ADH Technologies Inc.
"Bringing Innovation to Market"

Final Report

"Independent Evaluation of Nuclear Waste Management Organization (NWMO) Discussion Document #2"

Prepared for

The Town of Ajax, Ontario

By

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1.0 Executive Summary:

The Nuclear Waste Management Organization (NWMO) was established in 2002 by an Act of Parliament with a mandate to make a recommendation to the federal government regarding options for long term management of used nuclear fuel. The NWMO is required to review a minimum of three technical approaches to this issue, specified in the Act, and is required to make its recommendation by November 15, 2005.

Accordingly, the NWMO is in the midst of its program of activity to review options and develop a recommendation for the long term management of used nuclear fuel. Initially, it reviewed and developed a package of background information relevant to the issue and established a communication process through its website. The NWMO has adopted a process of open communication and sharing of information. In particular, it is seeking the views of Canadians on long term management of used nuclear fuel and is building this into its process of assessment of the associated technical, economic, environmental, and societal issues.

Among the tools that NWMO uses to communicate its activity and to seek input, is the development of "Discussion Documents." Discussion Documents 1 and 2 have been issued and a third document is planned as the NWMO prepares its final recommendation. These documents provide a good overview of the NWMO's thinking and its approach to recommending an option for the Government of Canada to consider. The documents are useful for individuals, organizations, and communities to review so they can begin to plan their input to the NWMO.

The Town of Ajax has reviewed Discussion Document 1 and submitted its thoughts and concerns to the NWMO. Since Discussion Document 2 was issued in September 2004, the Town of Ajax has commissioned further review in order to keep abreast of NWMO's work. The Town has engaged a consultant, ADH Technologies Inc. to conduct the review of Discussion Document 2. This report sets out the findings and recommendations from the review.

Based on the review undertaken by the Town on Discussion Document 2, the Town identified a number of concerns as follows:

- Health and safety of the public as well as security associated with the long term management of used fuel regardless of the option selected;
- Transportation of the used fuel through the communities;
- Appropriate institutional structures and support over the long term associated with the long term management of used nuclear fuel;

- A clear statement that the long term storage of used nuclear fuel within the Region of Durham (being in close proximity to Lake Ontario and large populated areas) is not an acceptable option;
- Appropriate financial compensation should be made available to nuclear host communities and affected area municipalities for the long-term and in the event of unexpected challenges; and
- Continued meaningful communication and sharing of information with NWMO to provide comments to the implementation plan.

The Town has the following recommendations for NWMO as it prepares a recommended management approach for the used fuel:

- That the Town be given an opportunity to provide input to the preparation of an implementation plan for the disposal of the used nuclear fuel;
- That a process be established to determine appropriate financial compensation and institutional support arising from the long term management of used nuclear fuel for host communities and affected communities;
- That should consideration be given to extending the life of the Pickering Nuclear Power Plant reactors, appropriate studies should be prepared to identify the potential impacts on the Town of Ajax and the increase in used nuclear fuel that may result;
- That should consideration be given to constructing new reactors at the Pickering Power Plant, appropriate studies should be prepared to assess the potential impact, and in particular, what impacts other reactor technologies might have on the used nuclear fuel management option, technology, and timing;
- That studies be prepared to determine the impact of transportation of the used nuclear fuel on affected communities in the event that an option requiring transportation is selected, and address the transportation impacts of new reactor technologies in the future; and
- That NWMO continue to monitor the used fuel management approaches in other countries.

2.0 Introduction:

The Nuclear Fuel Waste Act entered into effect in 2002. The Act was initiated due to the desire of the Government of Canada to establish the policy regarding the management of used nuclear fuel that is accumulating from Canada's nuclear power program. Since the 1950's Canada has been developing and applying nuclear power technology in the country, primarily in Ontario. The research reactors that were used to develop the technology and the 22 nuclear power reactors in Canada have accumulated a significant amount of used fuel. The Nuclear Waste Management Organization (NWMO) was created to ensure that funding for long term management of the used fuel was made available by those entities that produce the used fuel. The NWMO was also responsible to review various options for the long term management of used nuclear fuel in Canada. The NWMO is due to make its recommendation in this regard to the government of Canada in November of 2005.

The NWMO has established the process of identifying and assessing the range of used fuel management approaches and has developed a methodology for review, assessment, and reporting of its findings. As part of this process, they have developed a set of "discussion documents" supported by "background research" papers. There are three discussion documents planned and the second document entitled "Understanding the Choices" was issued in September 2004.

