address the question of whether there were siting opportunities outside the Golden Horseshoe Candidate Region that may be more suitable than West Lincoln. Using the same siting approach as that for the identification of candidate areas in the Golden Horseshoe, OWMC identified six "Opportunity Areas" that appeared to hold promise for the siting of a facility, and it compared those areas to West Lincoln by conducting multiple criteria (risk, environmental and costs) and both qualitative and quantitative evaluations. The results of the CRR evaluation identified a potential site in the St. Thomas area as possessing characteristics that were very close to West Lincoln.

OWMC's conclusion, however, of the CRR was that none of the siting opportunities identified ought to be pursued. The OWMC felt that while the St. Thomas/Aldborough site was similar to the West Lincoln site, there was no information to suggest that it would be better from a risk and environmental impact or cost perspective.

The CRR (1987/1988) was superseded by the CRRR (1990/1991). OWMC undertook this study because of further public review and ongoing comments on the Environmental Assessment. The CRRR was a similar exercise to the CRR, but there were a number of modifications, the most significant of which was that more specific hydrogeology criteria and updated transportation analysis were used in the evaluations. The use of hydrogeology in the comparative evaluation of the St. Thomas area to West Lincoln had the effect of significantly downgrading the potential suitability of the St. Thomas area. The hydrogeologic assessment of the St. Thomas area, which gave it the lowest suitability assessment possible, was challenged by the parties opposed to OWMC. The Joint Board's decision also expressed concern about the fairness of the assessment, but ultimately accepted OWMC's position (as it related to the acceptability of a fully-integrated facility at St. Thomas) over a site at West Lincoln. The Board found that it was unlikely that one could find a better site for such an integrated facility outside of the Golden Horseshoe Candidate Region.

Alternative Waste Management Systems Evaluation

The Board, in its reasons for decision, went on to consider whether the CRRR established a basis for reconsidering the assessment of alternative waste management systems. In particular, a partially integrated or dispersed waste management system involving disposal in an existing salt mine was considered. The Board, using the analysis provided by OWMC in the CRRR, and considering previous evaluation of alternative waste management systems by the OWMC, found that the potential existed for an alternate system with treatment facilities at potential sites in Southwestern Ontario. The Joint Board concluded that the CRRR did not demonstrate that such a system did not have merit. The Board gave three reasons: first, the Board doubted that the hydrogeologic concerns identified at the St. Thomas area would not be as significant if no landfill were proposed for St. Thomas; second, the Board accepted the evidence of the parties opposed to OWMC's witness on hydrogeology, that an alternative approach to siting treatment facilities would open up further areas (that is, in addition to St. Thomas) in Southwestern Ontario for consideration as potential sites for physical, chemical treatment and incineration facilities. Third, the CRRR, by its nature, did not take into account the relative advantages and disadvantages of a salt mine disposal system versus a landfill disposal system.

The Relationship Between the Systems Evaluation and Site Selection

A primary reason for the Board not accepting OWMC's *EA* was that the disposal of treated residues in a landfill would ultimately result in excessive levels of chlorides in underlying groundwater aquifers.

At the time of its *EA* submission, the OWMC had not completed all laboratory studies about the potential effects of landfill leachate. Once available, the results confirmed that residue organics and heavy metals would be captured by underlying clays and would not contaminate groundwater. However, because most of the treated wastes were to be solidified in a cement process, it was predicted that over time (but not for at least 600 years), landfill leachate would enter the groundwater. The leachate would, in 600 years, contain high levels of chlorides which would make the bedrock aquifer unusable for drinking water purposes. Further, the levels of chlorides in the aquifer would exceed the MOE's Regulatory Requirement for Reasonable Use of groundwater resources.

As a result, OWMC was required to identify and assess other methods of managing the landfill chlorides. OWMC, after evaluating ten options, decided that the preferred alternative was to extract the chlorides before entering the landfill and to reuse the extracted salts in various commercial processes and/or deep well injection disposal of the remaining salts.

The OWMC's decision to extract and manage the chlorides had a significant impact in the mind of the Joint Board. The fact that the landfill disposal could not contain the chlorides, and the additional cost associated with the extraction of the chlorides, provided a basis for re-considering disposal of waste residues in mined salt deposits. It was the Board's finding that when the chlorides problem was factored into the comparison of relative advantages and disadvantages of disposal in salt mine vs. disposal in landfill, that the potential existed for salt mine disposal to be preferred to landfilling. With this as a possible preference, the assessment of the system option evaluation by OWMC was considered to be deficient and as a result, the OWMC *EA* was not accepted by the Board. The joint Board found that the *EA* did not provide a comprehensive comparative evaluation – an evaluation that took into account all of the relevant factors of both “systems” and siting – of the most promising alternative(s) to the OWMC proposal, which in the Board's findings appeared to be disposal in salt mines at Goderich, Ontario with treatment facilities sited at the most promising location(s) in southwestern Ontario.

One last significant finding of the Board is noteworthy. The Board found that based on the evidence from the environmental risk and impact assessment of facilities development and operations at the West Lincoln site, the Board was satisfied that a fully integrated system consisting of landfill disposal was the best management system. In that case, the placement of these facilities at the West Lincoln site would be acceptable. The Board went on to state that the identified risks and impacts of facilities at West Lincoln, when compared to the broader province-wide advantages of establishing treatment facilities, offset the potential disadvantages of the West Lincoln site.

Public Consultation and Key Public Issues

A key consideration of the OWMC siting process was to ensure high levels of public awareness of OWMC activities and a wide range of opportunities for public involvement in the siting process.

The OWMC was born as a result of expressions of public concern over the province's decision to establish hazardous wastes treatment and disposal facilities on government owned land at South Cayuga. This decision was taken with virtually no public involvement and came as a surprise to local residents and politicians. Massive public protests in the form of meetings and demonstrations resulted.

In response to this public protest, the government established the Ontario Waste Management Corporation as an arms length organization of government to oversee the development and operation of the South

Cayuga site. When the OWMC rejected the South Cayuga site due to hydrogeological and hydrological deficiencies, a five-step Facilities Development Process (FDP) was developed. The FDP was only developed after a series of meetings with non-government organizations, advisory groups, business and municipal representations.

Throughout the FDP, OWMC provided information at each key decision points. This information, in the form of FDP progress reports, provided a review of the actions taken by OWMC and the rationale for actions taken. Included in each progress report was a list of the opportunities for public involvement in the FDP, issues raised and OWMC's responses. A key component of the FDP design was how to best involve the public in the siting process.

At the outset of the FDP, the OWMC established a provincial Advisory Group largely made up of environmental, agricultural, municipal and business interests to provide advice and guidance on the FDP. It is important to note that the Advisory Group served more as a sounding board for OWMC proposals and it did not have any specific decision-making authority.

In addition to the provision of reports and the provincial Advisory Group, OWMC developed and implemented a fairly ambitious public outreach program. This program consisted of public meetings, participation in various symposia and conferences, newsletters, videos, press briefings, speeches, meetings with government officials and politicians – all designed to build awareness of OWMC, the nature of hazardous waste management in the province and the potential methods to best manage the waste. The outreach programs occurred at several levels with provincial, regional (Golden Horseshoe) and local (Niagara) governments.

Within the FDP, OWMC identified a wide range of public consultation events designed to engage residents, municipal officials, interest groups, business and others with an interest in the siting process.

Throughout the FDP, OWMC held hundreds of organization-specific meetings; several dozens of public meetings to announce key decisions and to explain reasons for the decisions; and dozens of workshops with interested parties to develop siting criteria, weighting the significance of the criteria, and identifying impact management measures.

In addition to public meetings, workshops and information centres, the evaluation of the candidate sites and the detailed site assessment of the preferred site included kitchen table meetings with groups of residents to discuss aspects of the siting process and impact management measures, hundreds of house specific social and agriculture impacts interviews were conducted with property owners and a local storefront office was established to provide information and address community concerns.

A tour of comparable European facilities was arranged for several local politicians and representatives of the public.

While the emphasis of OWMC's public consultation program was on the FDP siting process, there were also meetings and workshops with interest groups, municipal officials and the public on the alternative means and methods to establishing a fully integrated facility in the Golden Horseshoe region. The number and geographic distribution of these consultation events was low and they were generally limited in comparison to those offered for the site selection program.

OWMC's public awareness and consultation program as it pertained to the siting process was generally considered to be comprehensive, with hundreds of opportunities for public involvement.

Public input played a key role in guiding OWMC in its site selection. In particular, the following public input served as important site selection touchstones:

- > The treatment facilities must only consist of proven technologies built and operated to the highest technical standards
- > There should not be reliance on technology. Natural containment was essential for any selected site.
- > Treatment and disposal facilities should be selected in close proximity to the major source of wastes generation to reduce transportation risks
- > The operation of the facilities should not represent a risk to people or the environment living in close proximity to the facilities
- > Those living near a selected site should fully participate in the development of impact management and monitoring programs
- > Those living near a selected site should not suffer any economic loss as a result of facility location
- > Preference should be given to environmentally acceptable sites in industrial areas

These comments and opinions all played important roles in guiding the OWMC siting process and subsequent impact management measures.

The public also identified several issues or shortcomings with OWMC EA and Siting Process. Significant comments included:

- > A need for OWMC and the government to more aggressively promote waste avoidance and effective waste reduction programs
- > Thorough consideration of alternative disposal methods including deep well injection, warehousing, and disposal in mines
- > Desirability of exporting of wastes to the USA for treatment
- > The establishment of a number of smaller and dispersed regional facilities rather than a larger centralized facility
- > To error on the side of caution regarding technological and environmental risks and impacts

There were also a number of process-related criteria expressed by the public including:

- > No meaningful assessment of alternatives to landfill and rotary kiln incineration
- > An emphasis on ensuring technical acceptability over public acceptability
- > Presentation of risk assessment studies in terms that were difficult to understand
- > Manipulation of evaluation process by OWMC to suit its needs

Finally, the Joint Board provided comments on the OWMC public consultation program in its EA decision: “it seems to us that the OWMC went to great lengths to ensure that there was proper public consultation, whether it was appreciated or not. That is an important distinction. A proponent cannot be faulted if the public chooses not to accept or participate in public consultation.”

Who Were the Opponents?

Throughout the OWMC FDP/EA, there were a number of interests who opposed OWMC. In addition to any community identified as a potential site for facilities, there were several parties opposed to OWMC’s activities. Major hazardous waste managers viewed OWMC as a business threat. In addition, a province-wide non-governmental organization - the Ontario Toxic Waste Coalition - was opposed to the establishment of a rotary kiln incinerator and a landfill at the West Lincoln site: their preference was for waste avoidance and waste reduction programs and smaller regional treatment facilities. The municipalities of the Region of Niagara and Township of West Lincoln opposed the location of the site and argued that other system configurations (i.e., salt mine disposal) were preferred to a landfill at West Lincoln. They also opposed the West Lincoln site as not being compatible with a rural agricultural setting and objected to the need to transport wastes from a freeway through the Village of Vineland to the site.

6.0 Impact Management Measures

Impact Assessment and Mitigation

OWMC undertook comprehensive risk and impact management studies of the preferred site in West Lincoln. Substantial on- and off-site environmental data were obtained during the site assessment activity. The existing conditions analysis served as a basis of risk and impact predictions, and for baseline monitoring. The analysis of existing environmental conditions included a diversity of physical, natural, social and economic features and characteristics. Particular emphasis was placed on potentially affected aspects of the environment and on agency and public concerns.

Data were obtained from such sources as detailed field investigations and on-site testing; interviews with area residents, community leaders, interest groups, municipal officials and business representatives; meetings with provincial ministries and agencies; and secondary source data. The data were compiled into maps, and summary tables and were documented.

The following is a list the specific data collection programs undertaken during the site assessment:

- interviews with residents on the preferred site and within the local surrounding area;
- distribution of drop-off questionnaires along the preferred access route; and
- agency contacts and meetings with residents outside the local community (e.g. ,kitchen table meetings).

The predictions of future conditions provided the baseline for risk and impact predictions.

Potential risks and impacts were predicted using updated facility design and operations information after the selection of preferred facility development and servicing options, together with the predictions of future conditions at the West Lincoln site without the facility. Predictions were prepared for each potential risk or impact.

Risks and impacts were predicted:

- qualitatively and quantitatively;
- with and without impact management measures;

- for individual and cumulative impacts;
- over various study areas and time horizons; and
- by risk and impact disciplines.

Predictions were prepared for on- and off-site risks and impacts, and for the access route to the site. Where pertinent, OWMC drew distinctions between normal and upset conditions and among the construction, operations, decommissioning and post-closure periods. The process of synthesizing individual risk and impact predictions progressed from direct to indirect and cumulative risks and impacts.

Once significant risks and impacts were determined, the potential for preventing or offsetting risks and impacts through impact management measures (i.e., mitigation, compensation, monitoring, contingency measures) was addressed.

Mitigation was introduced on site, between the facility and affected residences or farms, or at the residence or farm. Priority was given to establishing mitigation measures on site. People's day-to-day lives would be less disrupted by mitigation measures taken on site than measures that would be taken on their own properties.

Mitigation and compensation measures were considered for directly and indirectly affected residents, and the local and regional municipalities. Wherever possible, provision was made for agency and public involvement in the selection of these measures.

Monitoring

OWMC placed considerable emphasis on the development of a comprehensive monitoring program as an integral component of contingency planning monitoring.

The site assessment process also identified the need for on- and off-site monitoring during the pre-operations (to establish a baseline for impact prediction), construction, operations, decommissioning and post-closure periods. Proposed monitoring measures pertained to both normal and upset conditions, on- and off-site. The measures encompassed a diversity of facility activities, emissions and effluents from the facility, and components of the physical, natural, social and economic environments. Proposed monitoring measures were directed towards risks and impacts to individuals (e.g., noise and dust impact on nearby residents) and to the broader community concerns (e.g., out-migration, municipal finance).

A range of monitoring methods was identified. Examples of such methods included field monitoring, the regular review of available statistics, and the review of comments and concerns raised through government and public consultation activities.

With respect to monitoring, OWMC indicated that it would assume full monitoring responsibility for all on-site emissions and effluents. In other cases (i.e., off-site), it was proposed that the lead role be either assumed by other provincial or municipal agencies or shared with OWMC.

OWMC committed to a monitoring program that:

- included a community monitoring committee consisting of representatives from both the community and OWMC;
- involved the community in the development of a monitoring program and provide the resources for the community to hire an independent expert;
- provided the community with access to monitoring data; and

- provided the opportunity for periodic public review of the monitoring program.

7.0 Community Impact Agreement (CIA)

During the course of the hearing, OWMC and the Township of West Lincoln negotiated a community impact agreement. This negotiation was without prejudice regarding the outcome of the hearing. OWMC did not negotiate a Community Impact Agreement (CIA) with the Region of Niagara.

The CIA contains provisions related to the following items:

- the Property Value Protection Plan;
- a Community Monitoring Committee;
- procedures for the resolution of complaints, small claims, and special case claims;
- management of agricultural impacts;
- municipal finance arrangements;
- “social equity”;
- emergency response; and
- arbitration.

What follows is a description of some of more significant matters covered by the CIA.

The Property Value Protection Plan

Article 6 of the CIA dealt with the Property Value Protection Program (PVPP). Under the PVPP, Eligible Property Owners (owners of real property with in the Direct Impact Zone) have the right to apply to OWMC to have OWMC purchase the property at fair market value or to pay the property owner the difference between the fair market value and the selling price. *Article 6.07* defines fair market value, and established the mechanisms for determining it.

Article 6.11, “Special Case Property Applications for PVPP,” permits an owner of real property in TWL outside the Direct Impact Zone (DIZ) to apply for inclusion under the PVPP. If OWMC determines that the value of the property has been reduced as a result of the facility, the property is eligible for PVPP. If OWMC determines that the special case property is ineligible, the property owner may request arbitration.

Social Equity

OWMC agreed to pay the following:

- all farm residential and all residential property taxes of owners of residential eligible property within the DIZ;
- 50% of the farm residential and residential property taxes of owners of residential real property within the moderate visual impact zone; and
- 25% of the non-residential property taxes of eligible property owners within the DIZ.

Community Monitoring Committee

The Community Monitoring Committee is discussed in *Article 2* of the CIA. The Committee was to have between five and nine members, and no more than two of those members may be non-residents of TWL. The Committee will monitor OWMC’s Environmental Monitoring Program (as defined) and Process Monitoring Program (as defined) and will have the right to hire consultants, recommend changes to the

programs and impact management measures, and liaise with the community. OWMC would provide funding to the Committee, including funding of up to \$35,000 annually for consultants.

Complaints, Small Claims, and Special Case Claims

Article 3 of the CIA deals with complaints, small claims, and special case claims.

Article 3.03 sets out the Complaints Procedure, including provisions for a 24-hour complaints line, a registry of complaints, and required responses by OWMC.

Articles 3.11-3.14 cover the small claims (\$5,000 and under) procedures, including the right to arbitration if the claim is not resolved to the satisfaction of the Claimant.

Articles 3.15-3.21 set out the special case claim procedures for compensation for losses “demonstrated to be reasonably and proximately attributable to OWMC’s activities respecting the operation of the Facility.” Under these procedures, the claimant also has recourse to arbitration.

Management of Agricultural impacts

Article 4 of the CIA deals with management of impacts on the agricultural community. It required OWMC to do a number of things prior to facility commissioning (e.g., develop an emergency contact list of farm residents and agricultural businesses around the facility and institute a practical, workable means of notification in the event of an emergency), and to work with representatives of the agricultural community during the operating period of the facility.

8.0 Key Arguments, Strategies and Drivers

OWMC, through both the FDP and the presentation of its EA, relied on several drivers, arguments and strategies to guide its actions and promote its proposals. These include:

- 1) An urgent need to establish additional treatment and disposal capacity in the province. The need included additional capacity to treat wastes that were not currently treated to the maximum extent possible as well as the need for the province to have a public sector waste manager of last resort. This need was paramount and required action to be taken as quickly as possible.
- 2) OWMC accepted the province’s initial direction to establish and develop treatment and disposal facilities to consist of physical chemical treatment and rotary kiln incineration and landfill. These technologies had proven track records in Europe. OWMC adopted as a principle guiding its actions to only use proven technologies. OWMC expressed confidence in these technologies and implemented the site selection with these facilities in mind.
- 3) The site selection process quickly narrowed to the Golden Horseshoe Region of the province. This decision was made for two reasons: (1) this region possessed or was near to more than 70% of the hazardous wastes generated in the province, and (2) it also possessed the desired hydrogeologic setting for siting facilities. OWMC was guided by a desire to locate facilities close to the sources of waste generation. The implication of this action was that the geographic region that benefits from the generation of wastes would also assume responsibility for management of the wastes. Associated with this consideration was the desirability of the region to minimize transportation risks and costs.
- 4) The siting process placed a priority on selecting a site that minimized risk to people. By placing the highest priority on risk minimization factors, only areas that possessed superior hydrogeological

setting that offered a high degree of natural alternatives were considered. Additionally, areas that may not allow for high levels of air dispersion were also eliminated, as was the desire to minimize transportation risk to areas farther removed from the sources of generation.

- 5) OWMC approach was to ensure that its facilities and site would meet all tests of regulatory and technical acceptability. While the OWMC siting process included a comprehensive public information and public involvement program, public concerns about the facilities and site were balanced with the OWMC's desire to achieve regulatory and technical acceptability.
- 6) OWMC risk assessments indicated that the facilities could be developed and implemented without representing an increase in risks to people or the environment. This provided OWMC with confidence in its selected site.
- 7) Environmental Impacts associated with the development and operation of treatment and disposal facilities at the West Lincoln site could be effectively managed. OWMC had confidence that proposed mitigation, compensation and monitoring programs would adequately address all risk concerns and environmental impacts.
- 8) OWMC argued that given the volume, location of waste generation, the Golden Horseshoe Region offered the greatest potential for finding a site that would provide the highest level of service to Ontario waste generators without causing significant risks and impacts to people and the environment.
- 9) OWMC, through the review of its site selection process, was aware that other areas outside the Golden Horseshoe may have offered sites that were equal to - and possibly better than - the West Lincoln site. However, based on the technical information provided, the urgency to solve the problem and the technical acceptability of the selected sites, OWMC concluded that no site offered overwhelming advantages to the selected site at West Lincoln.
- 10) OWMC anticipated that regardless of the site selected, there would be public opposition. Its approach to public notification and information was to announce and explain the reasons for its decisions. It did not expect that any community would be willing to host a hazardous waste treatment and disposal facility; OWMC fully anticipated that it would have to make the case for its proposals before an administrative tribunal.

9.0 Outcome

The Joint Board conducting the hearing on OWMC's EA and did not accept the environmental assessment. The Board found that based on the information in the EA, and the evidence presented at the hearing, that OWMC's assessment of alternative waste management systems was deficient. Based on new information pertaining to waste generation, transportation risks and costs, the need to extract chlorides before disposal of treated waste residues and the availability of potential sites outside the preferred Golden Horseshoe candidate region, the Board found that a system consisting of treatment and disposal facilities at suitable locations in southwestern Ontario with disposal of residues in a salt mine in Goderich might be preferred to the West Lincoln site.

As a result, the Board did not accept the EA and denied OWMC approval to proceed with the undertaking. Subsequently, the Ontario Government dissolved OWMC.