The Town of Ajax has a keen interest in the activities of the Nuclear Waste Management Organization (NWMO) and its three year study to develop a recommendation for the long term management of used nuclear fuel. The Town is monitoring the progress of the NWMO study very closely. The NWMO is evaluating options for long term used fuel management as well as developing a process and program for engagement of communities and soliciting their input. The Town has had a number of meetings on the topic and is keenly interested in the outcome of the NWMO's work.

The NWMO is approximately two thirds of the way through its program and is beginning to develop a list of options and has received various inputs from communities, individuals, and specialists. The Town has requested an independent review of the progress to date with particular emphasis on issues of concern to the Town arising from the recently released Discussion Document #2. This document addresses the following:

- Reports on what the NWMO has learned from citizens and experts so far,
- Describes the long term used fuel management options under study,
- Outlines how the framework has evolved since Discussion Document #1, and
- Presents a preliminary assessment of the approaches.

Many of the Town residents are in close proximity to a major nuclear power facility, the Pickering Nuclear Power Plant. Accordingly, it is important that the community to be knowledgeable of the NWMO's program and activities and has appropriate opportunities for input to the process of establishing an approach for long term management of used nuclear fuel.

The Town of Ajax has engaged ADH Technologies Inc. (see Appendix 1) to undertake a review of Discussion Document #2 with a particular focus on three questions posed by NWMO which are:

1. Is the assessment framework comprehensive and balanced? Are there gaps and, if so, what does NWMO need to add?

2. What are the Town's thoughts on the strengths and weaknesses of each management approach: deep geological disposal; centralized storage; and reactor site storage?

3. Are there specific elements that the Town feels must be built into an implementation plan? What are the Town's thoughts on what a phased approach must include?

ADH Technologies Inc. has addressed each of these questions and provides an overall assessment of the impact of Discussion Document #2.

3.0 Discussion Document #2

Discussion Document #2 was developed during the spring and early summer of 2004 and issued in September of 2004. In general, the document sets out the status of the NWMO's activities and thinking and most importantly its approach to developing and making its recommendations.

3.1 Understanding Canadian Values

The document starts with an overview and examination of the values and priorities of Canadians and how the NWMO has developed and used this understanding to establish a framework for assessment and comparison of management approaches. The NWMO has developed a collaborative and open approach to its activities and actively seeks input from the public and experts. The document therefore describes what it has heard from the public and experts and articulates what it has learned to date.

Among the activities that the NWMO undertook in preparing the document are:

- A National Citizen's Dialogue was launched to better understand Canadian values. This dialogue brought together 462 unaffiliated Canadians from all walks of life representative of the public at large. Over the course of a series of day long sessions, participants articulated six core values which should direct the long term management of spent nuclear fuel.

- The initial dialogue with aboriginal people has identified their principles inherent in Aboriginal Traditional Knowledge. The NWMO needs to be responsive to their emphasis on planning within very long time horizons.

- The NWMO has created an NWMO roundtable on ethics and created an "ethical and social framework" to help direct its activities as well as the assessment of management approaches.

The report does a thorough job of exploring these topics and collecting input from Canadians. The result of this process has indicated Canadians wish the NWMO to further consider the following issues.

- A more precise description of the nature of the hazard posed by used nuclear fuel to human health and the environment.

- A more precise account of the nature of the risk posed by the transportation of used nuclear fuel.

- Clarification on what “social responsibility” or “public confidence” will entail.

- How the assessment is affected by the volume of used nuclear fuel which ultimately needs to be managed.

- Opportunities to reuse or recycle used nuclear fuel.

- Opportunities to site a deep repository in geologic media other than that noted in the Nuclear Fuel Waste Act.

3.2 Reporting Back on the Technical Methods

At the outset of its work, the NWMO identified 14 potential methods for the long term management of used nuclear fuel. Canadians, however, agreed in general that the focus should be on the three methods set out in the Nuclear Fuel Waste Act although certain other methods warranted monitoring. According to NWMO special consideration should also be given to methods that may transform the used fuel into a form that reduces potential hazards; a process known as partitioning or transmutation.

3.2.1 The Assessment Team

Early in 2004 the NWMO assembled a multidisciplinary group of individuals as an Assessment Team. The team was charged with two tasks:

1. Translate the ten questions presented in Discussion Document #1 and establish an assessment framework taking into account public and expert comment, and

2. Conduct a preliminary assessment of the alternative approaches.

The Assessment Team was asked to use a methodology that would allow for a “holistic” assessment taking into account diverse issues such as, technical, economic, financial, and environmental considerations. The Team was also asked to prepare a report that would set out its thinking as they considered the options.