Appendix B

**Review of the
Interim Waste Authority Ltd.
Environmental Assessment for
Solid Wastes Management Facilities**



1.0 Introduction and Background

In 1990, the Hon. Ruth Grier, Ontario Minister of the Environment and Minister of the Office of the Greater Toronto Area (OGTA), announced the Province's action plan for waste management. A key feature of the plan was the establishment of a public sector authority to search for, and to select, environmentally suitable long-term waste disposal sites for solid waste remaining after an enhanced diversion program in the Greater Toronto Area (GTA).

The Government of Ontario announced in April 1991, that three landfill sites would be established within the GTA's borders. More specifically, one site would be in Metropolitan Toronto/York Region to serve those municipalities and one site would be in each of Peel and Durham regions to serve their needs. The Region of Halton, while part of the GTA, was excluded from this siting process as it had sufficient landfill capacity for its long-term waste disposal needs.

The process of establishing three landfill sites in the GTA was to follow the special requirements of Bill 143, the Waste Management Act, 1991, the requirements of the *Environmental Assessment Act (EAA)*, and all applicable legislation.

The Provincial Government created a new body - the Interim Waste Authority Ltd. (IWA) - for the specific purpose of searching for and developing these three landfill sites. The IWA was incorporated under the *Ontario Business Corporations Act* and the terms of Bill 143 deemed it to be a Crown Agency. The Minister of the OGTA was the sole shareholder and appointed a board of directors composed of senior provincial public servants.

In 1991, the IWA released the *Draft Approach and Criteria Document (DAC* – also referred to as *EA Document 1*) for each of the three study areas, the document explained the proposed process for finding the three-landfill sites. This initial document responded to the intent of the government's Environmental Assessment Program Improvement project (EAPIP) task force report, titled *Toward Improving the Environmental Assessment Program in Ontario* (MOE, December, 1990): that report recommended that when a site search process begins, a document should be published which explains the process being proposed to find a site.

IWA's Environmental Assessment Document outlined the site selection process, criteria, public consultation and the broad issues of public and agency concerns. Basically, a six-step process was used to identify a preferred landfill site in each of the three study areas. In *Steps 1 and 2*, the IWA applied screening criteria to identify candidate areas. In *Step 3* existing roads, rail lines and hydro lines were used to define boundaries within the candidate area. In *Step 4*, comparative evaluation criteria were used to arrive at a long list of potential sites. In *Step 5*, the final long list of sites was narrowed down to a short list of sites through the application of additional comparative criteria. In *Step 6*, site-specific examinations were used to narrow the short list down to a preferred site.

As a result of a change in Provincial Government, the IWA was dissolved in 1994. Its EA was not reviewed and no regulatory decision was provided. The new Provincial Government made this decision in response to public opposition to the selected landfill sites as expressed during the election. It was the position of the new government that local municipalities should once again assume responsibility for waste management. This included finding the appropriate waste disposal capacity and noted that capacity need not be within the boundaries of the GTA municipalities.

Provincial Legislation, Policy and Initiatives Regarding GTA Waste Management

To fully understand the key drivers of the IWA siting process, it is necessary to understand the legislative context for the IWA.

On November 21, 1990, the Honourable Ruth Grier, Ontario Minister of the Environment and Minister Responsible for the Office for the Greater Toronto Area (GTA), announced the Province's action plan for waste management in the GTA. A key feature of the plan was the establishment of a public sector authority to search for and select environmentally suitable long-term waste disposal sites in the GTA. The public sector authority to search for new disposal capacity in the GTA was subsequently incorporated under the *Business Corporations Act* as a Crown Agency, the "Interim Waste Authority Ltd." (IWA).

By February 1991, the Waste Reduction Office (WRO) had been established by the Ontario MOE to develop and implement policies, programs, legislation and regulations to ensure that the Government's waste reduction targets (25% diversion from disposal by 1992 and 50% by 2000) as established in 1989 would be achieved. The need to accelerate 3Rs activities (reduce, reuse, recycle) in the GTA led to the creation of the GTA project Section within the WRO. This project Section was responsible for coordinating the development, and facilitating the implementation of a strategy to accelerate 3Rs in the GTA.

To further the 1990 waste management activities, the Government of Ontario announced a three-part provincial waste management strategy in June 1991, entitled *The Waste Crisis in the Greater Toronto Area – A Provincial Strategy for Action*. The strategy included: (i) actions to accelerate and intensify waste reduction and diversion programs in the GTA so that disposal capacity for residual wastes would be reduced; (ii) actions to increase residual waste disposal capacity in the GTA through an accelerated search for, and selection of long-term landfill sites consistent with the fundamental principles of environmental assessment; and (iii) emergency actions to deal with the expected shortfall in waste disposal capacity between the time that existing GTA landfill sites were slated to close and the opening of the new long-term sites.

Finally, as part of the MOEE program to achieve the provincial targets with respect to reduction, reuse and recycling, regulations were made and filed in early 1994 requiring (i) for southern Ontario, by January 1, 1995, the provision, by local municipalities with populations in excess of 5,000 persons, of blue box waste management systems and leaf and yard waste systems; (ii) the preparation of waste audits and waste reduction work plans by the owners of a wide range of public and private sector operations; (iii) the implementation of industrial, commercial and institutional source separation programs by a wide range of public and private sector operations; and (iv) the undertaking of packaging audits and packaging reduction work plans by large food and beverage manufacturing establishments, paper manufacturing establishments, chemical manufacturing establishments and importers. These regulations had particular significance in the GTA because of its high concentration of public and private operations.

In summary, the provision by the IWA of landfill waste disposal capacity within the three areas described earlier fit within the framework established by the MOEE that looked to the lower and /or upper tier municipalities and the private sector to implement the Province's waste management policies and objectives, in particular, the 3Rs diversion targets.

(a) Need for the Undertaking

The WMA provided specific direction to the IWA with regard to the establishment of need and purpose. The WMA required the Minister of Environment and Energy to provide the IWA with written estimates in regard to reduction, reuse and recycling and the IWA was required to use those estimates to determine the residual wastes requiring landfill disposal. These waste diversion estimates were provided to the IWA

in a Minister's letter dated May 15, 1992; they were used to define the problem to be addressed by the IWA undertaking. The determination of needed landfill capacity (i.e., the problem) by the IWA was therefore, not dependent on the results of the evaluation of the 3Rs (i.e., the evaluation of "alternatives to" the undertaking); it was prescribed.

(b) Identification and Evaluation of Alternatives to the Undertaking

The MOEE Interim Guidelines noted that "alternatives to" an undertaking were functionally different ways of approaching and dealing with a problem. For waste management projects, the MOEE Interim Guidelines include waste disposal export, the 3Rs and incineration. However, the requirements of sub-section 5(3) of the EAA respecting "alternatives to" the landfill undertaking were significantly scoped by Section 15 of the WMA as follows:

- > Section 15 of the WMA reduced the alternatives required to be considered to solely 3Rs and explicitly eliminated incineration and export of waste from the primary service area to any other area. This requirement to examine 3Rs was met by the completion of the GTA 3Rs Analysis by the MOEE. The evaluation of 3Rs alternatives clarified that neither reduction and/or reuse and/or recycling are a complete substitute for the proposed landfill waste disposal site undertaking. It was established that a landfill waste disposal site was required.
- > The WMA required that the potential use of other single landfill waste disposal sites be considered as an "alternative to" if the capacity of the other sites considered was adequate, after the Minister's estimate was used. IWA assessed the capacity for all existing GTA landfill sites and found them all to be inadequate for the 20-year service timeframe; in addition, by identifying the use of other single landfill site disposal sites as an "alternative to" the undertaking rather than an "alternative method", the Government objective was fulfilled. A multi-site approach to site selection in each service area need not have been considered by the IWA nor was it required to be considered under the EAA.
- > The MOEE Interim Guidelines suggest that all proponents consider the "do nothing" alternative to the undertaking; this represents what is expected to happen if none of the alternatives being considered are carried out. Since Section 15 of the WMA does not specifically require the IWA environmental assessment to consider the "do nothing" alternative, it is not required to be considered as an "alternative to" the landfill waste disposal site undertaking.

Part II of the WMA only required the IWA to site three landfills for the three specified service areas (i.e., Durham Region, Peel Region and in the combined area of Metropolitan Toronto and the Region of York). This was consistent with the government's policies regarding waste management initiatives. The site search process was restricted to the boundaries of these four municipalities.

(c) Identification and Evaluation of Alternative Methods

The MOEE Interim Guidelines described alternative methods as different ways of doing the same activity. For a landfill undertaking, examples of alternative methods considered by the IWA included landfills at different locations, or different engineering designs for landfill. The IWA considered alternative landfill design and operations options, alternative waste haul routes, utility relocation alignments and alternative single landfill site locations.

2.0 Alternative Methods of Carrying-out the Undertaking – Landfill Site Selection

Sub-section 5(3) of the *Environmental Assessment Act* (EAA) requires that an environmental assessment consist of a description and statement of rationale for “the alternative methods of carrying out the undertaking”. This section describes the approach used by the IWA to identify and evaluate alternative landfill sites.

Approach to Site Selection

The IWA followed a six-step approach to select landfill sites. This was a systematic site selection process that included:

- Step 1:** Primary screening (constraint analysis) to identify potential candidate areas.
- Step 2:** Secondary screening (constraint analysis) to identify candidate areas.
- Step 3:** Identification of candidate site boundaries to identify an initial long list of candidate sites.
- Step 4:** Comparative evaluation of the initial long list of sites to identify the final long list of candidate sites.
- Step 5:** Comparative evaluation of final long list of candidate sites to identify a short list of candidate sites.
- Step 6:** Comparative evaluation of the short list of candidate sites to identify the preferred site.

The site selection process sequentially narrowed the entire geographic area of each of the regions of study to a preferred landfill site. The level of detail used to assess environmental site characteristics increased progressively with each step of the landfill site selection process.

At each step of the site selection process, common activities were performed in order to facilitate decision-making. These common activities included scoping level of detail, identifying options/alternatives, etc. More details on each of the site selection steps are provided below.

Site Selection Step 1 – Primary Screening to Identify Potential Candidate Areas

In *Step 1*, lands that were considered least suitable for landfill development were screened from further consideration by application of severe constraint criteria. This screening - or primary constraint analysis - resulted in the identification of potential candidate areas which merited further, more detailed examination in *Step 2*.

Step 1 considered the entire study area. Only published, regional scale data sources were used.

In order to establish screening criteria and appropriate buffer areas, certain facility characteristics were assumed. In particular, a 100-m on-site buffer between the fill area and the site boundary was taken into consideration in setting buffer areas for screening criteria.

Mitigation measures applied in *Step 1* were limited to avoidance of sensitive features and maintaining adequate separation between sensitive features and potential landfill sites (through screening out buffer areas surrounding sensitive features). Feature-specific buffer areas were based on Government guidelines, discussions with agencies and study team expertise.

Step 1 criteria were placed in four criteria groups: (1) *Agriculture*; (2) *Biology*; (3) *Geology/Hydrogeology*; and (4) *Land Use and Social*. These criteria groups represented criteria that:

- identified “least suitable areas” on the basis of legislation, government policies and guidelines as well as the study team’s experience with landfill site selection;
- could be applied using published, regional scale secondary data sources; and
- resulted in the elimination of large areas of land.

Site Selection Step 2 – Secondary Screening to Identify Candidate Areas

In *Step 2*, a secondary screening was applied to remove additional lands considered less suitable for landfill development. *Step 2* constraints were considered equal to *Step 1* constraints, but applied in a separate step to avoid data collection and analysis on lands already screened in *Step 1*. The secondary constraint analysis resulted in the identification of candidate areas which were carried forward for more detailed evaluation in *Step 3*.

Step 2 analysis was performed only in potential candidate areas. In *Step 2*, criteria for the Agriculture, Biology and Land Use and Social criteria groups, which were included in *Step 1*, were further refined, and new criteria (surface water) were added, using additional published data sources and through contact with government agencies.

Data were collected for each criteria by the appropriate discipline using the identified data sources.

Once collected, data were reviewed and verified before application. A constraint map was prepared for each criteria group showing the geographical extent of criteria and its corresponding buffer.

Criteria group constraint maps were overlaid on the *Step 1* composite map to derive a *Step 2* composite map which illustrated the total area screened out by all criteria groups. The unconstrained areas on the *Step 2* composite map represented the candidate areas carried forward for further evaluation in *Step 3*.

Site Selection Step 3 – Identification of Candidate Site Boundaries to Identify an Initial Long List of Candidate Sites

In *Step 3*, boundary criteria were applied to candidate areas to derive candidate sites which were large enough to meet the minimum requirements for a 20-year landfill.

In order to establish the required size of the landfill facility, certain facility characteristics were assumed including waste density, on-site buffer area, the depth of excavation, the height of the landfill, side slopes, etc.

Mitigation measures applied in *Step 3* included avoidance of significant linear features (through screening these features). The review of candidate site boundaries performed by the disciplines also served to mitigate potential environmental effects through boundary revisions.

Step 3 boundary criteria represented linear features which would not be moved or crossed. Local roads were considered as boundary features unless they prohibited the identification of at least one site in any given candidate area. Gas and oil pipelines were not considered to be site boundaries since discussions with pipeline company officials confirmed that pipelines could be relocated in all cases.

The features represented by *Step 3* boundary criteria were identified and mapped within the candidate areas on the *Step 2* composite constraint map.

Candidate areas, and portions of candidate areas which did not meet minimum size and shape requirements, were screened from further consideration in *Step 3*. For the Toronto/York study, 32 candidate sites were identified in total.

Site Selection Step 4 – Comparative Evaluation of Initial Long List of Candidate Sites to Identify Final Long List

A comparative evaluation of the initial long list of 32 candidate sites (Toronto/York) was performed in *Step 4* to reduce the list to a reasonable number for more detailed analysis in *Step 5*. The appropriate number of sites for consideration in *Step 5* was judged to be between 10 and 20 sites. This number would ensure a reasonable balance between minimizing disruption to York Region residents while maintaining a representative number of siting alternatives.

Step 4 assessments were performed for on-site and off-site impact study zones (0 to 1000m) for each candidate site.

The comparative criteria used in the *Step 4* evaluation consisted of the following eight criteria groups: Agriculture, Biology, Economics, Geology/Hydrogeology, Heritage, Planned Land Use, Social and Transportation. Criteria groups used in *Step 4* were not considered of equal importance. Based on a combination of public workshop results, experience gained from previous landfill searches, and the professional judgement of the study team, the Agriculture, Biology, Geology/Hydrogeology and Social criteria groups were ranked equally and considered more important than the Economics, Heritage, Planned Land Use and Transportation criteria groups, which were also ranked equally.

The evaluation of candidate sites within criteria groups was performed at three levels: indicator, criteria, and criteria group.

In the overall criteria group evaluation, the degree of consensus among the eight criteria groups (e.g. Agriculture, Biology, etc.) on the suitability of the sites was identified. The qualitative evaluation method selected for comparing candidate sites in *Step 4* was referred to as a “consensus approach”.

The objective of the consensus approach was to select sites with the greatest degree of preference among the disciplines involved in the *Step 4* analysis for more detailed evaluation in *Step 5*.

A series of decision-making rules were created for the purpose of applying the consensus approach. The basic objective of the decision-making rules was to identify the highest degree of consensus on the lowest impact level and to progressively identify lesser degrees of acceptable consensus until a sufficient number of sites were identified.

From the 32 sites identified in *Step 3*, nineteen candidate sites (Toronto/York) were identified as offering potential for landfilling. These 19 sites were carried to a further level of evaluations in *Step 5*.

Site Selection Step 5 – Comparative Evaluation of Final Long List of Candidate Sites to Identify Short List

In *Step 5*, the final long list of 19 candidate sites (Toronto/York), including identified haul routes, were analyzed in greater detail and compared to identify a short list of candidate sites.

Analysis for Agriculture, Biology, Economics, Heritage, Planned Land Use and Social criteria groups was performed for:

- off-site within a primary impact study zone (0 to 500m);
- off-site within a secondary impact study zone (500 to 1,500 m);
- along the waste haul route impact study zone for each candidate site; and
- where applicable within road closure impact study zone (based on nuisance effects).

The Archaeology, Design and Operations, and Geology/Hydrogeology criteria groups conducted their analysis on-site and within the site vicinity. The Aviation criteria group analysis was performed for the Greater Toronto Area (GTA). The Transportation analysis was performed from the waste centroids to the site access point and along roads affected by local road closures. The Surface Water criteria group analysis was performed for the watersheds in which the candidate sites were located.

The number and type of comparative criteria used in the *Step 5* evaluation were increased from eight in *Step 4* to twelve with the addition of the Archaeology, Aviation, Design and Operations, and Surface Water disciplines reflecting the increased level of study detail.

In *Step 5*, ranks and weights were assigned to indicators, criteria and criteria groups. Suggested ranks and weights of criteria and criteria groups were released to the public and government agencies for review. Similar to the process in *Step 4*, data analysis was carried out within criteria groups, at the sub-indicator, indicator and/or criterion levels.

Site evaluation began once the criteria, indicators and their respective ranking and weighting were finalized and the data analyzed. The impact analysis was performed within criteria groups using one of two multi-criteria evaluation methods: Simple Additive Weighting Method or Concordance Method.

As a result of the evaluation methods, six sites within the Toronto/York Study area were carried forward to *Step 6*. These six sites were considered to be sufficient to properly consider trade-offs. The six sites also provided sufficiently different characteristics to allow further comparisons among each of the disciplines.

Site Selection Step 6 – Comparative Evaluation of Short List of Candidate Sites to Identify the Preferred Site

In *Step 6*, the short list of candidate sites, alternative waste haul routes, roads affected by local road closures and alternative landfill design components were analyzed and compared to identify the preferred alternatives.

Criteria group site assessments were performed in *Step 6* on-site, within the site vicinity, along the waste haul route, within the local community and economy, and within the Greater Toronto Area.

The following criteria groups assessed potential loss/displacement effects in areas to be physically altered by development: Agriculture, Archaeology, Biology, Economics, Heritage, Planned Land Used and Social.

Each criteria group defined discipline specific impact study zones based on “nuisance” effects (e.g. dust, odour, litter, noise, visual) predicted by the Air Quality, Noise and Visual specialists. In addition, the Design and Operations, and Geology/Hydrogeology criteria groups considered the general site vicinity in their assessments, although no specific geographic area was defined. The Biology and Surface Water criteria groups consulted with the Geology/Hydrogeology criteria group to assess on-site and off-site impacts resulting from changes to groundwater flow and water levels.

Potential effects predicted to extend beyond the landfill site vicinity were also assessed. Potential effects on the local economy, local community and municipal structure were considered by the Economics, Social and Planned Land Use criteria groups. The Surface Water criteria group assessed potential effects on surface water quantity and quality in tributaries upstream of the candidate sites and watercourses downstream to their lake outlets. The Transportation criteria group assessed road operations and safety along the waste haul routes from the waste centroids to the site access points.

The data sources used in *Step 6* expanded on those used in *Step 5*. Detailed investigations were carried out on-site, off-site and along the preferred haul route. These investigations included drilling and testing of monitoring wells, inventories of natural and cultural features and detailed surveys of affected residents, businesses and facility operators and farm operators. Researchers also consulted regional data sources. Access agreements were negotiated with landowners to permit on-site investigations (i.e., hydrogeologic).

In *Step 6*, ranks and weights were assigned to indicators, criteria and criteria groups. Suggested ranks and weights of criteria and criteria groups were released to the public and government agencies for review. In consideration of input received and *Step 6* data, criteria and criteria group ranks and weights were revised by the IWA study team where it was considered to be appropriate.

Similar to *Step 5*, data analysis in *Step 6* was carried out within criteria groups, at the sub-indicator, indicator and criteria levels. The *Step 6* comparison of the short list of candidate sites was based on the net environmental effects of landfilling predicted to occur at each candidate site.

The net effects analysis in *Step 6* was performed on a relative basis which considered the “net” effects of one site versus another; the analysis utilized information considered to be at an appropriate level of detail for *Step 6*.

As in *Step 5*, the criteria groups used two evaluation methodologies to derive site ranks within their criteria groups: Simple Additive Weighting or Concordance Analysis. Following the quantitative and qualitative review, a preferred site was selected in King Township (Toronto/York study).

3.0 Public and Agency Consultation

At the outset of the IWA siting process, the IWA issued *EA Document 1 (Draft Approach and Criteria)* that outlined IWA’s approach to public consultation. The IWA committed to an open and consultative landfill site search process in this document. To this end, an extensive public consultation program was designed and implemented over the life of the landfill site search.

3.1 Goals and Objectives

At the beginning of the site search process, the IWA established a number of objectives to help guide the development and implementation of the public consultation program for the landfill site search. These objectives were:

- 1) To obtain opinions and ideas on the public consultation process itself (i.e., ways of reaching the public, additional opportunities for discussion);
- 2) To provide opportunities for the public to access all technical information and personnel necessary to gain a clear understanding of the process;
- 3) To involve all potentially affected and interested parties in the search for a landfill site and to provide opportunities for input at key stages of the study before decisions are made;
- 4) To objectively consider the views received and incorporate ideas and suggestions into the landfill site search process;
- 5) To provide responses to public input that clearly explain the basis for decisions;
- 6) To make every attempt to provide adequate time for the public to learn about the issues at hand and disseminate information to interest groups;
- 7) To ensure compliance with the MOEE's *Pre-Submission Consultation Guidelines*; and,
- 8) To provide applicable information on those areas which are included in applicable Provincial legislation.

3.2 Public Consultation Program Description

The IWA public consultation program was designed to provide a variety of formal and informal opportunities for a two-way flow of information between the IWA and the public. Throughout the program, the IWA sought input from, and responded to the concerns of the public. It was the IWA's intention to incorporate public knowledge and values into the site search process.

The public consultation program was divided into phases that corresponded to the release of the Environmental Assessment (EA) Documents. During each phase a number of activities were held to provide the public with the opportunity to make their views known to the IWA staff and study team. The phases were:

- Phase 1** - Study Design Phase (*EA Document I*)
- Phase 2** - Activities Leading up to the Identification of the Long List of Candidate Sites (*EA Document II Part 1* and *EA Document II Part 2*)
- Phase 3** - Activities Leading up to the Release of the Short List of Candidate Sites (*EA Document III*)
- Phase 4** - Activities Leading up to the Release of the Preferred Site (*EA Document IV*)

Phase 5 - Activities During the Detailed Assessment and Design of the Preferred Site
(*EA Document V*)

Phase 6 - Activities Leading up to the Hearing (*EA Document VI*)

Activities carried out for the IWA public consultation program can be categorized under two general headings:

- Activities undertaken to increase public awareness (*Section 3.2.1*); and
- Activities providing opportunities for dialogue and information exchange (*Section 3.2.2*).

3.2.1 Activities Undertaken to Increase Public Awareness

Communication Materials

The IWA carried out a communications program with the objective of keeping the entire community aware of the site search, while at the same time, providing more detailed information to communities that were potentially more directly affected by siting alternatives.

The IWA process included ongoing communication with the public directly and indirectly through the media. Both **advertisements** and **media advisories** were used to convey information such as the announcement of sites and the release of EA documents as well as to advertise public consultation activities. Media advisories were used to inform people about upcoming activities and the availability of supplemental documents (e.g. *Equity Discussion Paper, Impact Management and Compensation Policy*, etc.).

With the release of each *EA Document I* through to *EA Document IV*, the IWA produced a **newsletter** entitled *Landfill News* (formerly *Focus on Waste*) summarizing the steps leading up to each document release and the site(s) announcement, the upcoming planned public consultation activities and a summary of the next step in the site search process. These newsletters were broadly distributed, sent to those people residing on-site and within 1.5 km of the candidate landfill sites and were available at the IWA Information Centres and upon request.

Activities Related to the Announcement Sites

Throughout the process, the IWA tried to be sensitive to the community's needs when making site announcements. With the announcement of the long list of sites, the short list of sites and the preferred site, the IWA undertook intensive notification procedures to ensure that all potentially affected residents and landowners on-site and within 1.5 km of candidate site(s) were aware of the announcement in a timely manner. For all three-site announcements, the notification procedure included:

- development of information specifically tailored to the needs of the on-site residents;
- hand delivery of information to on-site residents in the morning of announcements;
- delivery to those within 1.5 km of the site to arrive the day of the announcement (for the short list, this included delivery to residents in the haul route impact study zone);
- advertisements in local papers and the Toronto daily papers to make the broader community aware of the announcement;
- newsletter mailed to those on the IWA mailing list;
- distribution of EA documentation to municipalities, MPs, MPPs and site groups;
- news conference to make the announcement;
- distribution of a flyer to all households in the short list municipalities and a newsletter to all households in the preferred site municipalities;
- invitation to local officials and their staff to be briefed at the Information Centre(s) immediately following the long list announcement;

- briefings with MPs and MPPs;
- local media briefing sessions in each of the potentially affected communities; and
- offers to attend council meetings to discuss the site search.

Document Distribution/Public Information Office

To aid in the dissemination of information to potentially affected residents and other interested individuals/groups, the IWA established a Public Information Office (PIO) at the public consultation consultant's office. The PIO served as a central location where residents/groups could obtain information specific to the IWA's six-step site search.

3.2.2 Activities Providing Opportunities for Dialogue and Information Exchange

Activities that provided opportunities for dialogue and information exchange included:

- Toll-free information line;
- Regional consultation network (RCN);
- Workshops/open houses;
- Information centre(s);
- Submission of briefs;
- Meetings with residents;
- Liaison with municipalities;
- IWA reading room; and
- Briefing for non-government organizations.

These are discussed in further detail in the following paragraphs.

Toll-Free Information Line

A toll-free telephone information line was maintained at the Public Information Office throughout the landfill site search process. This line provided people with a convenient no cost mechanism to get information, to present their views to the IWA, ask questions and to request documentation. This line was staffed during regular business hours with extra hours added following the long list, short list and preferred site announcements. An answering machine recorded messages during periods when the line was not staffed.

Regional Consultation Network (RCN)

Early in the process, the IWA invited interest groups and members of the public who were interested in the landfill site search to form a Regional Consultation Network (RCN). The Terms of Reference for the RCN states that their role is to:

- provide IWA with input from a community based network of informed citizens representing the broad range of social environment, natural environment, economic environment, and citizens-at-large;
- become up-to-date and knowledgeable on the IWA site search;
- provide a consistent forum for discussion and potential resolution of issues arising throughout the duration of the site search;
- provide a regular opportunity for public input between formal review periods;
- provide a review of EA documents;
- provide a forum for input from site communities, if requested;
- review input obtained from the public; and
- supplement the IWA's comprehensive public involvement program.

The Metro Toronto/York Region RCN maintained a membership of approximately 20 members. Initial membership on the RCN included representatives from a number of citizens-at-large and the following organizations:

- Sierra Club of Eastern Canada
- Ontario Waste Management Association
- Vaughan C.A.R.E.S.
- Ontario Federation of Agriculture
- Thornhill Vaughan Residents' Association
- Oakridges Moraine Ratepayers
- Save the Oak Ridges Moraine
- East Gwillimbury Chamber of Commerce
- Georgina Board of Trade
- Richmond Hill Chamber of Commerce
- Environment Markham
- Etobicoke Chamber of Commerce
- Superior-Crawford Sand & Gravel
- Federation of Ontario Naturalists
- Whitchurch-Stouffville Chamber of Commerce
- King Residents Groups

Workshops/Open Houses

In order to obtain input on specific aspects of the site search, the IWA held a number of open houses and workshops at different times during the process.

Information Centre(s)

In June 1992, following the release of the long list of sites, the IWA established several Information Centres in the study region. These Information Centres were established to provide people with reasonably convenient access to landfill site search information, and representatives from the IWA and the study team. The Information Centres housed all publicly released documentation from the landfill site search including maps and displays describing the process and identifying the sites.

Submission of Briefs

An opportunity for participants to orally present their views to the IWA was offered following each site announcement. Following the release of the preferred site, the IWA was available to those people who wished to present a brief.

Meetings with Residents

Throughout the landfill site search process, the IWA indicated a willingness to meet with residents. During the site search process, the IWA held technical information sessions where disciplines experts were available to discuss specific issues with participants as well as general meetings with site groups and affected residents. IWA members also attended meetings hosted by municipalities and site groups.

Liaison with Municipalities

Following the release of EA Document I in August 1991, and the release of *EA Document II, Part I*, the IWA held a briefing session to inform local, regional, provincial and federal elected officials and their staff of the site search being undertaken in their area.

IWA Reading Room

For participants requesting more detailed information on the IWA site selection process, a reading room was opened in January 1993. The reading room was a resource centre for maps, data and records used by the IWA study team during the site search process.

3.3 Participant Funding

Participant funding was established by the IWA to support local groups in an independent review of the work completed and published by the IWA.

Participant funding to review IWA *Steps 1 to 5* and the proposed *Step 6* work program was offered to site groups and municipalities beginning in August 1992, through the formation of a technical committee that oversaw the receipt and review of funding proposals. This approach to participant funding was rejected by the municipalities and the site groups that would be eligible for such funding. Consequently, in November 1992, an independent facilitator was retained by the IWA to resolve the issue of participant funding. From that time, discussions between the IWA, site groups and municipalities continued well into *Step 6* regarding the process for participant funding. Site groups and municipalities received additional funding (\$1.5 million across the three-study areas) to study and report on various aspects of the site search process, and for administrative and legal expenses.

3.4 Impact Management and Compensation

In December 1992, the IWA issued a discussion paper on compensation entitled *Managing the Impact of Landfill: A Commitment to Fair Compensation* which outlined the IWA's commitment to use a full range of impact management measures including property value protection, remuneration to the host municipalities, and community monitoring. The purpose of the paper was to generate discussion on how to develop an effective program to manage landfill impacts. A series of workshops were held in February 1993 to solicit input on this discussion paper.

Based on the comments received on this paper, the IWA released its *Impact Management and Compensation Policy* (October 1993). This policy established in greater detail the measures that the IWA would undertake in areas such as property value protection, tenancy, water supply protection, host municipality compensation, and cases of personal hardship. The policy also outlined processes for determining fair market value for sale and purchase of properties, arriving at voluntary access agreements for property inspection and testing, and the development of a community monitoring program. The IWA took a proactive approach in the development of a policy on impact management to achieve a fair and negotiated agreement with potentially affected owners, tenants and local municipalities.

3.5 Key Issues

Throughout the IWA landfill site search process, issues raised in all forums were documented and responded to in the EA documentation. A chapter outlining issues that were identified to be key issues, including responses for each phase, is included in *Volume I of EA Documents II, Part I, III and IV* and *volume 2 of EA Document V*. The key issues were grouped under the following headings: General Siting Issues and Discipline Specific Issues.

“Key” issues refer to those issues that were deemed to be of the greatest public concern because they were raised frequently and in a number of forums.

3.5.1 General Siting Issues

Policy Mandate

- Rationale for linking Metropolitan Toronto and York Region as one study area
- Rationale for one larger site versus two or more smaller sites
- Alternatives to landfill
- Authority of the IWA
- *Waste Management Act/IWA Mandate*
- *Waste Management Act and Environmental Assessment Act*

Site Search Process

- Credibility of the site search process
- Use of the best and most recent information available
- Data used to derive the long list
- Establishment of criteria
- Overall site search process
- Siting methodology
- Ecosystems approach to siting
- Urban versus rural bias
- Consideration of cumulative impacts
- IWA's waste diversion estimate

Public Consultation

- *Improvements for the Public Consultation Program*
 - A number of improvements were suggested such as more media displays showing the risk of landfill, site announcement procedures that would ensure everyone was informed of sites, etc. Some participants were concerned about the lack of input on the decisions that led up to the creation of the IWA and its public consultation program.
- *Public Awareness & Consultation*
 - Concerns were expressed that the IWA was not listening to participants, and not responding to, or addressing input. Some participants expressed that the initial long list notification was the first notice received regarding the landfill site search, and that the 60-day public review period was too short.
- *Public Consultation, Communication & Notification*
 - Concerns were raised that the IWA was not listening to the public, and that the review period for documentation and schedule for public consultation events did not allow sufficient time for effective participation.
- *Public Consultation Not Meaningful*
 - It was suggested by participants that the IWA's public consultation program was not meaningful because the public had no power to veto or change the siting process and because true concerns over policy issues were addressed by the IWA. Concerns were raised that there was not sufficient opportunity for the public to comment on the underlying assumptions of the process such as the definition of the undertaking, need for landfill, number of sites, etc.

Other General Siting Issues

- *Compensation*
 - Compensation comments included a number of suggestions for compensation and for the compensation policy. Compensation was suggested for reduced property values, well water contamination, tenants of publicly owned lands, and pain and suffering experienced by residents as a result of the site search process. Both the Discussion Paper on compensation and the compensation policy were criticized for lack of specific information. In *EA Document V*. Participants questioned the methods used to define the property value impact zone.

- *Equity*
 - The consideration of equity in the siting process was a strong concern particularly for those residents living near existing landfills (e.g. Keele Valley). York Region residents cited equity issues such as: they “have done their fair share” in accepting waste from Metro Toronto in previous decades, and that a community that has hosted a large landfill should not be considered for another large landfill. Some participants also commented that the IWA process “pitted” communities against one another. In *Phase V* it was suggested that the IWA process did not follow the principles of equity; a number of suggestions were presented for the incorporation of equity into the site search process.

- *Participant Funding*
 - Concern was expressed about the amount of funds available, the timing of funding distribution, qualification for, and delays in receiving participant funding. The objectives of the participant funding program were also questioned. Following the release of the preferred site, concerns were raised regarding the provisions of Order-in-Council 9/94 including the timeframe to the Hearings, the government review, etc.

- *Health Issues*
 - Concern was raised about potential health problems as a result of landfill sites and the increased potential risk for area residents due to the location of existing landfills in the area. The IWA was criticized as not adequately measuring health impacts from landfill sites, and it was suggested that a cumulative impact assessment be conducted to determine the potential for increased health problems.

- *Access Agreements*
 - Concerns expressed included the perception that participants had been “coerced” into signing access agreements by the IWA, and that the cost of early access agreement bonuses could not be rationalized by the IWA.

3.6 Community Monitoring and Compensation/impact Management

In the IWA *Impact Management and Compensation Policy* (October 1993), the IWA committed to the following principle on community monitoring:

The local community is in the best position to know which issues and concerns are most important to them. The community should retain a degree of control over site operations, monitoring, contingency planning and ensure mechanisms are in place so that complaints are fairly, reasonably and quickly addressed.

The policy goes on to say:

Throughout the planning, construction, operation, closure and post-closure phases of a landfill, full and open communication is essential. No matter how much care is taken to prevent off-site impacts, problems may arise. Detecting potential problems and unanticipated effects so that they can be resolved before they become serious is an important part of operating an environmentally-safe landfill.

In keeping with the principle, the IWA is committed, at a minimum, to implementing the following community monitoring measures:

- 1) *Following the announcement of the preferred site, the IWA will seek interested citizens and invite membership on an Impact Management Committee to discuss the measures proposed in the Policy and the mechanism for reaching a negotiated agreement. This committee would ultimately continue as the monitoring committee described below. The status of this committee was discussed in Section 9.5 of this document.*
- 2) *Following site approval, set up a community monitoring committee to allow residents to make recommendations for the design of the monitoring program; to know the results first hand; to make recommendations for avoiding off-site impacts; and to monitor and recommend improvements with respect to waste haulage routes, traffic safety, waste disposal practices and contingency measures.*

The terms of reference, membership, and decision-making rules are to be established by the committee. An annual report will be prepared and copies of all committee reports and minutes will be made publicly available.

The monitoring committee could be composed of:

- i. *three members chosen by residents living within the nuisance impact zone;*
 - ii. *one representative from the Ministry of Environment and Energy;*
 - iii. *two representatives from the IWA (or operating agency);*
 - iv. *one member from the local municipality; and*
 - v. *one Chair and Vice-Chair chosen from above by consensus of all members (the Chair will vote only to decide an issue that would otherwise result in a deadlock). A replacement for the Chair would be selected from the representative group to maintain membership as described above.*
- 3) *A minimum yearly allocation of \$10,000 will be provided for committee operation and the payment of reasonable stipends and expenses for public members.*
 - 4) *An allocation of up to \$100,000 will be provided to hire independent consultants to review, and /or recommend a procedure for benchmark testing of water supplies prior to and during landfill operations.*
 - 5) *Within one year of site approval, the IWA will provide funds to be committee to hire independent professionals to advise residents within the nuisance impact zone and to identify measures to minimize impacts.*
 - 6) *Upon site opening, the IWA will provide funds to the committee to hire an independent environmental inspector to address public concerns.*

4.0 Key Strategies, Arguments and Drivers

The IWA siting process was considerably scoped from that which would have been required under the full requirements of the Environmental Assessment Act. The new Waste Management Act focussed on the IWA process as follows:

- The IWA was not required to justify the need for its undertaking. Through various studies, the Provincial Government would determine which volume of wastes would be diverted from landfill through wastes reduction programs. The balance would require disposal in landfills.
- IWA was not required to assess alternatives means to the undertaking, export and incineration were to be excluded from the IWA process.
- The IWA was not required to consider multiple sites for landfills. As a result, only one landfill site for each region was to be selected.
- The constraint mapping process for *Steps One and Two* eliminated all urban areas from consideration for landfilling. As a result, only sites in rural settings were considered.
- A wide reaching public consultation process supported the site selection process. Any interested party had an opportunity to provide input to the process.
- Public consultation opportunities included workshops where the public was able to identify, weight and decide upon siting criteria.
- The IWA impact prediction process was comprehensive – all environmental effects and their significance were identified and described. A comprehensive impact management program consisting of mitigation, compensation and monitoring program was designed. The impact management program would, in the view of the IWA, reduce any impacts to acceptable levels.

5.0 Outcome

As a result of a provincial election in 1994, a new government was formed. As a result of commitments made during the election, the new government terminated the IWA EA before public hearings. The IWA was subsequently dissolved, and the responsibility for management of solid wastes was returned to the municipalities.

Appendix C

**Review of the
Government of Alberta
Voluntary Siting Process for
Hazardous Wastes Treatment
and Disposal Facilities**



1.0 Introduction and Background

Throughout much of its history, Alberta's economy was primarily based on agriculture. However, the province witnessed a progressive shift to industrialization, especially with the discovery of oil in 1947. The consequent development of the oil and gas industry in Alberta, in combination with other industries, began to produce increasingly large volumes of hazardous wastes. The disposal of these wastes was largely uncontrolled and haphazard, with municipal landfills absorbing most of the burden.

In the early 1970, the Government of Alberta committed itself to a process of industrial diversification. It realized that this would lead to the production of more waste, especially the complex and particularly hazardous wastes that are the by-products of tertiary processing of materials and the manufacture of products. During that time, the province lacked any advanced system for storage, treatment and disposal of these wastes. Some waste management relief was afforded by exports, particularly the shipment of PCB wastes to facilities in Oregon. To address this and other problems, the Government of Alberta in 1971 created Alberta Environment.

2.0 Alternative Means and Methods

In 1972, Alberta Environment retained Associated Engineering Services Limited (AESL) and James F. McLaren Limited to conduct the first provincial study on the disposal of hazardous wastes. The recommendations of this study included:

- Immediate environmental monitoring to accurately determine waste delivery rates and their characteristics;
- Developing a formal list of regulated wastes; and
- Establishing a site for a disposal facility near Edmonton.

During the same year, AESL and Goodfellow Group prepared a report detailing the development of a treatment facility recommended in the previous study.

In the early 1970s, Alberta Environment received the first proposal for a hazardous waste disposal facility using deep-well technology. However, the Provincial Cabinet rejected this proposal as too expensive.

Between 1975 and 1979, several Alberta Environment studies were prepared on landfills. These studies investigated the production of landfill leachate and the mitigation of gases. These studies led to a greater appreciation of the extent of both toxic and non-toxic leachate in municipal landfills.

With the growing recognition of the hazardous waste problem in Alberta, in 1979 Kinetic Contaminants (Canada) Ltd (KCL) proposed to build a hazardous waste disposal facility at Fort Saskatchewan, a town of 12,000 citizens twenty-five kilometers northwest of Edmonton. KCL had informally approached Alberta Environment about the need for a facility, based on an earlier recommendation in one of the AESL studies, that 'quantities of toxic and hazardous wastes now being generated are sufficient to justify the establishment of centralized, systematic, and effective waste treatment and disposal facilities.'

However, distrust and miscommunication surrounded the KCL proposal from the start. Secrecy surrounded the KCL proposal. The company was unwilling to release the site assessment information in its possession for public scrutiny. In addition, the company badly handled the public hearing for the proposed development. An audience of 300 people had no opportunity to view most of the slides prepared by the company because of projector trouble. The audience, already distrustful and suspicious,

started accusing company of withholding information and not answering enough questions. This meeting became a public relations disaster. It led to massive public outcry and a movement to stop the development.

The company withdrew its proposal, but made a similar offer to the small town of Two Hills, 110 kilometers northeast of Edmonton in 1979. KCL held private meetings with key local officials before any public siting announcement. This secured an endorsement from the Two Hills Chamber of Commerce and tacit support from the Town Council before going public. Once the official announcement was made, the public reaction in Two Hills was similar to that in Fort Saskatchewan a few months earlier. It was, in some respects, even more antagonistic once citizens learned that they had not been consulted after extensive meetings between company leaders and commercial and local public officials. Townspeople even threatened to erect tall fences to separate themselves from those neighbours who might support the proposal. KCL subsequently withdrew its proposal.

As a result of these events, in September 1979, the Minister of Environment announced a moratorium on any further attempts to site hazardous waste disposal facilities, and established a six-member citizen-government group, called Hazardous Waste Management Committee (HWMC) to investigate the precise nature of the hazardous waste problem in Alberta and devise an alternative siting and waste management process.

In conjunction with the establishment of the HWMC, several consulting firms were retained to prepare studies for committee's use relating to various aspects of hazardous waste. These firms reported on the following issues:

- Risk analyses on different types of disposal facilities;
- Investigation of economic feasibility of disposal facilities;
- Financial options available regarding the ownership and management of disposal facilities;
- Inventory of existing hazardous wastes in the province and projections about the wastes expected to be generated; and
- Social aspects of waste management.

Also, reviews of best technologies were conducted by the Alberta Government to learn about the variety of methods available that would be appropriate for dealing with the types of wastes generated in the province. Some of these technologies were readily available in Europe and other parts of North America.

Investigations of technological options included an Alberta Environment mission to waste management facilities in Germany, France, England and Denmark. The acceptance of particular technological packages and a commitment to an integrated system were important factors in helping to convince the government and the public that a safe management system was available for Alberta.