The work of the Team provided a preliminary description of the strengths and weaknesses of the options under consideration, thereby providing a context for substantive discussion of the approaches. The Team also highlighted some of the difficult choices involved in selecting a recommended option.

3.2.2 The Alternative Methods for Long Term Storage

The alternative methods under consideration by NWMO are the methods set out in the Nuclear Fuel Waste Act. The Assessment Team has identified advantages and limitations for each of the methods as summarised in Table 1:

Table 1 - Advantages and Limitations of Alternative Methods

Method	Advantages	Limitations
At Reactor Storage (Build dedicated facilities on the existing reactor sites)	No transportation through adjacent communities	Results in multiple storage sites usually near large bodies of water; near population centres in some cases
Centralized Storage (Dedicated surface or near surface facility in central location)	Site can be selected on basis of most suitable conditions for used fuel storage; limits number of sites to manage	Requires transportation from reactor sites to the central location
Deep Geological Repository (Permanent storage deep below ground in selected geological formations)	Reduces or may eliminate the need for long term institutional and operational continuity; reduces security concerns	Requires transportation; difficult to confirm reduced monitoring requirements in advance and difficult to retrieve material in future if desired

3.3 NWMO's Responsive Framework

Through the work conducted so far the NWMO concludes in Discussion Document #2 that "The dimensions of a preferred management approach are beginning to emerge through our dialogue with Canadians". Canadians want to see a long term strategy and plan that also begins to take steps on the early phases of the plan. They conclude that the Preliminary requirements of a Preferred Management Approach include:

- **Adaptability**; ability to adapt the used fuel management approach to new and unforeseen circumstances such as new technology or procedures.

- **Phased decision-making**; ensure careful controlled improvements in operations and design that enhance performance reduce uncertainties, and improve economies.

- **Robust system of governance**; includes roles for many levels of government, independent regulators, and oversight bodies, as well as international bodies and watchdogs. Also includes maintenance of human capital needed to manage the used fuel over time.

- **Opportunities for citizen engagement**; governments and industry to be more transparent about what they are doing, and more inclusive of citizens and other stakeholders, both in how decisions are made and in the on-going management of used nuclear fuel.

3.4 NWMO's Continuing Activities

The NWMO continues to work on a number of fronts in response to concerns raised by Canadians.

First, it will continue to elaborate specific characteristics of each management approach under study including work on economic and financial aspects.

The NWMO will also examine the different types of geological media that may provide feasible options for safely and securely hosting a repository or centralized storage option.

Finally, the NWMO will begin the development of implementation plans for the management approaches. These plans will address mechanisms for on-going societal involvement, oversight and monitoring systems, institutional design including human resource capacity, and principles to guide site selection.

After further consultation with Canadians the NWMO will begin to develop its recommendations and will share them in early 2005 in the form of a draft study report. They will then seek public comment and input after release of the draft study report and before the final report is produced.

4.0 The Questions

The NWMO has posed three questions to the Town of Ajax for comments on Discussion Document #2.

1. Is the assessment framework comprehensive and balanced? Are there gaps and if so what does NWMO need to add?

2. What are the Town's thoughts on the strengths and weaknesses of each management approach: deep geological disposal; centralized storage; and reactor site storage?

3. Are there specific elements that the Town feels must be built into an implementation plan? What are the Town's thoughts on what a phased approach must include?

The Town's observations and comments on these questions are as follows:

4.1 Is the Assessment Framework Comprehensive and Balanced?

As noted in the description of the contents of the Document, the NWMO established an Assessment Team to develop the methodology and the criteria for assessing the options and arriving at a recommended approach. The document sets out in detail how this was done and what the preliminary conclusions are. The membership of the Team included a multidisciplinary group of experts and specialists in a wide range of fields. The expertise was both technical, and non-technical, and ranged from environmental assessment and risk management to economic, financial, and policy analysis.

Considering the framework laid out in Discussion Document #1, the Team searched and selected a methodology that would allow for systematic integration of social and ethical considerations with technical, economic, financial, and environmental considerations.

The Team adopted three basic assumptions as follows:

- It assumed that Canada needs to make a decision now on an appropriate approach for long term management of used nuclear fuel.