While professional opinion was sought on the subject of appropriate technology, numerous groups were making their ideas known, including the general public, environmental interest groups, the media, industry and members of the Legislative Assembly. Public concerns about landfills centered on whether or not a truly secure waste facility was possible. With landfilling, the underlying fear was the potential for groundwater contamination. The fact that many local landfills and dumps had leaching problems did not ease public concern. With pressure to find the most appropriate solution, the Government of Alberta made a decision to proceed with the development of a complex hazardous waste disposal facility that would include incineration, physical/chemical treatment, stabilization, secure landfilling, and deep-well disposal. Knowing that previous attempts to site the facility failed due to the public scepticism about the initiative,

the government developed and financed a radically different site selection approach, which emphasized a voluntary strategy.

3.0 Siting Process

In its 1980 report, HWMC provided the basic structure for the approach that was ultimately embraced by the Alberta legislature. After review by the Environment Council of Alberta (an independent review commission), the provincial environmental minister created the Hazardous Waste Task Force to implement a new site selection process. This approach stressed volunteerism only communities offering to host a site would be considered as candidates. It also was designed to allow provincial authorities to make the final decision on site selection, in the event of the community acceptance, and to chose the private corporation that would be involved in construction and operation of the site. The province would also play a direct role in the management of the facility.

Siting criteria were applied through constraint mapping, which ruled out parcels of land that were deemed inappropriate. This method of eliminating - rather than selecting - candidate sites is commonly used in these types of decision-making process; however, its combination with exhaustive public participation makes it unprecedented before this case.

Criteria for eliminating sites were defined under four main headings:

- **Physical:** surface and bedrock geology, groundwater, and topography;
- **Biological:** forestry, wildlife, birdlife;
- **Land Use:** Federal lands, agricultural land, road and rail linkages, and resource extraction;
- **Human:** intensive use recreation areas and population centers.

The new approach began with advertising and general information meetings. The province established a number of liaison and other committees that were intended to foster regular and direct interaction between public, provincial, crown and private corporations representatives at every stage of the siting process. The agenda of these meetings consisted of introducing the history of the waste management program, the objectives of the HWMC, an explanation of the constraint mapping process, slide-tape presentations of some negative experiences with hazardous waste sites, open discussions of people's concerns (which were recorded), the formations of action committees and the nomination of a delegate to attend a provincial workshop for further elaboration on the waste facility process plans.

As a first step, a "regional assessment" document was drawn up for each interested volunteer community. Ministry experts, including geographers and cartographers, constructed detailed assessments of the soils, hydrology, and terrain. Since there were no obligations to proceed further, and since the service was free, the assessment was seen as a useful document for local needs (e.g. zoning purposes). Many municipalities participated in this phase solely out of interest in the assessment itself. Ultimately, the requests to do detailed site studies (exploratory drilling and evaluation of data from drilling) were received from fifty-two out of seventy potential communities.

Communities that maintained an interest in hosting the waste facility continued into the second stage. This phase was comprised of creating a local advisory committee to study the proposal, and organizing a series of information meetings, which looked not just at hazardous waste treatment and disposal, but also at broader questions of waste management. A key objective was "to inform the public that the risks with a well-designed waste-management system were considerably less than the risks associated with waste mismanagement." At this stage, fourteen communities requested further consideration, although nine

were subsequently eliminated on either environmental grounds or in response to vocal public opposition. Five communities remained eager to pursue the possibility of further involvement.

At this point, the siting process underwent a number of changes. The Task Force reduced its earlier emphasis on large town meetings in favour of greater numbers of smaller meetings in which a larger percentage of the population could participate and vocal opponents would be less likely to dominate. As one local resident explained: “At first, I was a strident opponent of the plant, and I was the last person who would ever be able to speak up at a big, public meeting. But in the smaller meetings I felt comfortable. I got to ask all of my questions and had them answered. It made all the difference.” (Rabe, 1994:67).

Prior to the final siting decision by the Government Cabinet, all five communities on the “short list” chose to hold a referendum to determine public interest. To prepare the public to make an informed decision, each community received as many detailed educational seminars as were necessary to meet the demand. This proved to be most beneficial, as voter turnout was high in all cases, and results were all in favour of hosting a facility. In addition, detailed hydrogeologic investigation reports concluded that all sites could be capable of supporting the waste facility.

In September 1982, seventy-nine percent of Swan Hill voters supported the facility proposal. Another community from the “final five” – the town of Ryley – voted seventy-seven percent in favour of hosting the facility. The town of Swan Hills was selected by Alberta Cabinet as the site of a comprehensive waste facility in March 1984. In the Environment Council of Alberta final report that recommended Swan Hills, the number one criterion under “Essential Criteria” was: “There must be a substantial degree of public acceptability...”

Community leaders from the town of Ryley were very outspoken in vocalizing their disappointment in not being selected as a site host. They believed that Ryley was a better site physically and closer to waste generators and that the decision came down to political favouritism.

The voting outcome was not the sole reason for the government’s selection. Swan Hills proved attractive to provincial policy makers because it was relatively close (209 kilometers) to Edmonton and linked to it directly by a provincial primary highway. At the same time, unlike Ryley and other candidate sites, Swan Hills had no immediate neighbouring communities, so its acceptance of a facility did not require garnering the support of any nearby towns.

A source of potential opposition was also missing from Swan Hills situation. Whereas conflict between farmers and non-farmers was a feature of the facility siting debate in other Albertan would-be host communities, there was little such division in Swan Hills. The combination of poor soils of the region and its harsh northern climate both inhibit agriculture in the region. Consequently, there is no farming around Swan Hills: indeed, there is no farm within 50 kilometers of the town.

As for the town of Swan Hills, it was eager to diversify its economy, which was previously reliant on oil and natural gas extraction, and attract investment of long-term economic development. Like many small Albertan—and Western Canadian—towns of this period, the Swan Hills' unemployment and bankruptcy rates increased rapidly in the late 1970s and early 1980s. The other four communities that held plebiscites over siting were also eager for economic development and diversification, but were not in as serious an economic down-swing as Swan Hills.

4.0 Compensations and Benefits

A community is highly unlikely to volunteer unilaterally to host a treatment or disposal facility in the absence of tangible economic rewards or clear assurances of long-term safety in facility management. Market approaches to siting, with their primary emphasis on the attractiveness of compensation packages, are frequently dismissed by public as bribery and fuels strong animosity toward facility proponents.

In the Alberta case, most of the communities that stayed in the process did so in part because of the perceived economic benefits of hosting the facility. However, it should be stressed that other than the promise of new local jobs and a significant tax assessment that would result directly from the facility development, the Task Force made no explicit offers of community compensation. Therefore, the strongest expression of interest came from smaller communities, where the benefits per capita were magnified.

Benefits to the town of Swan Hills commenced with plant construction when some 150 construction workers were housed and fed locally. Various other benefits have been realized by the town including economic diversification, increased population (approximately 120 new residents), increased local employment (60 positions at the treatment center), construction of new homes (18 houses, 17 townhouses), increase tax base, upgraded local utilities, and improvements to the local tourism industry.

In addition to above mentioned benefits, the province has established a fund, held by independent third party, to assure perpetual care of the landfill site following its eventual closure and to cover twenty years of monitoring.

5.0 Outcome

Since the Swan Hills Special Waste Treatment Centre opened in 1987 with the capacity to incinerate organic liquids and solids, treat inorganic liquids and solids, stabilize and decontaminate hazardous wastes and landfill contaminated bulk solids. The centre was expected to process approximately 15,000 to 20,000 metric tons of hazardous waste each year, although its potential capacity is significantly greater. Many consider it to be one of the most comprehensive and integrated treatment facilities ever constructed in North America, considering the breadth of treatment approaches and types and volumes of waste that it can handle. The centre is expected to preclude any need for additional major facilities in the province.

Following site selection, local committees throughout the province continued their involvement in waste management issues and many centres have benefited from an enlightened view of recycling, solid waste disposal and the collection and transfer of hazardous waste.

In conclusion, it should be mentioned that Alberta's voluntarily approach to the selection of a site for the hazardous waste treatment facility utilized basic principles of information flow, total disclosure and public involvement in decision making. This ensured that the reasons for choosing the preferred location for the facility were completely clear to the public and the potential host communities. This program covered the entire province and indeed, assessed many areas that may have seemed illogical. By intentionally avoiding preference for any location and by applying criteria which were consistent with the protection of the environment, site selection was met with widespread public interest and acceptance. The main difference between Alberta's siting programs and most others is that no location was predetermined and no area was considered without public consent.

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Appendix D

**Review of the
Voluntary Siting Process in Ontario for
the Management of
Low Level Radioactive Waste**

1.0 Introduction and project Background

In Ontario, during the 1930s, 40s and 50s, a refinery in Port Hope processed radium. The remains of this industrial activity are approximately 1.1 million cubic metres of historic low-level radioactive waste (LLRW). The LLRW was scattered throughout the town (pop. 16,000) and other wastes from the refinery can be found in the neighbouring municipalities of Welcome (in Port Hope Township) and the Port Granby site in Clarington (west of Port Hope).

In 1975, “extensive radioactive contamination” was found in this area. It was then that the Atomic Energy Control Board (AECB) began to consider management options for the LLRW. A disposal facility for LLRW was suggested to “protect people and the environment from LLRW now stored in southern Ontario.” The objectives of long-term containment and isolation of LLRW were to protect people and animals from direct radiation and to keep radionuclides and other contaminants from entering the air, watersheds and soils.

There were several attempts by a Federal Crown corporation to site a low-level radioactive waste management facility in Ontario. However, the public reaction was harsh because of a perceived lack of public involvement in the initial siting processes. In response, in December 11, 1986, “the federal government established an independent task force to advise on a less confrontational approach.” Based on voluntary participation of communities in a “collaborative, joint decision-making” process, the Siting Process Task Force recommended the use of a Cooperative Siting Process in December 1987. This proposed siting process was different than others that had been tried in Ontario. The process relied on communities to volunteer to host a LLRW disposal facility in exchange for a comprehensive set of benefits.

A five-phase process was developed, and in September 1988, the Minister of Energy, Mines and Resources appointed a new Siting Process Task Force (SPTF) to implement *Phases One to Three* of the *Cooperative Siting Process* in 18 months (the time frame was subsequently extended to 23 months). In that time, the mandate was to:

- Initiate the Process aimed at the improved management of low-level radioactive wastes in Ontario.
- Report to the Minister in 18 months about volunteer communities, recommended disposal options, proposed terms of reference, and detailed cost implications.

During Phase One of the process, 850 municipalities in Ontario were invited to learn about the process. Eight Regional Information Sessions were held and after those large sessions, 26 communities volunteered to hear more about the process. Of those 26 communities, 14 municipalities participated in a consultation program to learn more about the potential benefits of hosting a LLRW disposal site and to have their concerns heard. The range of options narrowed down again in 1991 when three communities emerged as potential volunteer sites. Eventually, Deep River - a community of 14,300 in northeast Ontario - was the sole volunteer municipality to host a LLRW site. The story of Deep River and the voluntary siting process ends in 1997 when the discussions between community groups, the Town Council and the federal government ended with Deep River withdrawing from the process.

This case study describes in more detail, the five-phase process, alternatives means, impact management measures, the Community Agreement-in-Principle (CAP) and the outcome.

2.0 Alternative Means to the Undertaking and Alternative Methods

During the siting process, the public requested that the Siting Task Force identify and examine a range of alternatives to storing LLRW in a volunteer community. In the “*Deep River Initial Assessment Report*” by the Siting Task Force (August 1995), the proposed alternatives were summarized in three groups: (1) On-site management; (2) Alternative volunteer community; and (3) Absence of a volunteer community. Each alternative to a disposal facility was assessed against the mandate of the SPTF:

To implement the Co-operative Siting Process and find a community to volunteer a site for the proposed LLRW facility

A full analysis of the alternatives (other than selecting a volunteer community) was undertaken in response to public demand. The alternatives to a LLRW facility in Deep River are were gathered and are summarized in “*Costing Study of Do Nothing Scenario and Other Alternatives.*” Below, each alternative is summarized.

2.1 Group One Alternatives: On-site management

2.1.1 “Do Nothing”

This alternative involved maintaining the status quo at Port Granby and Welcome and, therefore, leaving waste in its current state. In addition, the LLRW in Clarington, Hope Township, Town of Port Hope and Scarborough would have been left on-site. This option was rejected because it contradicted the AECB’s orders to remove the LLRW.

2.1.2 Stabilize and Manage

The second option under Group One involved enhanced management of the wastes *in situ* in Clarington, Hope Township and the Town of Port Hope, including improving engineering and stabilization work. This alternative was not selected because it, too, did not support the AECB’s objectives to decommission the Port Granby and Welcome sites and remove the waste to a permanent storage facility.

2.2 Group Two Alternatives: Other Potential Volunteer Community

2.2.1 Disposal in Port Hope

Disposal in Port Hope was considered an alternative late in the process because in October 1994, the Port Hope Council confirmed their willingness to be a Potential Volunteer Community for the permanent storage of LLRW. During Phase Four of the siting process, many selection processes and assessments were undertaken in Port Hope, including a public referendum that was passed. However, in July 1995, Council withdrew from the process: they cited irreconcilable differences during the negotiation of the Community Agreement-in Principle. This option was an alternative to the offer of Deep River to host the LLRW facility. However, it was not brought forth as a viable option because of the community’s withdrawal.

2.3 Group Three Alternatives: Absence of a Potential Volunteer Community

2.3.1 Impose a Solution Locally

The first Group Three alternative was to construct a facility in, or near, the Source Communities (i.e., Port Hope, Port Granby and Welcome). This would have involved one site for all wastes from the three Source Communities. This option would have involved a new site selection process. This alternative was rejected because it was not within the mandate of the SPTF to impose a site without a community’s consent.

2.3.2 Dispose Commercially

Another option was to dispose of the waste at a commercial facility. At the time of the decision, there was one commercial facility in North America called Envirocare, located 135 km west of Salt Lake City, Utah. This option was rejected because of political difficulties in trans-border waste shipments and prohibitive transport costs

2.4 Alternative Technologies

In addition to the alternative means to undertake the siting process, the Siting Task Force identified many potential technologies to deal with the LLRW. In essence, each potential volunteer community had to understand the concepts of disposal, storage and long-term storage of LLRW. Four potential technologies are described in detail on pages 5-5 to 5-14 of the report titled “*Deep River Initial Assessment Report*” (1995). Alternative technologies in the case of Deep River included:

- Engineered burial mound;
- Shallow burial trench;
- Open pit with previous surround; and
- Underground mined cavern.

In addition, the Siting Task Force outlined waste transportation options on pages 5-15 to 5-22 of the same report. They included:

- Long haul transportation to Deep River
- Local transportation in the Source Communities from the current waste sites to the start of the long-haul route
- Local transportation from the end of the long-haul route to the proposed facility in Deep River

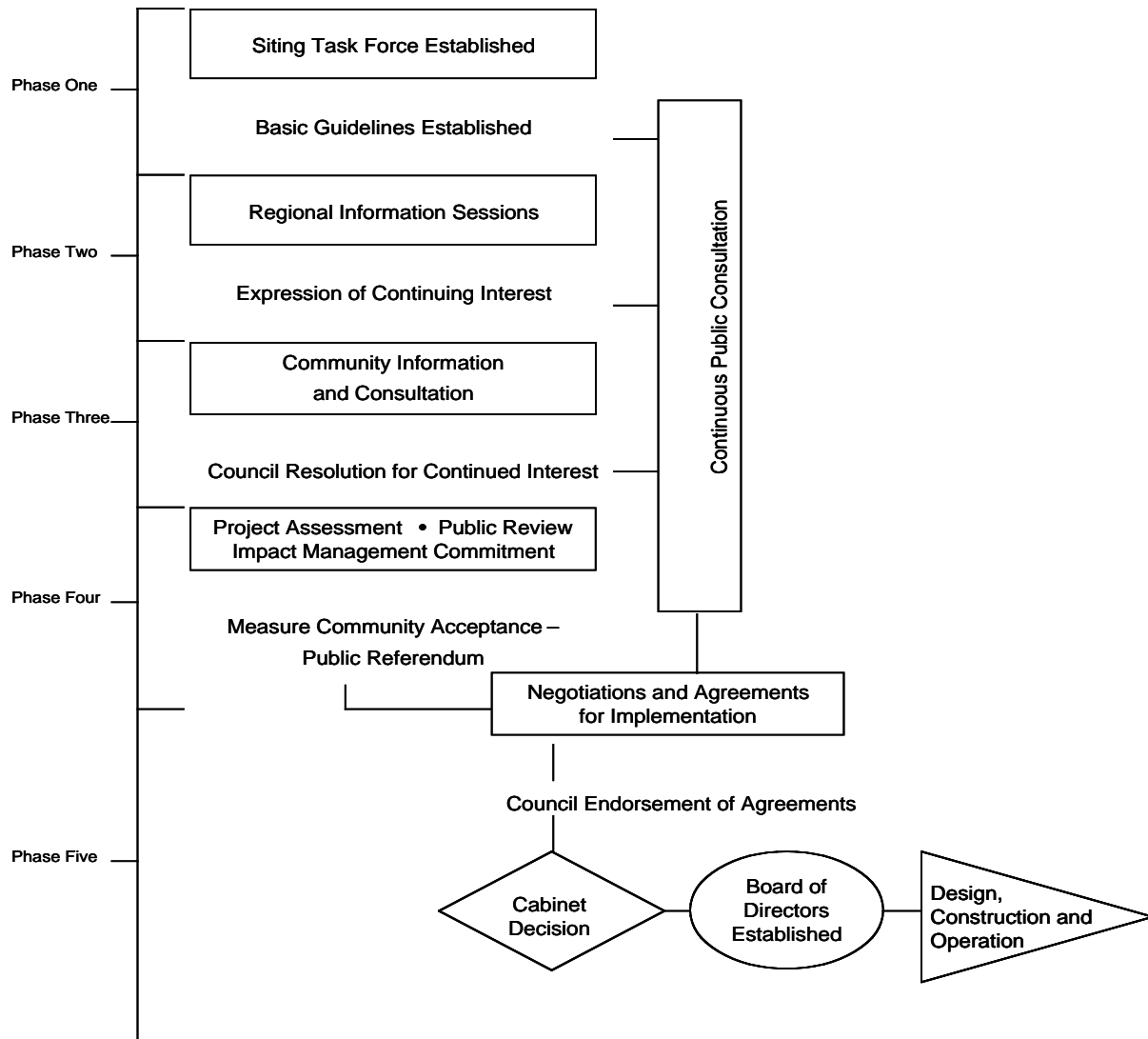
3.0 Site Selection

The Cooperative Siting Process to identify a volunteer community to accept LLRW for long-term, permanent storage started in 1987 and lasted until early 1997. The approach to site selection was to be different from traditional sitings in Ontario, in that it was to rely heavily on community consultation and choice at the community level regarding whether or not to accept a LLRW storage facility. The process, as outlined in *Figure 1*, was divided into five phases:

- Phase One: Establishing Guidelines*
- Phase Two: Regional Information Sessions*
- Phase Three: Community Information and Consultation*
- Phase Four: Project Assessment*
- Phase Five: Implementation*

The following pages contain a description of each of the Phases along with the timing and outcome of each.

Figure 1. The Cooperative Siting Process (graphic adopted from “*Opting for Cooperation: A Process in Action*” a report of the Siting Task Force, August 1990, page 11)



Phase 1: Initiating the Cooperative Siting Process

Phase One began in 1988 and it involved information and awareness building, inviting municipalities to participate and commencing the siting process.

At the outset of the Phase, there were some process adjustments in terms of content of the subsequent Phases based on public review of the criteria. In addition, the Siting Task Force clarified certain parts the Process including:

- Confidentiality of meetings
- Ongoing low-level radioactive wastes
- Opting out of the Cooperative Siting Process
- Community report
- Definition of “community”

The Task Force also had to deal with the larger question of waste management priorities. After many discussions, the conclusion was that the Task Force would place “top priority on the improved management of the historic low-level radioactive waste accumulations produced from past practices and located in Port Hope, Scarborough and at the Welcome and Port Granby sites.”

In addition, this Phase involved a province-wide community consultation program to reach out to interest groups, government agencies, the media and local communities. In addition, a Technical Advisory Committee was formed to provide communities with information on safety standards, guidance on waste issues and licenses.

Part and parcel of the Cooperative Siting Process was that: *An explicit, up-front impact management policy [would] be used to ensure that all communities [were] aware of the range of options available to them.* Therefore, the draft Impact Management Guidelines were made public in March 1989; however, no revisions resulted from that process. (Refer to Section 5 of this report for more detail on Impact Management).

Site elimination criteria were also developed during *Phase One*. This meant that at the outset, any areas or sites that were deemed unsuitable were eliminated. The elimination process was governed by five Level One criteria (guided by federal and provincial policies and regulation) and seven Level Two criteria (incorporating previous experience, technological options, etc.)¹

Another key outcome of *Phase One* was the creation of Community Liaison Group (CLG) guidelines. These guidelines were meant to facilitate community participation and ensure that the siting process reflected all community interests. Based on the outcomes of Phases One to Three, the Task Force would have, in hindsight, made the CLG documents much clearer and given more thought to the roles and responsibilities of members.

During *Phase One*, the Siting Task Force distributed introductory letters to all 850 municipalities in Ontario. Then, in February 1989, all municipalities were invited to send two representatives to attend a regional information session. The process for the regional information sessions is included below.

¹ These criteria can be reviewed on pages 18 and 19 of “Opting for Cooperation: A Process in Action” a report of the Siting Task Force, August 1990.

Phase 2: Regional Information Sessions

The purpose of the regional information sessions was to provide municipalities with a chance to learn about the Cooperative Siting Process and the need for long-term management of LLRW. Eight sessions were held in the spring of 1989. During the sessions, the voluntary nature of the process was emphasized. Over 400 participants attended the sessions to request information and express concerns. Afterwards, the response from municipalities for more information exceeded the anticipated response: 26 municipalities requested further information. Therefore, the regional sessions were deemed a success in that they reached out to number of communities. However, at this stage, there was concern that many of the communities were in northern Ontario - far from the source of the LLRW in southern Ontario.

Phase 3: The Siting Task Force Information and Consultation Process

The purpose of *Phase Three* was to ensure that communities had enough information to make an informed decision about LLRW storage.

The first step was to visit the communities that had been carried forward from *Phase Two*. Although 26 communities initially requested more information, five municipalities withdrew from the process before the introductory sessions could be held: the Township of Chisholm, Township of Sydney, Fort Frances, Oshawa and Faraday. The Siting Task Force presented each Town Council and members of the public with information about the process. They explained the need for any interested communities to form a Community Liaison Group (CLG) and for each community, in conjunction with the Task Force, to widely advertise and publicize the process.

During this stage in the process, the Siting Task Force received a lot of public feedback including the following concerns:

- The potential health risks, and the risks to ground and surface water were perceived to be high, with a baseline health study considered essential before proceeding;
- The potential negative impacts on economic development and tourism were believed to be severe;
- The potential transportation risks and effects were also thought to be great;
- Citizens were often not convinced of the long-term integrity of the technology needed to manage LLRW; and
- Others concerns reflected a lack of trust in the federal government's willingness to pay for compensation and for a well-managed facility.

Following the information sessions, seven of the potential volunteer communities recommended against proceeding further: this was likely because of a lack of public support. In *Phase Three*, fourteen communities continued on, and each formed a CLG. The Community Liaison Groups played a large role in presenting community's views. By April 1990, all fourteen communities had formed CLGs. Every Community Liaison Group member was paid a nominal honorarium and was reimbursed for expenses. Each CLG moved at its own pace, in line with the community's lead. At this point, some observers noted that since multiple municipalities were considering volunteering for the facility siting, the process was "competitive," not cooperative. The Task Force believed that the process was both competitive and cooperative because of the unconventional approach to siting.

Each Community Liaison Group was required, along with the Task Force, to create a consultation program to inform community members about the siting process, LLRW, waste management, potential technologies and impact management. The following techniques were utilized:

- Information packages;
- Guest speakers;
- Lewiston and Port Hope area site tours;
- Thunder Bay meeting of all CLG chairpersons and facilitators;
- Newspapers, video, television and radio, printed material, presentation to the community, open houses, information displays, informal meetings, questionnaires, and polling; and
- Community profiles and concerns.

The fourteen communities that participated in *Phase Three* were well informed about the siting conditions which the SPTF was looking for in a LLRW facility, and they were also generally aware of the benefits that may come as a result of serving as host community. At the end of *Phase Three*, the CLGs made recommendations about whether or not they thought the community should continue; Town Councils then made their resolutions. Each of the communities, and their decisions, are briefly described below.

Atikokan

The CLG recommended opting out of the process, which the Atikokan council supported. Issues included distance from source communities, (Atikokan is in northwestern Ontario), concern over transferring risk and liabilities from stronger areas to weaker ones, from south to north.

Deep River area (including Deep River, Chalk River, the United Townships of Rolph, Buchanan, Wylie and McKay, and Head, Clara and Maria Townships)

This amalgamated area was represented under one CLG. The CLG recommended to the municipal council to proceed to *Phase Four* and an assessment.

Ear Falls

The CLG in this small town in northwestern Ontario recommended to their Council that they opt out of the siting process. Issues raised included concerns over impact on the tourism industry and potential of water contamination. Ear Falls is located far from the source LLRW.

Elliot Lake

This town, in the near north of Ontario, initially recommended that it proceed to *Phase Four*. However, after prolonged discussion, it decided not to continue because of uncertainty and concern over the future of the local economy.

Geraldton

The CLG in this municipality, located close to the north shore of Lake Superior, recommended continuing to *Phase Four*, and the town council approved this decision. The interests included their hope for economic diversification and the anticipated compensation benefits package.

Hope Township

As a source community for LLRW, the CLG recognized the necessity of continuing in the process. The Town Council supported this resolution.

Hornepayne

A great deal of controversy surrounded this municipality's involvement in the process. Some citizens actively protested the proposal. Concerns over health effects and social impacts divided the community. The CLG recommended that Hornepayne opt out however, after long discussions with the Town Council, a resolution was passed to continue to *Phase Four*.

Manitouwadge

The CLG recommended that the municipality opt out of the process, which was supported by the Town Council.

Mattice-Val Cote

The CLG recommended that the municipality opt out of the process. Town council supported this decision. The community was concerned about site elimination criteria and the municipality could not agree on a site to host the facility.

Newcastle

Being a source community, the CLG and the SPTF intended to develop an action plan for developing a report on whether Newcastle would continue into *Phase Four*. Conflicts and setbacks abounded and this community did not proceed to *Phase Four*.

Port Hope

The CLG advised the Town Council of overwhelming local support to find a solution to the long-term problem of LLRW in Port Hope. As a result, Council approved passage to *Phase Four*.

Red Lake

This northwestern Ontario town was one of the most northerly municipalities that formed a CLG. However, after strong community opposition to hosting a facility, the CLG recommended that it opt out of the process: Town Council approved this decision.

Township of James

Though the CLG recommended proceeding, the Town Council had delayed a decision for approval until a referendum was held. The general issues revolved around transportation to the community and the compensation package. The Township did not proceed to *Phase Four*.

Upsala

This northwestern Ontario town received overwhelming opposition to hosting a site. As a result, the CLG recommended to opt out of the process and advised the SPTF that it would not continue in the siting process.

The SPTF took many considerations into account and recommended the three volunteer communities of Deep River, Geraldton, and Hornepayne to proceed to *Phase Four*. The volunteer communities were thanked for their willingness to participate and the SPTF agreed that distance from the source LLRW should not be a deciding factor for participation in *Phase Four*.

Phase 4: project Assessment, Public Review, Impact Management Commitment

Phase Four of the Cooperative Siting Process took place from 1991 to 1995. *Phase Four*, however, appeared to mark the departure for a joint-decision making approach towards a focus on approving and building a site.

At this point in the process, Hornepayne had withdrawn: the literature is unclear about the exact reasons, but it is believed that local public opposition and transportation costs played a role in the community's withdrawal. The transportation costs per metric tonne were estimated at \$37 for Deep River, \$68 in Hornepayne and \$70 for Geraldton.

Therefore, the three final communities were Geraldton, Port Hope and Deep River (A Community Volunteers, Siting Task Force, November 1995, pages 49 to 51). The three communities that were assessed in *Phase Four* were geographically distant and each had different reasons for volunteering, as described below.

Geraldton

Geraldton (pop, 2,900) is located more than 800 km north of Port Hope. Its community leaders felt that the economic benefits package associated with LLRW storage was attractive. At the beginning of *Phase Four*, Geraldton was a potential volunteer municipality. However, the lands it wished to volunteer were out of its municipal jurisdiction. The annexation of the lands took longer than expected, therefore, in March 1994, the CLG recommend that Geraldton withdraw from the process because there was not enough time to prepare for the referendum scheduled for November of that year. The municipal council accepted the CLG's recommendation and they opted out of the process.

Port Hope

The role of Port Hope as a source community cannot be underestimated. Port Hope was the source of the LLRW and therefore, transportation costs would be extremely low. There were serious differences of opinion between the Siting Task Force and the Town Council of Port Hope about the terms of the Town's volunteer status. Eventually, lengthy negotiations over the CAP in Port Hope broke down because of disputes over the degree of property protection offered by the federal government. The Council opted out of the process in July 1995.

Deep River

Deep River (pop. 14,300), a community in northeast Ontario, was interested in the potential economic benefits and was also looking for a long-term solution to dispose of the temporarily-stored waste at the nearby Chalk River Laboratory (CRL). As a result of the withdrawal of Port Hope and Geraldton, and the previous withdrawal of Hornepayne, Deep River was the sole community willing to move towards a project assessment. Therefore, this discussion focuses on the process in Deep River during *Phase Four*. Assessments were carried out on the following:

- Construction of a mined cavern facility within the municipal boundaries of the Town of Deep River;
- Excavation of LLRW from the existing storage sites and transportation to a rail terminal;
- Remediation and decommissioning of the existing sites;
- Transportation by rail of LLRW from the source communities;
- Relocation of bulk wastes currently stored in Deep River and managed by AECL;
- Design options for a mined cavern; and
- Phased closure of the mined cavern facility and implementation of a long-term monitoring program.

Each of these assessments is described, in detail, in the "*Deep River Initial Assessment Report*," 1995.

The potential effects of a site in Deep River on the natural environment were assessed for:

- Air quality (including dust, radon and vehicle emissions);
- Noise and vibration;
- Groundwater;
- Surface water;
- Aquatic habitats and species;
- Terrestrial habitats and species; and

- Valued Ecosystem Components.

Each of these assessments is described, in detail, in the “*Deep River Initial Assessment Report*,” 1995.

Effects on the human environment were then assessed: the community’s demands are summarized in the Community Agreement-in-Principle (see *Section 5.0* of this report for further details).

The SPTF concluded that at the end of *Phase Four*:

- There was sufficient information on the proposal, the risks and the benefits for Deep River to make an informed decision;
- The initial assessments showed that “potentially adverse environmental effects that may be caused by the proposal” were either “insignificant or mitigable with known technology”;
- The CAP outlined direct and indirect benefits to the community;
- There was sufficient public consultation;
- The AECB would likely licence the proposed mined cavern facility; and
- Detailed site characterization and engineering design needed to be completed before applying the AECB.

Behind the scenes of the assessment, there were growing concerns in the community, and impatience at the federal level with the progress of the voluntary siting process. *Phase Four* began to move away from a joint decision-making process towards a focus on building a site. Once the SPTF Secretariat (the actual federal bureaucracy) began to regard the Deep River CLG as less of a partner, and more of an ‘assumed’ host during the technical assessment, communication between the parties began to break down. The SPTF Secretariat wanted to streamline the final phase. The SPTF Secretary-General argued that the process had become too participatory, costly, complicated and time-intensive. The government response was to postpone consultations with neighbouring and access-route communities until Phase Five. The municipality of Deep River, the town council, the CLG and neighbouring, downstream and access route communities strongly disagreed with their new stance.

Phase Five was never reached because Deep River withdrew from the process in 1997. There were many events leading up to the decision to withdraw, and there is not one single reason that can, in hindsight, be pinpointed as the main reason. Some events in the three years between 1994 and 1997 that led to the withdrawal of Deep River are explored in more detail below.

During *Phase Four*, neighbouring municipalities downstream from Deep River began to pressure the CLG chairperson about their concerns over the potential environmental effects of the proposed facility. As a result, the chairperson threatened to resign unless neighbouring towns were allowed to vote on whether or not to proceed to Phase Five. The SPTF Secretariat and Deep River’s Town Council rejected the suggestion to expand the voting to neighbouring communities. In October 1994, the CLG issued a letter of resignation.

A vote was held in Deep River in September 1995 to gauge public sentiment about a LLRW facility. Seventy-two per cent of voters (with a 62% voter turnout) supported the agreement to site a facility in Deep River.

Another separate vote was held in the neighbouring towns: the result of this vote was the rejection of the plans to host a LLRW facility. Recognizing the growing discontent in the region, and the need to manage it, a study group was formed to focus on the potential downstream affects a LLRW facility on drinking water.

Neighbouring communities continued to voice their concerns that the suggested LLRW facility was actually downstream from the town of Deep River, though technically inside the municipal boundary. In essence, they felt that the potential environmental risks would be heavier on communities lower on the Ottawa River, yet Deep River residents would receive the compensation packages and benefits. As a result of continuing pressures that emerged from the study group, the Deep River CLG went on to include Chalk River and United Township representatives on the CLG.

Disputes also emerged over the compensation and employment benefits package that the Deep River Council wanted to guarantee in the final agreement. In the Agreement-in-Principle between the negotiating committees of the Deep River Town Council and the Siting Task Force, the section on economic benefits outlined the security of medium and long-term employment. This became an issue of contention since the demands of the Town were not in line with what the federal government was able to guarantee to the municipality.

Reports reveal that the SPTF and the SPTF Secretariat fell out of favour with the Deep River Town Council and Mayor when plans were released that showed their intent to expand the size of the facility to include the disposal of more highly radioactive waste being produced at Chalk River Laboratory.

Later in the process, community members felt that the siting process had been reduced to illegitimacy. Various factors contributed to this breakdown in the process, including the lack of public access to information that the SPTF, their consultants and Town Council had access to. The community eventually withdrew from the process in 1997, when federal and local officials were unable to agree on the job guarantee assurances in the CAP.

Phase 5: Negotiations and Agreements for Implementation

Phase Five was never completed because Deep River - the sole volunteer community remaining in *Phase Four* - backed away from the siting process. This Phase would have included finalizing the CAP, impact management measures, endorsement and agreement from various levels of government, and finally, construction and monitoring plans.

4.0 Management Measures

The Siting Task Force defined impact management as “actions or strategies to handle the effects of the proposed low-level radioactive waste management facility on the economic, demographic, housing, public service, fiscal, environmental and social aspects of a community.”

Impact Management Guidelines, as outlined in Phase One of the Cooperative Siting Process, state that “[a]n explicit, up front impact management policy will be used to ensure that all communities are aware of the range of options available to them.” At this time, Impact Management Guidelines were generic and would specify the measures to be undertaken in the volunteer municipality to:

- Protect human health and safety;
- Prevent or reduce potentially adverse effects from facility construction and operation;
- Compensate for any unavoidable negative effects; and
- Enhance local benefits.

A workshop was held in February 1989 to discuss the development of impact management policies, and in March 1989, a draft version was circulated at the regional level and distributed at community

information meetings in *Phases Two* and *Three*. Based on that, the measures of mitigation, compensation, contingency and community relations would be available to participating communities (described below):

- **Mitigation measures** as standard practices for project planning would include modifications to facility design, such as pollution and noise reduction devices and architectural compatibility with surroundings, careful site design and layout that included landscaping and naturalization, and adoption of environmentally sound construction and operational practices.
- **Compensation measures** were to include both impact-related and equity-related compensation. Examples outlined by the SPTF of impact-related compensation included in-kind compensation for damages done, service subsidies, property tax abatement to offset potential tax increases, property value protection, and property buy out. Equity-related compensation included local purchasing and hiring policies, tax subsidies, tipping fees, co-use of the facility, bonus services, and bonus facilities (see *Section 5.0* for further details).
- **Contingency measures** went on to include environmental monitoring and emergency response, planning, and financial security. The environmental monitoring program for Deep River was based on a tentative agreement, this included creation of a project Monitoring Committee (PMC) that would “review, assess and disseminate pertinent information, including the results of monitoring activities, consistent with the license requirements of the Atomic Energy Control Board.” The PMC was to receive funding for staff and consulting support and was expected to submit annual and, if necessary, interim reports to the Deep River Town Council and federal authorities.
- **Community relations measures** included liaison committees, telephone hotlines, complaints procedures, and claims resolution processes.

5.0 Community Agreement-in-Principle (CAP)

The Deep River Community Agreement-in-Principle (CAP) established the community-based conditions under which a new facility for the disposal of low-level radioactive wastes (LLRW) would be developed, operated, monitored and closed. The SPTF noted that three conditions were necessary:

- 1) Community approval of the proposed project in a referendum;
- 2) A subsequent decision by the Government of Canada to proceed; and
- 3) Licensing of the project by regulatory authorities.

The results of the process show that it broke down before meeting the second condition. Part of the reason for the dissolution of the process was the community and the federal government could not agree on a set of benefits, namely, the contents of the CAP. Below is an outline of the requests of the Siting Task Force and the Corporation of the Town of Deep River as provided in a July 1995 publication titled *Deep River Community Agreement-in-Principle*.

5.1 Economic Benefits

Anticipated economic benefits included:

- Direct and indirect employment -
 - construction and operation of the mined cavern facility was expected to employ an average of 85 people for 10 years;

- The purchase of goods and services from local businesses -
 - potentially as much as \$20 million from the local economy;
- A grant-in-lieu of property taxes paid to the municipality by the federal government based on the assessed value of surface facilities;
- Locally advertised employment opportunities;
- Preference for hiring locally; and
- Encouraging businesses in Deep River and Chalk River to compete for contract and sub-contracts involving the transportation of wastes.

5.2 Equity Compensation

The primary form of equity compensation was to be directed towards a continuing federal presence at Chalk River Laboratories (CRL) to maintain or increase existing employment levels. The consent of the Town of Deep River to accept the proposed mined cavern facility was conditional upon a commitment from the federal government to maintain employment at CRL at not less than the level as of March 31, 1995. Potential activities to maintain the federal commitment to maintaining job levels included:

- Maintaining research programs;
- Investing in infrastructure; and
- Upgrading existing facilities.

A provision was written into the CAP that if the general plan that the Town presented to the federal government was not fulfilled, the government would have to pay the Town of Deep River “a tipping fee on the historic Port Hope area LLRW as the material is placed in the LLRW disposal facility, amounting to \$30.00 per cubic metre...”

5.2.1 Economic Diversification

A secondary component of the Equity Compensation was to be direct cash payments that would be specifically applied to economic development and diversification programs. The CAP suggested a total payment of \$8.75 million from the federal government to the Town of Deep River: \$1 million on signing the CAP, \$4 million after approval from the AECB and \$3.75 million after one year. The CAP outlines six specific programs the funding would be designated for.

5.2.2 Compensation for Additional Historic Wastes

The CAP suggested that the federal government pay \$12.00 for every cubic metre in excess of 15% of the originally estimated amount of LLRW to be disposed of in Deep River.

5.3 Mitigation

The CAP outlines mitigation and monitoring programs for the following:

- Water supply;
- Noise;
- Dust;
- Vehicle emissions;
- Excavated rock;
- Monitoring the project construction;
- Complaints;
- Accident and spill response;
- Facility monitoring; and

- Closure of the facility.

5.4 Remediation

The CAP document outlines remediation measures: these are actions that would be taken to “compensate individuals or organizations for negative effects that cannot be avoided or satisfactorily reduced through mitigation.” Ideas included the establishment of a Claims Resolution Committee, procedures for registering complaints and small claims, and a property value protection program.

5.5 Management Committee

Finally, the CAP suggests a Management Committee that could help the community participate in the LLRW disposal project post-federal government approval.

6.0 Key Arguments, Strategies and Drivers

6.1 Regional Boundary Issues

The regional boundary issue was discussed at length in *Section 4.0, Phase Four*. In essence, the communities downstream from Deep River were upset that Deep River was in line to receive the compensation packages and economic agreements, but the downstream communities would not. Those communities felt that they would bear the brunt of any adverse environmental impacts of a LLRW disposal facility and that it was unfair that only Deep River would benefit financially. Concerns were also raised that although the proposed site was within the municipal boundaries of Deep River, it was in fact, closer to the downstream communities. Neighbouring communities were excluded from the siting referendum. This was at a time, during *Phase Four*, that neighbouring communities of Deep River wanted more input into the siting decision including an opportunity to participate and influence the process: therefore, regional public opposition grew.

6.2 A Process Developed To Ensure Public Involvement

The process was initially designed to ensure public involvement and commitment at every stage of the process. However, Gunderson and Rabe (1999) note that “the Ontario LLRW siting process lacked the more integrative nature of successful siting in Alberta and Manitoba. In these cases, other key components such as formal burden sharing among multiple communities... were woven through the siting deliberation process.” Looking back, the Deep River CLG felt powerless in their role and addressing the issues and concerns of neighbouring communities and therefore withdrew from the siting process.

Some lessons learned by the Siting Task Force (SPTF) include the need for flexibility in the timing and approach of some process-related issues and ensuring that potentially affected communities have rights in the process. Based on the results of Phases One to Three, the SPTF recommended the following: clear objectives and transparent procedures, more support and guidance for the CLGs, additional information provision for the CLGs on the process, and clear delineation of roles and responsibilities for all parties. Something else that would have been advantageous at the outset of the process was for the Task Force to be able to clearly explain to communities what the tangible benefits of accepting a facility were. “Residents wanted to know, at the outset, what was in it for them.” The SPTF also notes that it would have been helpful for the federal government to affirm its commitment to equity compensation. Looking back, the Task Force would have focussed more attention, in the consultation stage, on the perception of risks, stigma and ethical concerns.

6.3 Clear Benefits For Community Members

Once Deep River was selected as the preferred community, the focus for the SPTF was then on putting together a suitable benefits package to ensure local support for the LLRW facility. However, in 1997, the federal government and local officials were unable to come to agreement on the CAP job assurances in the mid- and long-term. In hindsight, the Task Force recommended that in the early stages of the Cooperative Siting Process it would have been beneficial if communities had understood what was in it for them at the outset. In Phases One and Two, the equity packages and impact management agreements had not been drafted. It was difficult to ask curious residents to “trust the process” to develop benefits packages. Perhaps, if consideration was given in the early stages as to what communities would want and what the federal government could offer, the result of the siting process may have been different.