- It assumed that the volume of used nuclear fuel to be managed would be limited to levels projected for the life of the current facilities.

- It assumed that a superior management approach would be one that is robust over the long term.

The document describes the various used fuel management methods under consideration in some detail. However, the Team focused on the three methods identified in the Nuclear Fuel Waste Act (Reactor Site Storage, Centralized Storage, and Deep Geologic Repository) and recommended a “watching brief" on the partitioning and transmutation methods. These latter methods involve using nuclear science and technology to transform the material in the spent fuel into less hazardous forms. While this approach is not used in Canada there is significant activity and research on this process under study in other countries, primarily in Europe. Hence the document does a good job of describing and assessing the range of options and describing the strengths and weaknesses of each. Moreover, the Team outlines the timeframe associated with the three primary methods. The report concisely summarizes and compares the methods.

The report describes the assessment method that was selected and used. After considering several possible assessment methods, the Team selected a technique known as “multi-attribute utility analysis.” This method takes into consideration the special challenges and high degree of complexity in managing used nuclear fuel. It is a step-by-step process for constructing and applying a decision model. The multi-attribute utility analysis helps identify a most preferred option and ranks the remaining options, screens options to a short list, and eliminates acceptable from unacceptable choices. In regards to the long term management of used nuclear fuel, this method will address the following:

- The diversity of values, concerns and preferences across Canadian society related to this issue;

- The multiple objectives that have been presented by Canadians to address the various approaches to used nuclear fuel management;

- Compare the different management approaches in terms of the evolving needs of future generations; and

- The method must provide a degree of transparency that will

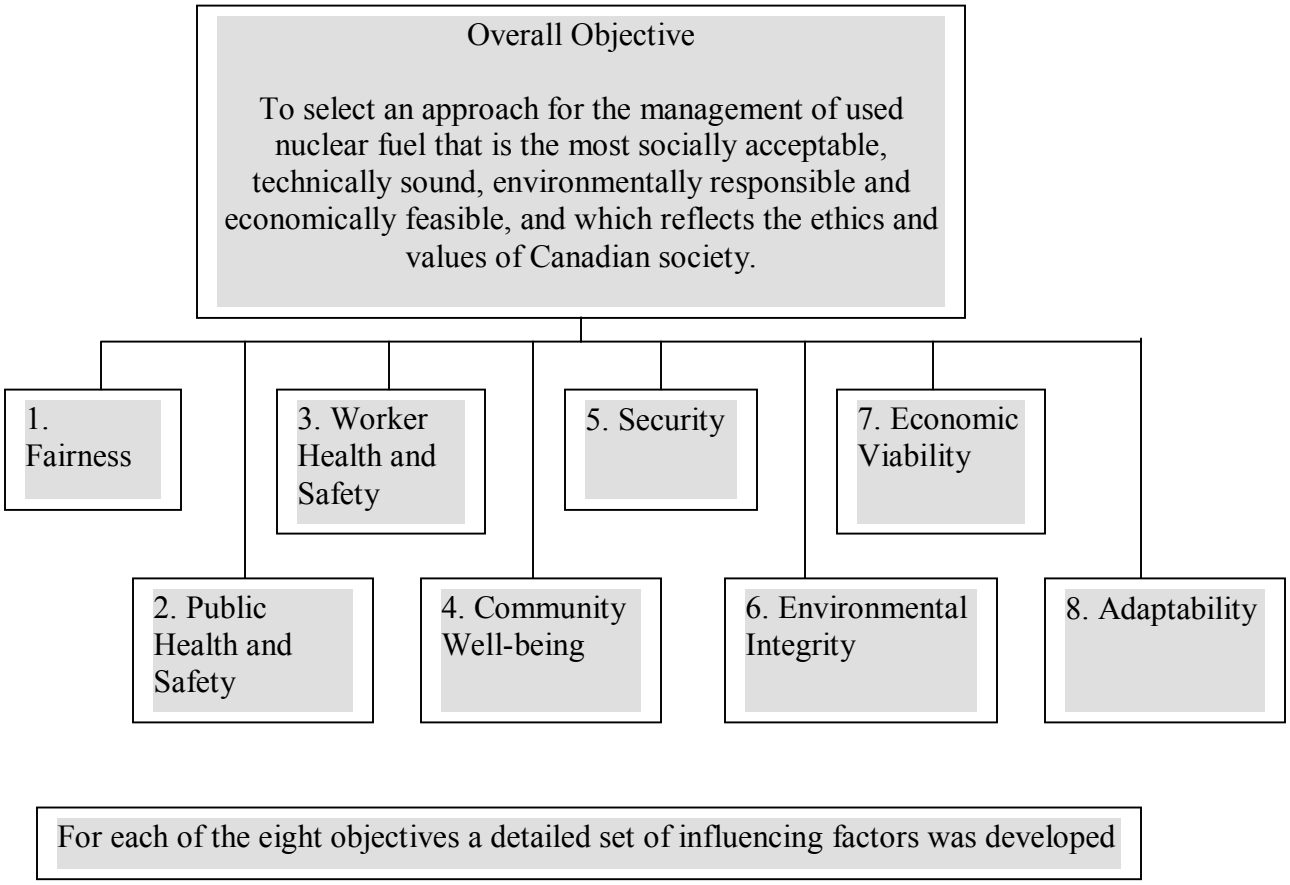
    - Provide a fair description of the assumptions and judgments made.
    - Offer directions to greater underlying detail if required.
    - Create a report that is effective in communicating the work and results of the assessment.