Another critique of the process is that it “failed to engage a large number of Ontario communities in serious discussion of siting options,” and that it relied largely on one volunteer community. Since there were no alternative communities in 1997, there was nowhere to turn when Deep River refused to host the LLRW disposal facility.

7.0 Outcome

The outcome of the Cooperative Siting Process is that no Ontario community volunteered to host a long-term disposal site for LLRW. An explanation of the breakdown in the process is included in Section 4.0, Phase 4. Essentially, concerns were raised over potential impacts on groundwater; neighbouring municipalities felt that there was a disproportionate offer of benefits to Deep River when they were to bear the burden of potential adverse environmental effects. A vote was held in neighbouring municipalities about whether or not to host a LLRW storage facility and the idea was rejected. However, 72% of Deep River residents supported the idea in 1995. In addition, the compensation and employment package offered by the federal government was unable to satisfy the demands of the Deep River Town Council. In 1997, after almost a decade of public consultation, research and assessment, the process failed to identify a host site. Currently, long-term management solutions are being considered in the source communities.

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Appendix E

**Review of the
Geological Repository for the Disposal of
Spent Nuclear Fuel and High-Level
Radioactive Waste at Yucca Mountain**



1.0 Introduction and Background

Yucca Mountain is located on federal land in a remote area of Nye County in southern Nevada, about 100 miles northwest of Las Vegas, Nevada.

For over two decades, the Yucca Mountain project (the project, Proposed Action) has conducted an extensive scientific effort to determine whether Yucca Mountain is a suitable site for a deep underground facility called a repository. The purpose of a repository is to safely isolate highly radioactive nuclear waste for at least 10,000 years. This waste is predominantly generated by the nation's 107 commercial nuclear power plants.

The total cost of the project is estimated to be at least \$34 billion. The site is not expected to accept waste until 2010 at the earliest. If finally licensed, it is expected to hold up to 77,000 tons of waste, buried in a labyrinth of bunkers 660 feet beneath the surface.

In July 2002, Congress approved the President's recommendation of the Yucca Mountain site for development as a repository. The next step in the project's development is for the Department of Energy (DOE, the Department) – the Proponent – to submit a license application to the U.S. Nuclear Regulatory Commission (NRC). The NRC is the licensing and regulatory agency that will make the final decision on whether the DOE is allowed to proceed with construction and subsequent licensing to operate the repository. The DOE plans to apply for a license in December 2005.

Public opinion polls show that more than 75 percent of Nevadans strongly oppose the project. In addition, the state's congressional delegation, as well as the governor, the Nevada legislature, and most local governments are against the facility.

Yucca Mountain is a ridge comprised of layers of volcanic rock, called "tuff." This rock is made of ash that was deposited by successive eruptions from nearby volcanoes, between 11 and 14 million years ago. These volcanoes have been extinct for millions of years. At its crest, Yucca Mountain reaches an elevation of 4,950 feet. It receives less than 7.5 inches of precipitation on average per year. The mean annual temperature is about 63° Fahrenheit.

There are no known natural resources of commercial value at Yucca Mountain (such as precious metals, minerals, oil, etc.). No one lives there. The closest year-round housing is about 14 miles south of the site, in the Amargosa Desert.

The proposed Yucca Mountain repository withdrawal area would occupy about 230 square miles (150,000 acres) of federal land that is currently under the control of the U.S. Air Force, and the Bureau of Land Management.

According to DOE, Yucca Mountain would receive 28,000 highway and 10,000 rail shipments of high-level nuclear wastes over a 30-year period. Under federal guidelines, nuclear waste shipments would be made on existing interstate highways, designated state routes, and rail lines. The wastes would be contained in specially designed shipping casks.

The repository would be built at least 660 feet below the surface and at least 530 feet above the present-day water table. Initial plans call for an above ground waste handling facility covering 150 acres and an underground storage vault encompassing a labyrinth of tunnels up to 115 miles long. The surface complex would be located on the east side of Yucca Mountain. It would include "hot cells" for spent fuel handling, administrative offices, repair shops, warehouses, and loading docks. Utilities, roads, and a railroad would

need to be extended to the site. In addition, a muck pile would be required to contain rock and debris excavated from the underground vault. The below-surface repository would be a mile west of the above ground complex. Six access openings, four shafts and two ramps would connect it to the surface.

Canisters of radioactive waste would be transferred to multi-wheeled vehicles, which would transport them below ground. There, they would be unloaded and placed in boreholes. About 700 boreholes would be needed to house approximately 24,000 canisters in a horizontal emplacement configuration. Vertical emplacement of one canister per hole would require much more excavation. The operations period would consist of a 28-year emplacement phase and a 22-year caretaker phase. Afterward, the repository would be decommissioned and sealed for the duration of its 10,000-year life. Regulations prohibit reliance on any monitoring of the facility after it is closed.

2.0 The Need for the project

In 1975, President Ford decided to forego reprocessing of commercial spent nuclear fuel in favour of a once-through fuel cycle. In 1977, President Carter also decided that reprocessing should be indefinitely deferred to address urgent concerns about global nuclear proliferation. As part of this policy, President Carter proposed acceptance of spent nuclear fuel at an away-from-reactor facility.

The goal for a geologic repository at Yucca Mountain is to isolate nuclear waste from people and the environment for tens of thousands of years. According to DOE, as long as the waste stays in solid form and remains deep underground, it will not be harmful because layers of rock will shield its radiation.

From 1960 through 1996, the federal government issued licenses for 110 commercial nuclear reactors, which have served 34 states and combined to produce 20 percent of the nation's electricity. More than 40,000 tonnes of nuclear wastes already have built up at the plants with 2,000 tonnes added each year. Building a specially designed repository at Yucca Mountain will begin the process of moving used nuclear fuel and high-level radioactive waste now stored at 131 sites, including DOE facilities, university reactors, defence sites and commercial nuclear plants.

The Department's delay on its obligation to begin moving used fuel from nuclear power plants on January 31, 1998 has forced nuclear power companies to store more used fuel than expected for longer periods than were originally intended. By the end of 2006, about 60 reactors will run out of their original storage space, and by the end of 2010, 78 reactors will have exhausted their original storage capacity. Companies that have not added on-site storage capacity by those dates would have to do so at that point.

3.0 Alternative Means to the Undertaking

In 1979, a Federal Interagency Review Group (IRG) recommended geologic disposal of nuclear waste over other alternatives. Next year, taking into consideration safety, technical, legal and political criteria, in the *Final Environmental Impact Statement, Management of Commercially Generated Radioactive Waste*, DOE evaluated alternatives to mined geologic disposal, including:

- very deep borehole disposal,
- disposal in a mined cavity that resulted from rock melting,
- island-based geologic disposal,
- subseabed disposal,
- ice sheet disposal,

- well injection disposal,
- transmutation,
- space disposal, and
- no action.

According to this evaluation, none of the alternatives were superior to mined geological disposal. In that same year, endorsing the IRG recommendation in a speech to Congress, President Carter established a national policy of disposing of high-level nuclear wastes in geological repositories.

4.0 The Siting Process

In 1980, DOE initiated its repository-siting program. According to the technical and advisory studies, a preferred medium for geological disposal was salt. However, none of DOE's military reservations were located above salt deposits. This meant that the Department might need to consider private lands or deal with state governments, which often questioned the technical adequacy of sites, and demanded a strong voice in repository decisions. In response to these political problems, DOE requested that Congress support the repository-siting program with national legislation to allow the agency to assert rights over the states. This effort resulted in passage of the *Nuclear Waste Policy Act (NWPA)* in 1982. Pursuant to the Act, two repositories were to be built, one in the east and one in the west. DOE was required to recommend three sites in each region for full-site characterization by 1985 (for western areas) and by 1989 (for eastern areas).

The Department released draft EISs for nine sites in December 1984. By May 1986, the number of potential sites was narrowed from nine to five. Substantial criticism of these EISs occurred. These criticisms dealt with scientific processes used, scope of analyses, variables used for study, methodologies employed, data collection, and conclusions reached. Also, by the time the EISs for the western sites were being prepared, it became obvious that requisite scientific information for the repository program to be implemented on schedule would not be obtained.

While the process of selection from nine to five sites was based, in part, on incomplete EISs, the next reduction – from five to three – of the number of potential sites was very controversial. In 1986, the Department selected Yucca Mountain, Nevada, Deaf Smith County, Texas, and Hanford, Washington. The problem was that these locations were not the top three sites in the EA analysis at the previous stage, but were the first, third and fifth in order of suitability. DOE failed to explain why the site on its Hanford reservation, fifth in rank, was chosen over the second ranked site in Mississippi.

In 1986, unable to resist widespread public opposition throughout the eastern United States, the Energy Secretary suspended the search for the repository in the east indefinitely, arguing that a single repository would meet the national needs for the foreseeable future.

Due to the combination of controversies over the DOE program and schedule delays, Congress legislatively intervened in the nuclear waste-siting program a second time by adopting *Nuclear Waste Policy Act Amendments (NWPAA)* in December 1987. The new Act mandated that only one repository be constructed instead of two (one in the east and one in the west) and that Yucca Mountain be the only site to be characterized for suitability. Under provisions of *NWPAA*, no other site could be substituted without clear demonstration that Yucca Mountain is unacceptable for compelling scientific reasons. The burden of proof for determining its unacceptability was placed on DOE.

5.0 Public Involvement

Public Participation Process

Before publishing the Notice of Intent to prepare the EIS on August 7, 1995, DOE notified its stakeholders, the media, Congressional representatives, the Office of the Governor of Nevada, affected units of local government in the Yucca Mountain vicinity, the NRC and other Federal agencies such as the Bureau of Land Management and National Park Service, and the Nuclear Waste Technical Review Board of its plans to prepare the EIS and its approach to the scoping process. In addition, DOE met with 13 Native American tribes and organizations and provided them the same information.

When the Department published the Notice of Intent in 1995, it mailed a series of information releases to Yucca Mountain stakeholders notifying them of the opportunity to comment on the scope of the EIS; sent press releases and public service announcements to newspapers and television and radio stations; and made information about Yucca Mountain, the EIS, and the Environmental Protection Agency (EPA) process available on the Internet and in public reading rooms across the country. To reach low-income and minority communities, DOE contacted news publications and radio stations that tend to service these communities in order to notify them of the scoping meetings and the locations of available information.

In 1995, DOE held 15 public scoping meetings across the country during a 120-day public scoping period. It considered each of the comments included in the more than 1,000 documents it received during the scoping process and, in response, included additional information and modified analytical approaches.

During the preparation of the EIS, DOE held discussions with a number of government agencies and other organizations to discuss issues of concern, obtain information for inclusion or analysis in the EIS, and initiate consultations or permit processes. For example, DOE asked the American Indian Writers Subgroup to prepare a document that recorded the viewpoints and concerns of Native Americans about Yucca Mountain and the EIS.

The Department announced the availability of the Draft EIS for public review and comment in the *Federal Register* on August 13, 1999; this announcement began a 180-day comment period, which was scheduled to end on February 9, 2000. On February 8, 2000, DOE announced a 19-day extension to the public comment period to February 28, 2000. During this period, it distributed 3,400 copies of the Draft EIS to stakeholders and held 10 public hearings throughout Nevada and 11 public hearings elsewhere across the country.

Before the public hearings, DOE placed advertisements in local newspapers, including local Spanish-language newspapers, and distributed public service announcements and press releases to more than 175 local and national stakeholders and media outlets to publicize information that would be accessible to the general public and to minority and low-income communities. In addition, in concert with the publication of the Draft EIS, DOE made available Spanish-language fact sheets about Yucca Mountain and the proposed repository.

The Department designed the advertisements and public notices to provide the public with notice of the availability of the Draft EIS, and the opportunities and ways in which stakeholders could participate in public hearings (at specific locations and times) or provide comments by other means. The notices and advertisements indicated that the EIS evaluates the potential impacts of constructing, operating and monitoring, and eventually closing a repository at Yucca Mountain in Nye County, Nevada, to dispose of the Nation's spent nuclear fuel and high-level radioactive waste. They also indicated that the EIS will help Federal officials make informed decisions, and further informed the reader how interested parties could obtain additional information, including copies of the Draft EIS.

The Department generally selected locations for public hearings in Nevada based on their proximity to potential transportation routes and the potential repository site, or based on communities having relatively large populations. Given the impracticality of holding hearings at every location potentially affected by the transportation of spent nuclear fuel and high-level radioactive waste, DOE selected national hearing locations in the major metropolitan areas most likely to experience large numbers of shipments or at locations close to nuclear power plants.

Commenters were invited to submit their comments by regular mail, e-mail, faxes, and at public hearings at 21 locations. In addition, DOE held a meeting with representatives of Native American tribes and organizations to solicit their comments.

DOE received more than 11,000 comments on the Draft EIS from Federal agencies; state, local, and tribal governments; public and private organizations; and individuals. These comments were presented as recorded statements at the Native American meeting, recorded statements at the public hearings or in written documents submitted at those hearings or sent to DOE by regular mail, e-mail, and faxes.

As part of this Final EIS, the Department has included compact disks that contain electronic images of the certified transcripts of the Native American meeting and all public hearings held during the public comment period on the Draft EIS. These compact disks also contain electronic images of all comment documents (including transcripts for each commenter at the public hearings) that DOE received on the Draft EIS through August 31, 2001. In addition, DOE has placed this material on the Internet site for the proposed Yucca Mountain Repository, and has placed copies in DOE Reading Rooms across the country.

The Comment-Response Volume of the Final EIS contains all of the comments on the Draft EIS that DOE received through August 31, 2001, and the Department's responses to those comments. The department assessed and considered public comments on the Draft EIS both individually and collectively.

In response to some comments, DOE has modified the EIS in a variety of ways, including:

- Clarifications or changes to the text;
- New or more recent information (such as 2000 Census data and population projections); and
- Modified analyses (such as those for transportation impacts in which it modified the characteristics of the representative commercial spent nuclear fuel and accident source terms).

Other comments resulted in a response to:

- Explain DOE policy;
- Refer readers to information in the EIS;
- Answer technical questions;
- Further explain technical issues; and
- Correct reader misinterpretations.

Major Issues Raised by the Public

The Department extracted the individual comments from all other comment documents and categorized them according to the topical outline prepared for this Comment-Response Document. Because a number of comments were similar in nature, the Department summarized them. The chapters of this document contain every comment DOE received (either in summaries or individually) and the DOE responses, as follows:

- Proposed Action;
- *Nuclear Waste Policy Act*;

- *National Environmental Policy Act*;
- Other Legal, Regulatory, and Policy Issues;
- Alternatives;
- Spent Nuclear Fuel and High-Level Radioactive Waste;
- Repository Design, Performance and Affected Environment;
- Transportation Modes, Routes, Affected Environment and Impacts;
- No-Action Alternative;
- Cumulative Impacts;
- Impact Mitigation and Compensation; and
- DOE Credibility.

The last chapter contains comments that the Department received which are outside the scope of this EIS, and responses to those comments as appropriate. Examples of these comments include:

- Statements in general support of or opposition to a repository at Yucca Mountain, geologic repositories in general, and nuclear power;
- Lack of public confidence in the Yucca Mountain program;
- Perceived inequities and political aspects of the siting process by which Congress selected Yucca Mountain for further study;
- The constitutional basis for waste disposal in Nevada;
- Legal issues involving Native American land claims and treaty rights; and
- Unrelated DOE activities.

The Department considered and recorded these concerns, but has not included analyses of these issues in the EIS.

In regard to the issue of Indian land claims in the Yucca Mountain area, the Department made the following comment:

- A 1985 U.S. Supreme Court decision (*United States v. Dann*, 470 U.S. 39 (1985)) held that the Western Shoshone claim to land associated with the Ruby Valley Treaty has been extinguished, and that fair compensation has been made. The Western Shoshone people maintain that the Ruby Valley Treaty of 1863 gives them rights to 97,000 square kilometers (37,000 square miles) in Nevada, including the Yucca Mountain region. In 1977, the Indian Claims Commission granted a final award to the Western Shoshone people, who dispute the Commission's findings and have not accepted the monetary award for the lands in question. In *United States v. Dann*, the Supreme Court ruled that even though the money has not been distributed, the United States has met its obligations with the Indian Claims Commission's final award and, as a consequence, the aboriginal title to the land has been extinguished.

6.0 Impact Management

To analyze the potential environmental impacts associated with the Proposed Action, DOE compiled baseline information for various environmental resource areas and examined how the construction, operation and monitoring, and eventual closure of a repository at Yucca Mountain could affect each of those environmental resources, and resulting impacts on human health. In considering the impacts on human health, DOE analyzed both routine operations and accident scenarios.

The Department acknowledges that it is not possible to predict with certainty what will occur thousands of years into the future. The National Academy of Sciences (NAS), the EPA, and the NRC also recognize the difficulty of predicting the behavior of complex natural and engineered barrier systems over long periods. The NRC regulations acknowledge that absolute proof is not to be had in the ordinary sense of the word, and the EPA has determined that reasonable expectation, which requires less than absolute proof, is the appropriate test of compliance.

DOE, consistent with recommendations of the NAS, has designed its performance assessment to be a combination of mathematical modeling and natural analogues. Performance assessment explicitly considers the spatial and temporal variability and inherent uncertainties in geologic, biologic and engineered components of the disposal system and relies on:

- Results of extensive underground exploratory studies and investigations of the surface environment;
- Consideration of features, events and processes that could affect repository performance over the long-term;
- Evaluation of a range of scenarios, including the normal evolution of the disposal system under the expected thermal, hydrologic, chemical and mechanical conditions; altered conditions due to natural processes such as changes in climate; human intrusion or actions such as the use of water supply wells, irrigation of crops, exploratory drilling; and low probability events such as volcanoes, earthquakes, and nuclear criticality;
- Development of alternative conceptual and numerical models to represent the features, events and processes of a particular scenario and to simulate system performance for that scenario;
- Parameter distributions that represent the possible change of the system over the long term;
- Use of conservative assessments that lead to an overestimation of impacts;
- Performance of sensitivity analyses; and
- Use of peer review and oversight.

To identify the socioeconomic region of influence, DOE estimated the residential distribution of the future anticipated workforce by considering where current employees associated with the Yucca Mountain project and the Nevada Test Site now reside. Based on this estimate, about 98 percent of the expected repository workforce would reside in Clark, Lincoln, and Nye Counties. Thus, these would be the counties, if any, that would be expected to experience socioeconomic impacts from the construction, operation and monitoring, and closure of a repository at Yucca Mountain.

Although DOE defined the region of influence as such, it has not limited the socioeconomic analyses to these three counties; it assessed the remaining 14 counties (called the *Rest of Nevada*) taken together. DOE did not report the combined results for the 14 counties in the Draft EIS because collectively their impacts would be much smaller than the already low impacts estimated for the three-county region of influence. In response to comments however, the Final EIS reports the combined results for the *Rest of Nevada*.

DOE defined the transportation-related region of influence to include Clark, Lincoln, and Nye Counties as well as other counties through which a potential branch rail line or heavy-haul route would pass. The potential transportation-related socioeconomic impacts presented in the EIS focused on the three-county region of influence, but also were reported as an aggregate for the other counties for certain measures commensurate with their relative level of impact (for example, Gross Regional Product).

According to the Department, it appropriately considered Native American viewpoints by incorporating into the EIS the Native Americans' own identification of potential impacts to historic and other cultural resources important to sustaining and preserving their cultures.

DOE has maintained long-term and ongoing interactions with Native American tribes regarding Yucca Mountain. The Department initiated its Native American Interaction Program in 1987 to consult and interact with tribes and organizations on the characterization of the Yucca Mountain site, and the possible construction and operation of a repository. It also interacts cooperatively with the Consolidated Group of Tribes and Organizations, which consists of officially appointed tribal representatives responsible for presenting their tribal concerns and perspectives to the Department.

During the preparation of the EIS, DOE interacted with Native American tribes on a range of topics of interest to assess their viewpoints and perspectives. In addition, DOE supported the American Indian Writers Subgroup of the Consolidated Group of Tribes and Organizations in its preparation of *American Indian Perspectives on the Yucca Mountain Site Characterization project and the Repository Environmental Impact Statement* (DIRS 102043-AIWS 1998). The results of this report are included in the EIS.

Based on the results of the report, DOE acknowledges in the EIS that people from many Native American tribes have used the area proposed for the repository as well as nearby lands; that the lands around the site contain cultural, animal, and plant resources important to those tribes; and that the implementation of the Proposed Action would continue restrictions on free access to the area around the repository site. Furthermore, the presence of a repository would represent an intrusion into what Native Americans consider an important cultural and spiritual area. These concerns notwithstanding, DOE and the Consolidated Group of Tribes and Organizations recognize that restrictions on public access to the area have been generally beneficial and protective of cultural resources, sacred sites, and traditional cultural properties.

The cumulative impacts of the Proposed Action are discussed in a separate section of the EIS. The following are some impacts that were evaluated:

- Cumulative impacts of past, present, and reasonably foreseeable shipments of radioactive materials throughout the nation and in Nevada;
- Cumulative impacts to groundwater from the repository, along with the impacts of past, present, and reasonably foreseeable activities in the region;
- Reasonably foreseeable cumulative impacts to water resources from a repository at Yucca Mountain;
- Cumulative health effects to people in Nevada from all past, present, and future exposures to radiation; and
- Cumulative impacts from all Federal and non-Federal actions and policies in the affected area.

The Department analyzed the No-Action Alternative to serve as a basis for comparing the magnitude of potential environmental impacts of the Proposed Action. Under the No-Action Alternative, and consistent with the *NWPA*, DOE would terminate activities at Yucca Mountain and undertake site reclamation to mitigate any significant adverse environmental impacts.

DOE would design and implement a post closure monitoring program in compliance with the NRC regulations. Before closure, DOE would submit a license amendment to the NRC for review and approval. The license amendment application would include, among other items:

- An update of the assessment of the performance of the repository for the period after closure;

- A description of the postclosure monitoring program; and
- A detailed description of the measures to be employed to regulate or prevent activities that could impair the long-term isolation of the waste, and to preserve relevant information for use by future generations.

The application also would describe DOE's proposal for continued oversight to prevent any activity at the site that would pose an unreasonable risk of breaching the repository's engineered barriers, or increase the exposure of individual members of the public to radiation beyond limits allowed by the NRC. DOE has modified the EIS to include the types of monitoring and other institutional controls that would be contemplated. However, the Department would define the details of this program during the consideration of the license amendment for closure. This would allow the Department to take advantage of new technological information, as appropriate.

The Testing and Performance Confirmation Program is designed to meet specific NRC requirements. The program allows for continued oversight through tests, experiments, and analyses to evaluate the accuracy and adequacy used to determine with reasonable expectation that the repository would meet post closure performance requirements

7.0 Outcome

Legislative Steps

The EIS process began with the Notice of Intent published in the *Federal Register* on August 7, 1995. The Notice encouraged public participation in the scoping process. The public comment period was closed on December 5, 1995, following 15 public meetings across the Nation. Comments received during the scoping process were formally documented in a Comment Summary Document that was published in July 1997. A Draft EIS was issued in July 1999 for public review and comment.

When the Final EIS that addressed public comments was published in February 2002, the Secretary of Energy announced his determination that the Yucca Mountain site met all of the repository requirements prescribed by the *NWPA*. Accordingly, he recommended the site to President Bush. The President concurred and forwarded the Yucca Mountain recommendation to Congress, which approved the site selection in July 2002.

The state of Nevada, Clark County and the City of Las Vegas brought separate legal actions challenging the DOE, the Nuclear Regulatory Commission (NRC) and the EPA on several aspects of the Yucca Mountain Project as well as constitutionality of forcing one state to take all the nation's nuclear waste. The U.S. Court of Appeal for the District of Columbia Circuit opted to combine all the cases into one due to the complexity of this issue.

In July 2004, the court in its unanimous ruling rejected the constitutional claims and dismissed the challenges against the DOE. The following are some of the claims rejected by the court:

- DOE's Yucca Mountain repository site criteria were improperly set;
- DOE's Final Environmental Impact Statement was inadequate;
- DOE's secretary's recommendation of the site to the president was invalid;
- The president's recommendation of the site to Congress was unlawful;
- Congressional approval of Yucca Mountain in 2002 is inconsistent with the U.S. Constitution, including the Property Clause.

The only argument upheld by the court was EPA's inadequate radiation safety standard at 10,000 years for the site. As the court ruled, the *Energy Policy Act* requires that the EPA's determination of public health and safety standard for Yucca Mountain must be "based upon and consistent with" the NAS's study commissioned by Congress. The Academy's recommendation is that compliance period should extend through the time of the peak risk for radiation doses from the repository, which studies show will likely to occur in 300,000 years or more. In this regard the court found that the EPA ignored the findings of the NAS.

"It would have been one thing had EPA taken the Academy's recommendations into account and then tailored a standard that accommodated the agency's policy concerns. But that is not what EPA did," the court wrote in its ruling. "Instead, it unabashedly rejected NAS's findings, and then went on to promulgate a dramatically different standard, one that Academy had expressly rejected." Judges concluded that "it entirely unreasonable for EPA to have acted inconsistently with NAS findings and recommendations."

The Nuclear Energy Institute (NEI) argued that, despite the court's ruling, compelling reasons exist for upholding the EPA's radiation standard, because it is consistent with all other hazardous waste management practices, and no legal or scientific precedent exist for implementing a longer-term regulatory compliance period at any nuclear material disposal facility.

In its decision, the court offered two alternatives for implementing its mandate:

- EPA can work with the NRC to revise regulations to extend the compliance period beyond 10,000 years, or
- Congress can enact legislation empowering EPA to deviate from the radiation standard recommended by the NAS.

After the NEI's appeal to the court's July ruling was denied in September 2004, the Institute issued notice of their intent to ask the U.S. Supreme Court to reverse the July ruling. The DOE and EPA indicated that they will not join NEI's appeal and will comply with the ruling from the U.S. Court of Appeals.

The next step in the repository's development is for DOE to submit a license application to the NRC, which is the licensing and regulatory agency that will make the final decision on whether the DOE is allowed to proceed with construction and subsequent licensing to operate the repository.

Remaining Areas of Controversy

The following areas of controversy were identified during the public interaction processes. Many of these are not resolvable because they reflect either differing points of view or irreducible uncertainties in predicting the future.

Native American Viewpoint

Disagreement exists about the nature of the repository as it might impact elements of the natural and cultural environment that are of concern to Native American tribes.

Perceived Risk and Stigma

Disagreement exists concerning whether the perception of risk and stigma cause behavioral changes, the ability of researchers to predict future human behavior based on perception of risk and stigma, and the capability to reliably predict economic effects of any such stigma.

High-Level Radioactive Waste—Equivalency of Metric Tons of Heavy Metal

Disagreement exists about the method for calculating the amount of metric tons of heavy metal (MTHM)

in a canister of high-level radioactive waste. This would affect the number of canisters that could be disposed of under the Proposed Action.

Engineered Barriers

Disagreement exists about how much reliance should be placed on engineered barriers versus natural barriers to achieve waste isolation in a geologic repository.

Transportation

Disagreement exists regarding factors relevant to the analyses of the potential environmental impacts from the transportation of spent nuclear fuel and high-level radioactive waste including for example, the need for community- and highway-specific information, and assumptions and input information used in the analyses.

Evaluation of Long-Term Performance

Disagreement exists regarding the ability to predict long-term performance for 10,000 years or more. Uncertainties associated with complex natural systems and engineered barrier behaviors and the use of computer models that are unable to rely on the results of long-term testing raise questions about the ability of the Department to predict repository performance.

8.0 Key Arguments and Strategies

Why Nevada was singled out, with no backup plan by the government, is still subject to considerable debate. The opponents of the project, along with Nevada politicians who have spent many years trying to halt the implementation of the federal law, express serious doubts about the safety of transporting highly radioactive nuclear spent fuel through the nation's cities. They state that a Yucca Mountain repository would require approximately 100,000 shipments through 45 states, by either truck or train, for about 30 years. In addition to the risky transportation campaign, there are also concerns that nuclear waste disposal would bring with it damaging to Southern Nevada's tourism industry negative publicity.

The proponents of the project argue that nearly 3,000 shipments of used nuclear fuel have crossed 1.7 million miles in the past 40 years without any release of radioactive material. They conclude that because of this exemplary safety record, and federal, state and local cooperation during each shipment, the transportation to Yucca Mountain can be accomplished safely.

Opponents maintain that Yucca Mountain was chosen because Nevada had a small and politically weak congressional delegation. They argue that when in 1985 the long list of nine possible sites was pared to three – Yucca Mountain, Deaf Smith, Texas and Hanford, Washington - then-Nevada Republican Sen. Chic Hecht inadequately defended Nevada in Congress. It was the main reason he lost his re-election bid in 1988 to then-Gov. Richard Bryan.

In contrast, some of the nation's most powerful politicians helped eliminate Texas and Washington from consideration. At that time then-Rep. Jim Wright, a Texan, was speaker of the House, and then-Rep. Tom Foley of Washington was its majority leader. Also fighting against Nevada was then-Sen. Mark Hatfield of Oregon, whose state shares the Columbia River with Washington.

"The siting process was obviously a political process," UNLV history professor Hal Rothman said. "Science is irrelevant. Anybody who thinks that bad science will stop it (the nuclear dump) is fooling himself."

9.0 Key Drivers of the Process

When Secretary of Energy Spencer Abraham recommended the Yucca Mountain site as a scientifically sound and suitable for the development to President Bush his reasons were:

- A repository is important to the national security. The United States must advance their non-proliferation goals by providing a secure place to dispose of any spent fuel and other waste products that result from decommissioning unneeded nuclear weapons, and ensure the effective operations of nuclear Navy by providing a secure place to dispose of its spent nuclear fuel.
- A repository is important to the secure disposal of nuclear waste. Spent nuclear fuel, high level radioactive waste, and excess plutonium for which there is no complete disposal pathway without a repository are currently stored at over 131 sites in 39 States. The nation should consolidate the nuclear wastes to enhance protection against terrorist attacks by moving them to one underground location that is far from population centers.
- A repository is important to the energy security. America must ensure that nuclear power, which provides 20% of the nation's electric power, remains an important part of its domestic energy production.
- A repository is important to the efforts to protect the environment. The United States must clean up their defence waste sites permanently and safely dispose of other high level nuclear waste.

However, there was another very important reason behind this recommendation. Utilities and state agencies have sued the DOE, contending that the federal law directed the government to begin accepting nuclear waste by January 31, 1998. In this lawsuit, the utilities want to place in escrow their payments to the Nuclear Waste Disposal Fund until the government complies with the law. The fund, which includes contributions from nuclear power customers, is the main source of financing for the Yucca Mountain study. Those customers are also expected to cover the majority of the cost to build a repository.

The NEI - the nuclear power industry's lobbying and advocacy group - estimates that about 60 commercial reactors will run out of on-site waste storage space by the end of 2006. These not announced reasons are probably the key forces that drive the development of the Yucca Mountain repository.

10.0 Consensus

The approach to the decision-making in this case would probably be best described as legislative/political. In the situation of extreme need to find the solution to the problem, the government uses its legislative power in an authoritarian - rather than democratic – way to reach the consensus.

125 national citizen organizations call for the disqualification of the Yucca Mountain site. In spite of their requests, made on behalf of many thousands of their members, and the thousands of negative public comments submitted during the public comment periods, DOE has proceeded with the development of the nuclear waste repository.

A.C. Robison, a Las Vegas consultant for the nuclear power industry, said he believes it's only a matter of time before nuclear waste is shipped to Yucca Mountain and that Nevada should negotiate for benefits.

"All things being equal, do I want nuclear waste in Nevada? No. I would rather it was buried in a New York subway or some other ridiculous place. But not all things are equal and they never have been.

Nevada, and specifically Yucca Mountain, will probably be determined by scientists to be the best place for nuclear waste."

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Appendix F

**Review of the
Voisey's Bay Nickel Mine
Environmental Assessment**



1.0 Introduction and Background

Voisey's Bay Nickel Company Limited (VBNC) – the Proponent – proposed to develop a nickel-copper-cobalt mine and mill (the project) at Voisey's Bay, Labrador. The property is located in northern Labrador on a peninsula bordered to the north by Anaktalak Bay and to the south by Voisey's Bay, approximately 35 km southwest of Nain and 80 km northwest of Utshimassits. Principal components of this mining and milling project include open pit and underground mining operations, a mill, waste disposal areas, an accommodations and services complex, a port facility, maintenance and storage areas, site roads, an airstrip and related infrastructure, and a power supply and distribution system.

The original mineral discovery at Voisey's Bay was made by Archean Resources Ltd. in late 1993 while conducting a regional exploration program under contract to Diamond Fields Resources Inc. (DFR). The property was claim-staked in early 1994 after surface samples returned high copper and nickel values. VBNC was formed in 1995 as a subsidiary of DFR to manage and operate the project. In August 1996, INCO Limited (INCO) purchased DFR, and VBNC became a wholly-owned subsidiary of INCO. VBNC is the current registered holder of the mineral claims at Voisey's Bay.

The VBNC Claim Block is approximately 49,450 ha (495 km²). The indicated mineral resource is estimated to be 150 million tonnes. Approximately 700 persons would be employed during construction of this undertaking. Direct employment is estimated to be approximately 420 persons during open-pit operations and will increase during underground operations. Workers would be transported to the site by air. Living accommodations would be provided on-site. No town site is planned.

Over the currently estimated 30-year life of the project, total employment benefits are estimated to be 76,000 direct and indirect person-years. Provincial GDP impact over the same period is estimated to be approximately \$11 billion.

The expected life of the undertaking depends on the mineral resource and production rate. Upon mine closure, the site would be decommissioned and rehabilitated to return it to a safe and environmentally stable condition. Progressive decommissioning and rehabilitation would commence at an early stage during mine development and would continue throughout the life of the mine.

The Environmental Impact Assessment (EIA) process started in January 1997. The Department of Fisheries and Oceans was the federal Responsible Authority (RA) for the project. The Federal and Provincial Governments, the Labrador Inuit Organization, and the Innu Nation signed a Memorandum of Understanding (MOU) establishing a joint environmental assessment review of the project. Under the MOU, the Voisey's Bay Environmental Assessment Panel was appointed to carry out this review. In April 1999, the Panel completed the assessment and delivered the Report recommending to the federal government that the project be authorized to proceed. The Government of Canada issued a favourable response to the Panel Report in August 1999. The Government of Newfoundland and Labrador and INCO signed a Development Agreement for the project in October 2002.

2.0 The Need for the project

Fundamental to Environmental Assessment (EA) is the requirement to consider the need for the proposed undertaking. It is important in the context of EA to understand how "need for the undertaking" should be interpreted.

According to the Proponent, as the world's largest nickel producer, INCO has been focused on a strategy of expansion and growth. The reasons for this strategy include the world demand for nickel continues to grow, thereby creating significant opportunities for growth; and INCO has been selling more nickel than it produces and consequently realizes little or no profit on the nickel it purchases from other sources to meet customer requirements.

VBNC and INCO need the project to meet future nickel demands including growing industrial needs. INCO requires low cost reserves to remain competitive and maintain its position as the leading supplier of nickel in the world.

For the people of the Province of Newfoundland, the project will result in increased training and employment opportunities and associated wages and benefits. It will also contribute to the growth in business opportunities arising from the increased demand for goods and services created by the project, which will ultimately help to attract new investment into the province.

In 1998, Thomas Bartek, on behalf of the Innu Nation, undertook an independent analysis of the supply and demand for nickel and the need for the Voisey's Bay project. Bartek found that VBNC's growth projections were unreliable because the proponent analyzed growth over the period 1960-1997, rather than referring to the more recent past. This time frame included the high growth period of 1960-1973, when the annual compound growth rate was 6.6%. This had the effect of boosting the compound growth rate average from 1.7% to 3.4%, and misleadingly suggested that future growth in demand would be strong. Bartek concluded in his assessment that there was no need for the additional nickel capacity from the Voisey's Bay mine until 2006 at the earliest.

3.0 Alternative Means to the Undertaking

Alternatives to a project are different ways of achieving the same end goal or result. It is paramount that EA submitted by a proponent includes consideration of alternative means of carrying out the project that are technically and economically feasible and environmental effects on any such alternative means. This process normally includes identification and description of different alternative means, evaluation methodology, identification of a preferred alternative, and its comparison to the "Do Nothing" option. The final decision involves making trade-offs. To ensure a traceable and replicable planning process, it is paramount that sufficient information is provided for the reviewer to understand the reasons, including considerations of environmental and socio-economic impacts, for selecting the preferred alternative and for rejecting others.

As stated in the EA, "the only other alternative to fulfill INCO's strategy, and meet its customers' demand for nickel, is to develop other nickel deposits. Should this alternative be unsuccessful, INCO would have a reduced role in the world nickel market, which might also reduce the overall world nickel supply." This explanation regarding alternatives to the proponent's strategy does not consider alternative methods to the project (i.e. underground or open pit mining).

The EA contains only sparse information on the analysis of "Do Nothing" alternative: "If the project does not proceed, the mineral resource will not be developed, and the potential effects and benefits predicted in this EA will not be realized." This was not a systematic evaluation of two alternatives using predetermined criteria. Moreover, this decision cannot be replicated by someone who, for example, may see in this statement completely different message – the non-renewable mineral resource will not be depleted, and potential negative effects will not be realized.

It should also be mention that there is no information in the EA on how the public was involved in the discussion of alternative means.

The Panel conducting the EA review requested that additional information be provided by VBNC regarding the discussion of alternatives as to the pace and scale of the operation. The proponent's response to this request is provided in the "Alternative Means of Carrying Out the project" chapter in Additional Information section of the EIS. In its justification for the appropriate pace and scale of the project, VBNC reviewed:

- Existing and projected global nickel market and demand for nickel;
- Market share of INCO; and
- Operational or economic constraints.

4.0 The Siting Process

Unlike the location of the ore body, there is some flexibility in determining the selection of the site for primary infrastructure. The note should be made that the difference between alternative means and methods in the submitted EIS is not always clear. For example, "several alternatives for the project have been studied in order to determine the most suitable choice for facility location and operation activities." From this statement one may conclude that finding the most suitable location is an alternative mean - but not method - of carrying out this undertaking.

The siting approaches were examined for selecting the locations for the port and for the tailings and waste rock disposal. The ad hoc method was used in these selections. This method represents the writing of conclusions without doing the analysis. In case of the port location, three criteria were considered in choosing the preferred location among three alternatives. No rationale for the number of criteria and alternative locations was provided. The advantages and disadvantages of the alternatives were presented in narrative terms, without the explicit specification of magnitude and significance of the impacts.

The discussions of tailings and waste rock disposal locations were done in a similar way. The EIS states that while there are several "alternative means for disposing of potential acid generating materials," there are relatively few options that are environmentally acceptable. Lake basin, valley deposition, on-land disposal, submarine disposal and mine backfilling are five alternative disposal methods that were considered during the screening process. On-land disposal was eliminated due to difficulties associated with maintaining the tailings in a flooded condition, which is essential to restrict sulphide oxidation and prevent acid generation. The legislative constraints associated with submarine disposal were considered restrictive. Mine backfilling is considered impractical during the early stages of mine development (open pit) but will be considered following completion of open pit mining. Lake or valley deposition was therefore considered to be the most appropriate disposal alternatives.

Reid Brook is the most prominent watershed on the VBNC Claim Block. Candidate sites were defined as any basin which has the capacity to contain the required volume of tailings or mineralized mine rock, could maintain a permanent water cover, and would discharge outside the Reid Brook watershed.

A total of eight potential lake basin or valley deposition candidate sites were identified. While within the Reid Brook watershed, and therefore cannot be considered as a candidate location, the site No. 2 (later selected as the preferred one for the open pit mining) was included in the evaluations because its outflow can easily be diverted from its natural course.

The candidate sites were evaluated against a set of engineering and environmental criteria and constraints. No justification for criteria selection was provided. Of the eight ponds examined:

- Five present problems of difficult access for both a road and pipeline, which in some cases would be very long, and present pumping difficulties, especially in winter (Ponds # 3, 5, 6, 7, 8); and
- Three would require very large dam structures to provide sufficient storage capacity (Ponds # 1, 3, 5).

According to the EIS, three ponds (No. 2, 4, and 5) “meet the requisite requirements for a disposal site”. The decision to include in this list site No. 5, which could not pass two constraints, was not justified. Site No. 2 was chosen as a preferred alternative for the co-disposal of the open pit tailings and mineralized mine rock. As in the selection of the port location, the advantages and disadvantages of alternatives were discussed in a descriptive form, and no ratings or weights were considered. Site No.2 - which does not fit the definition established before the application of criteria/constraints - was included in the list of eight potential alternatives thereby creating an impression that the final decision was made before the evaluation.

The qualitative assessment used for the selection of the preferred site for the project’s infrastructure fails to achieve the primary objectives of an evaluation system: traceability and replicability. Not all identified criteria were systematically applied to all alternatives. Unless all but one of the alternatives are clearly unacceptable, this evaluation approach is unlikely to be valid, and does not compare favourably with even a simple checklist, in which each alternative is systematically considered for each criterion. When the alternatives are not systematically compared against a specified set of criteria, it is difficult to see how the decision was made, and what evidence supports it.

Finally, it should be mentioned that in both examples, no public involvement in this site selection process was reported in the EIS.

5.0 Public Participation

The proponent developed various mechanisms for communication with stakeholders. Open houses, information programs, workshops, meetings, presentations, printed and audiovisual materials, and other mechanisms were used as communications initiatives. In addition, VBNC produced information sheets on a number of project-related issues and distributed them to households in Labrador communities. Each information sheet was produced in English, Inuktitut, and Innu-aimun.

Open Houses

VBNC held a first round of open houses in Labrador North Coast communities to provide information and receive comments from residents on the project. Open houses were designed to meet environmental assessment requirements for comprehensive public involvement. An initial series of open houses presented the concept for the project and plans for baseline environmental studies.

The purpose of the second round open houses was to present updated project information and to receive any concerns or comments from residents of these communities. VBNC presented preliminary results of issues scoping and baseline studies.

Information Programs

As stated in the EIS, comments were received by VBNC staff and consultants and incorporated into baseline studies where appropriate.

Workshops

VBNC held numerous workshops to address specific aspects of project planning. While initial workshops addressed general project development, more recent workshops were organized to focus on specific environmental assessment issues such as archaeology, shipping, and bear management.

- Mining activities;
- Archaeology;
- Tailings and mineralized mine rock disposal;
- Proposed environmental baseline studies;
- Management of black bears; and
- Translation workshops, which objective was to establish a process for translating mining terminology in English into Innu-aimun so that information presented in translated versions of the EIS will be understandable to local residents.

Meetings with Women's Organizations

The purpose of these meetings was to exchange information relating to the development of the project and the employment of women for the project.

1-888 Toll-Free Number

The Proponent established a "1-888-293-8880" toll-free number (available throughout North America), advertised it widely throughout the province, and set up a response system so that the full range of questions about the project and VBNC can be answered in English, Inuktitut, and Innu-Aimun.

Funding

CEAA allocated a total of \$380,000 for participant funding to principal stakeholders and other qualifying interest groups. VBNC supported a number of health, arts, culture, education, social, and recreation initiatives in Labrador and Newfoundland. This was reflected by funding contributions for:

- The Labrador Winter Games;
- The Melville Hospital in Happy Valley-Goose Bay;
- Memorial University; and
- A special issue of "Them Days" magazine, depicting the history of life in the Voisey's Bay area.

Public Involvement Plan

The Public Involvement Plan is a part of Environmental, Health and Safety Management System (EH&S Management System) established by VBNC. The objectives of this plan are to:

- Provide information to the public regarding the project;
- Inform the community regarding project design and activities;
- Identify the need for mitigation;
- Gain an understanding of public concerns;
- Develop two-way communication with nearby communities; and
- Assist in obtaining input to EH&S management decisions.

The proponent also undertook the following public involvement techniques:

- Mail-outs to households on the North Coast of Labrador;
- Videos on project components;
- Communication sessions to explain the results of the EIS to a wide audience;

- Maintenance of VBNC public offices;
- Meetings with government officials and interest groups and other parties;
- Presentations to interest groups and the public;
- Kitchen-table talks;
- Community forums;
- Site visits;
- Conference and trade shows;
- Company newsletter;
- Annual environment reporting;
- Release of project documents; and
- Media releases.

VBNC pledged to closely monitor the effectiveness of public involvement activities, the success of techniques and the effectiveness of communication achieved by various techniques. The summary of public meetings was included in the EIS. The following topics were briefly reported in this summary: date, location, subject, participants, and the number of participants. However, the transcripts of these meetings are not available. Furthermore, the EIS contains no mention on how the public concerns were incorporated into decision-making process.

Aboriginal Involvement Plan

Along with the Public Involvement Plan the Aboriginal Involvement Plan is also a part of EH&S Management System. VBNC admitted that it recognized the importance of environmental issues to the Innu Nation and Labrador Inuit Association (LIA), and attempted to include these organizations in environmental aspects of project planning wherever appropriate.

In spite of the fact that there were no standards, guidelines, regulations or Canadian Environmental Assessment Agency specifications on how to incorporate Aboriginal knowledge into an EIS, the proponent made efforts to consider and incorporate local Aboriginal knowledge and expertise in preparing the EIS.

The proponent tried to incorporate Aboriginal knowledge into the environmental assessment since the early stages of the process. The Innu Nation and LIA contributed to environmental management initiatives related to the project. The identification of issues and concerns from participants at open houses, workshops, and scoping meetings assisted in the establishment of the boundaries and content of baseline studies, effects analysis, mitigation, environmental management plans, environmental effects significance predictions, and monitoring programs.

Site Observers

Annual agreements were signed with the Innu Nation and LIA providing for terms of reference and funding for Aboriginal observers. The agreement with LIA has been in place since February 1995 and with the Innu Nation since October 1995.

The observers are responsible for monitoring certain activities at the project site. They observe site environmental conditions, wildlife and fish presence, and the condition of known archaeological sites. They also monitor environmental performance of site personnel. The observers report regularly to the membership of LIA and the Innu Nation and advise their respective organizations of activities at site. Environmental monitoring reports are also provided to VBNC.

Aboriginal observers work with VBNC personnel to identify compliance with existing permits and environmental regulations. They review the application of good management practices for drilling activities (audit inspections) and resolve specific issues as they arise. Aboriginal observers communicate with VBNC site personnel and contractors to coordinate activities to fulfill their mandate. The observers have been instrumental in assisting with the development and implementation of environmental protection measures and generally have increased the awareness of Aboriginal concerns at the Voisey's Bay exploration site.

Liaison Committees

To develop effective working relationships among VBNC, LIA, and the Innu Nation, liaison committees were established for communication and resolution of environmental matters. The purpose of the committee was to facilitate effective communications, consultation and, where possible, resolution of environmental matters. This was accomplished by:

- Sharing and discussing timely information about new permit applications and major site activities associated with environmental effects; and
- Anticipating and where possible, resolving issues, concerns and complaints by either party by seeking a consensus by the committees on recommendations and measures that can be readily implemented by the parties.

Where resolutions or recommendations were achieved, they were acknowledged in writing by the members of the committees. Should the committees fail to resolve concerns, the issues would be referred to senior personnel of VBNC, the Innu Nation or LIA. The VBNC/LIA committee is called Avatigijavut and the VBNC/Innu Nation committee is called the Technical/Liaison Committee. These committees try to meet regularly, in person or by teleconference, at least twice a month and more frequently when circumstances warrant.

Permit Application Review

A protocol was established by VBNC to inform LIA and the Innu Nation of permit applications related to exploration activities. A copy of actual approvals issued for exploration was also provided to LIA and the Innu Nation. A monthly status report was prepared by VBNC and sent to both organizations. These status reports list approvals received, the applications that were submitted and the approvals anticipated in the month to come.

Also, a joint proposal was developed by LIA and the Innu Nation to take a lead role in conducting a major archaeological field study program. As a part of the Biophysical Environmental Baseline Studies, Aboriginal workers participated in biophysical baseline studies conducted in the three-year period and contributed their skills as members of field study teams on freshwater, marine, and terrestrial baseline studies. Moreover, the Aboriginal Involvement Plan included Black Bear Management and Local Place Names program. In the former, presentations on bear management at the project site, bear collaring and tracking, and wildlife regulations were made by VBNC, consulting biologists, and the Provincial Wildlife Division. Innu elders described their concerns, contributed their views on the treatment of bears and discussed possible management measures. In the latter, members of the Innu Nation and LIA have assisted VBNC with the compilation and review of local Innu and Inuit place names in the Voisey's Bay area.

6.0 Impact Management

Issues scoping is the process used to focus the EA on issues and concerns identified by the public, technical experts, and regulatory agencies. The issues scoping process conducted for the project consisted of three main components: workshops and open houses conducted by VBNC, issues scoping studies undertaken by the Innu Nation and LIA, and scoping meetings held by the Panel. The comments received were organized and evaluated to identify Valued Environmental Components (VECs): those components which are both valued by society and can serve as indicators of environmental change.

VBNC presented information and consulted with the public regarding the project, its baseline studies, and environmental assessment. Initial discussions and meetings led to two rounds of open houses within Labrador North Coast communities. VBNC also held two sets of issues scoping workshops with representatives from the federal and provincial governments, LIA, and the Innu Nation. Discussions at these workshops helped to refine the VECs presented in the EIS. The Proponent held several additional subject-specific workshops to better understand issues such as shipping, waste management, and bears.

At the request of Innu Nation and LIA, VBNC funded issues scoping studies for the Innu Nation in 1995 and LIA in 1996. These studies facilitated the consideration of Innu Nation and LIA issues in the environmental assessment and project planning.

Potential Environmental Effects are identified at the beginning of each environmental effects section. The significance of environmental effects is analyzed using the criteria specified in the Guidelines for preparation of the EIS for the project: magnitude; geographic extent, timing, duration and frequency, reversibility, ecological and socio/cultural context, probability of occurrence, and the capacity of renewable resources to meet the needs of the present and those of the future. The definitions established for the ratings applied to "magnitude" and "reversibility" are outlined in the table. Tables analyzing potential environmental effects using these criteria are included as an appendix at the end of each VEC chapter.

Net or Residual Environmental Effects - those predicted to remain after the application of mitigation outlined in this EIS - and their significance are presented in the "Residual Environmental Effects" section of each VEC chapter. Following the conclusions reached in the "Environmental Effects Assessment" section of each chapter, the significance of environmental effects, including *cumulative effects*, for a particular VEC was determined for each project phase (construction, operation, decommissioning, and post-decommissioning). In addition, residual environmental effects were also described for potential accidental events.

The probability (high, moderate, low) of a net environmental effect (major, moderate, minor or negligible) was usually based on "professional judgement" in the EIS. While the inclusion of the experts' opinion is paramount in the assessment process it is not clear how, for example, implementation of traditional knowledge, underlined in the Aboriginal Involvement Plan, affects this type of estimations. Moreover, the lack of additional documentation in the EIS makes it impossible to replicate this "professional judgement".

Important components of the VBNC EH&S Management System are Environmental Protection and Reclamation Plans, as well as Monitoring and Follow-up Plan.

Environmental Protection Plan (EPP)

EPPs are practical documents which set out detailed site-specific protection measures or procedures to be implemented during specific phases of the project. EPPs are the principal guiding documents that enable mitigation to be properly implemented as prescribed by permits and authorizations, as well as by VBNC

policy, guidelines, and standards. Many environmental requirements and commitments are/will be consolidated into EPPs representing key environmental implementation tools for project activities. EPPs will be developed for all major phases of the project: exploration, construction, operation, decommissioning, and post-decommissioning.

EPPs are the cornerstone for implementing environmental protection measures. They provide a consolidated documentation of environmental protection procedures, against which performance can be readily assessed. EPPs are used for the following purposes:

- Identifying EH&S concerns and develop appropriate protection measures for these concerns;
- Listing all required permits and approvals and their associated terms and conditions;
- Providing concise and clear written instructions for procedures that protect the environment;
- Providing a reference document for personnel when planning and/or conducting specific activities;
- Communicating changes in the program through the revision process; and
- Providing a reference to applicable legislative requirements.

An EPP is a "working document" for use in the field by project personnel. VBNC off-site personnel can also use the EPP to implement and monitor commitments. EPPs provide a quick reference for project personnel and regulatory authorities to assess performance and make suggestions for improvements.

Reclamation Plan

The proponent is committed to reclamation during construction, operations, decommissioning, and at closure. Surficial disturbances associated with the operation of the project will be controlled and mitigated through reclamation. Reclamation will form an integral part of the mine plan and will be ongoing during the life of the project. Progressive reclamation will provide the opportunity to reduce the extent of disturbed land over the life of the project's operation.

The objectives of the Reclamation Plan are to:

- Protect public health and safety by using safe and responsible reclamation practices;
- Reduce or eliminate environmental effects once the mine ceases operations;
- Re-establish conditions which permit the land to return to a similar pre-mining land use; and
- Reduce the need for long-term monitoring and maintenance by establishing effective physical and chemical stability of disturbed areas.

Reclamation Plans will be developed to address the phases of the project. Each Reclamation Plan will describe the procedures to restore disturbed areas to a safe and environmentally stable condition. Reclamation plans will comply with conditions of permits and authorizations and VBNC policies, guidelines, and standards. The following are the examples of the principles that have been established for the project in order to guide the overall Reclamation Plan:

- Apply cost-effective and appropriate reclamation practices to reduce environmental risks and allow for traditional use of the land;
- Establish an internal corporate reporting and monitoring system, that verifies whether reclamation plans and practices have been appropriately implemented;
- Incorporate Aboriginal knowledge into the Reclamation Plan, where applicable;
- Discuss reclamation with government officials, company employees and local communities; and
- Regularly update the Reclamation Plan to remain current with evolving and new reclamation methods and procedures.

The last point of this list requires a comment. There is no mention of what the term “regularly” means. Reclamation plans should undergo periodic review in about every three years after the commencement of the operations, because technologies, costs and project details can all change significantly within the time period. It is also worth mentioning that the information on reclamation contained in the EIS is very general and non-specific, and does not allow for meaningful assessment of the efficacy of the proposed reclamation.

Monitoring and Follow-up Plan

Monitoring includes the specific programs developed by VBNC to comply with acts, regulations, permits, and corporate commitments. Monitoring can be further defined as those activities undertaken by the proponent to demonstrate that the project operates within specific limits of environmental performance.

Compliance monitoring will be conducted for biophysical and socio-economic effects as well as for internal policies and standards.

A follow-up is a program for verifying the accuracy of the environmental assessment of a project and determining the effectiveness of any measures taken to mitigate the adverse environmental effects of the project. Follow-up program activities required for regulatory compliance would be funded by the proponent.

VBNC proposed to institute a follow-up program in cooperation with regulatory authorities and interested parties. VBNC recommended the follow-up program be conducted to determine that the:

- Predictions of the environmental assessment, with respect to the VECs examined, are valid and being met;
- Models used in the assessment process to predict potential effects are valid and the results are verified;
- Environment is being protected from any adverse effects of the project; and
- Mitigative measures taken to protect the environment from the project are effective.

VBNC also proposed to form environmental monitoring committees with LIA, the Innu Nation and other interested parties. The follow-up program will extend over the life of the project. These committees would foster exchange of information and concerns regarding specific environmental issues relating to the project. The committees may also provide an opportunity to integrate Aboriginal knowledge into the follow-up program.

The Additional Information document addresses monitoring and follow-up programs in Chapter 10. However, most of the discussion is spent on describing how monitoring is generally approached at three similar projects – the Falconbridge Raglan mine in northern Quebec, the BHP NWT Diamonds project, and Cheviot Coal project in Alberta. The additional information does not describe the details of the monitoring – where, when, what, and who – or which of the three examples, or which parts of them, would be used as a model for the Voisey's Bay monitoring plan. Without specifying the important details of the monitoring program before the project receives its permit approval, it is not possible for reviewers of the EIS to determine whether an adequate monitoring program is being designed.

7.0 Outcome

As part of the regulatory approval process, VBNC was required to conduct an environmental assessment study of the proposed project. A Memorandum of Understanding between the Federal and Provincial Governments, the LIA and Innu Nation established a harmonized environmental assessment. The process resulted in the appointment of a Panel in January 1997 to conduct the environmental assessment review. Guidelines for the preparation of an EIS for the project were finalized in June 1997. In December 1997, VBNC submitted its EIS. The document was issued for a 90-day public review, which was subsequently extended by 30 days. In May 1998, the Panel issued a *Deficiency Statement: Request For Additional Information* on the basis of the public review, having determined that the EIS was insufficient to proceed to public hearings. The Panel requested that additional information on the following be provided by VBNC, after which it will be the subject of a 45-day public review period:

- Marine transportation system;
- Alternative means of carrying out the project;
- Water and waste management;
- Anaktalak Bay;
- Reid Brook;
- Biological resources;
- Mercury contamination potential;
- Socio-economic effects;
- Insurance and liability provisions; and
- Monitoring and follow-up programs.

After receiving this information in June 1998 the Panel announced in July that EIS contained sufficient detail to support meaningful discussion of the proposal at public hearings. In April 1999 the Panel completed the EA and delivered the *Report on the Proposed Voisey's Bay Mine and Mill project* to Canada, Newfoundland and Labrador, the Innu Nation and the LIA, recommending that the project be authorized to proceed subject to the terms and conditions identified in the report.

The Panel concluded that:

- The project could contribute significantly to sustainable social and economic development on the north coast and in the rest of Labrador without harming vital ecosystem functions and habitats or the ability of Inuit and Innu to use land in traditional ways; and
- In order to make this contribution, VBNC must uphold the commitments it made during the public review process and work diligently throughout the life cycle of the proposed project to prevent or minimize adverse effects and maximize benefits.

The Government of Canada issued a favourable response to the Panel Report in August 1999.

8.0 Key Arguments and Strategies

An important part of the EA process is the Impact and Benefits Agreement (IBA) between LIA and Innu Nation and the proponent. The terms and conditions of this IBA are governed by confidentiality agreements with LIA and the Innu Nation and therefore the provisions outlining implementation procedures for this agreement cannot be disclosed.

One purpose of an IBA is to prevent or reduce adverse effects of a project and provide benefits to Aboriginal people. As established by the Whitehorse Mining Initiative in 1994, Aboriginal, environmental, government, and mining industry representatives have agreed that benefits result from a cooperative approach to development. The negotiation of IBAs has become a standard process that Canadian mining companies follow as part of the development of new mines near Aboriginal communities.

IBAs may include topics such as:

- Environmental protection, including special concerns about wildlife;
- Protection of Aboriginal social and cultural values;
- Education, training and employment;
- Language in the workplace;
- Health and safety;
- Business opportunities;
- Aboriginal access to project facilities at the mine site;
- Financial participation; and
- Dispute resolution mechanisms.

VBNC, LIA, and the Innu Nation proceeded with early or pre-implementation strategies covering certain provisions of the IBA. The purpose of these strategies was to facilitate the early implementation of time-sensitive programs to address issues of mutual benefit. For example, human resources surveys were conducted in advance to help the parties in assessing employment skills and availability. Also, as a part of pre-implementation strategies, VBNC held meetings with the Innu Nation and LIA regarding business opportunities for local residents.

IBA-related initiatives by VBNC included providing funding for the Innu Nation Community Task Force (November 1994-March 1995), open houses in Aboriginal communities, and visits by Innu Nation and LIA representatives to INCO operations in Sudbury and other mines in North America, including the Red Dog mine in Alaska and the Louvicourt Mine in Quebec.

In October 2003, INCO signed the IBA with the LIA and Innu Nation concerning the development of Voisey's Bay.

Employment at Voisey's Bay will be based on VBNC's adjacency principle, which means that those qualified and living near the site will be given first priority for jobs. Aboriginal peoples affected by agreements with INCO will be given first priority. Other qualified Labrador residents will get second priority, while qualified individuals on the Island portion of the province will get third priority.

Hiring and training will be undertaken with consideration for Innu and Inuit peoples, residents in adjacent communities, and gender equity. Personnel will be qualified for the positions for which they are hired, for the purpose of safety and efficiency. Following that, the main principle governing hiring priorities is that of adjacency. To monitor success in meeting these goals, VBNC is already tracking characteristics of the labour force and income levels by

Innu and Inuit peoples:

- Gender;
- Geographic location (Labrador, Newfoundland, Canada); and
- Job category.

These employment priorities will be supported by training initiatives, including the Multi-Party Training Plan, which will facilitate Aboriginal peoples obtaining new jobs and filling vacancies that may be created through other mining developments in northern Labrador. The goal of this training program is to enhance the participation of Innu and Inuit peoples in these positions.

To monitor success in meeting training goals, the numbers of employees participating and success rates of VBNC training and orientation programs will be recorded in a manner similar to labour force data.

An Industrial and Employment Benefits Agreement will be concluded which will capture INCO's commitments to promote employment of the province's labour force, provide local businesses with full and fair opportunity to compete for the supply of goods and services, and will recognize the agreements in place with Aboriginal peoples.

Where possible, Newfoundland and Labrador facilities will be used during the construction, fabrication and assembly stages of the project. Engineering, procurement and project management will take place in the province and have significant participation by provincially-based firms.

An INCO Innovation Centre developed in St. John's will be build on existing education and research at Memorial University in exploration, mining and metallurgical technology.

9.0 Key Drivers of the Process

For INCO, the development of the project will meet the company's goal of maintaining its leading position in the nickel industry as a proven and reliable supplier of nickel that can meet the growing needs of its customers. The project will replace both purchased nickel that INCO has used to meet its customers' needs and declining production from company's existing Canadian operations.

Given that the global nickel market is expected to grow, significant new production will be required to meet the growth in demand for nickel. The project will be one of the important new sources of nickel to meet this increase in demand but its costs must be competitive, given the other potential new low cost sources of nickel are expected to be developed. These competing new sources of nickel - unlike the project's hardrock sulfide ore deposits - are laterite ore surface deposits (located in Australia and other tropical or subtropical countries), which may be processed at very low costs given recent and expected ongoing advances in processing technologies for these types of ores.

For the people of the Province of Newfoundland, the project will result in increased training and employment opportunities and associated wages and benefits. It will also contribute to the growth in business opportunities arising from the increased demand for goods and services created by the project, which will ultimately help to attract new investment into the province.

Labrador Inuit and the Innu Nation had concerns that the project should not go ahead until land claims had been settled and IBAs were concluded. The Panel recommended that if this does not happen, there should be an environmental co-management agreement to ensure Aboriginal peoples are fully consulted about the development. Where Native people have title to their traditional lands, governments have certain obligations if they are going to allow resource development such as the project to take place on those lands. Governments must ensure that Aboriginal people:

- Participate in the resource development;
- Are properly consulted, and
- Receive fair compensation.

Participation and compensation have to be delivered through IBAs negotiated between VBNC and the Innu Nation and LIA. The proponent intended to avoid or reduce some of the predicted negative effects of the project and to increase predicted project benefits through the IBAs and to ensure that Aboriginal people are involved in the Voisey's Bay development.

10.0 Consensus

While IBAs and land claims are separate and beyond the strict scope of the EA process they - along with economic benefits to the Newfoundland and Labrador - became the pillars in achieving the final approval of the project. Aboriginal people were determined that if, there was to be a development, then they would have to benefit and that there could be no project without their consent.

The year 2002 culminated in the signing of the separate IBAs with Innu Nation and LIA, a Development Agreement and an Industrial and Employment Benefits Agreement with the Government of Newfoundland and Labrador.

The Labrador Inuit Land Claim has been a long time in coming. In June 2001, Labrador Inuit and the Federal and Provincial Governments signed an Agreement-in-Principle. Ratification of the final agreement began in November 2003.

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