Based on the ten questions addressed in Discussion Document #1 the Team designed an overarching objective for the management approach and then broke this down into a series of eight second level objectives. The overarching objective that the Team developed is:

"…….to select an approach for the management of used nuclear fuel that is most socially acceptable, technically sound, environmentally responsible, and economically feasible, and which reflects the ethics and values of Canadian society……"

The eight second level objectives, as shown in Figure 1, were derived from the ten original questions from Discussion Document 1. In order to achieve the overarching objective, the eight second level objectives must be accomplished.

Figure 1 – Objectives Hierarchy



A description of the eight level second level objectives is as follows:

1. Fairness

To ensure fairness in the distribution of costs, benefits, risks and responsibilities with this generation and future generations.

2. Public Health and Safety

To ensure public health and safety. The public should be safe from the threat of injuries due to accidents during the transportation or other operations of the used nuclear fuel.

3. Worker Health and Safety

To ensure worker health and safety including construction, mining and other tasks associated with managing the used nuclear fuel.

4. Community Well-being

To ensure the well-being of all communities (host communities, communities in the surrounding region and on the transportation corridor and those outside the vicinity who feel affected). The potential implications must be considered including economic activity, environmental disruption and culture.

5. Security

To ensure security of facilities, materials and infrastructure. For example, the used nuclear fuel should be secure from the threat of theft, terrorism, and war.

6. Environmental Integrity

To ensure that environmental integrity over the long term is maintained including concerns with stresses or damage associated with existing and new infrastructure (such as roads and facilities) and operations (such as transportation).

7. Economic Viability

To design and implement a management approach that ensures adequate economic resources are available to pay the costs of the selected approach now and in the future while contributing positively to the local economy.

8. Adaptability

To ensure the selected management approach is able to be modified to adapt to changing knowledge and conditions over time. The approach should provide flexibility to future generations.

For each of the eight objectives a detailed set of “influence factors” was developed. This was an elaborate process of identifying items that may influence the particular objective to be accomplished. A sample of the various influences on an objective such as security is shown in Appendix 2. For example, influencing factors on security include risk scenarios such as sabotage, terrorism, and theft. A score was given to each objective and influence factor for each long term management approach. The score was based on a scale of 0 - 100, with 0 defined as “an extremely poor, unacceptable level of performance on the objective” and 100 defined as “an ideal performance with respect to the objective” (e.g. a situation where absolutely no adverse consequences would occur). After the scores were totalled and averaged for each objective, the preliminary results indicated that all the methods are feasible but the Deep Geologic Repository had some overall advantages.

4.1.1 The Town's Issues arising from the Assessment

Although the assessment is comprehensive and balanced, there is one aspect that warrants further consideration and may be of particular interest to host communities and those communities located near nuclear power plants. This relates to the initial assumptions within which the Assessment Team applies its decision making process. Of particular interest is the assumption that the amount of spent nuclear fuel to be managed is effectively capped at the amount that would be produced during the planned life of the existing nuclear power reactors in Canada.

It would be useful to note that the trend in the industry is to extend the life of existing nuclear power assets. This practice is particularly well established in the U.S. and other countries where a number of plants have had their life extended. The premise here is that by investing in refurbishment of a plant, its economic life can be extended in order to maximize the economic value. Typically the period of extension is 20 years.

Hence, in the context of the decision of which approach to develop for management of used nuclear fuel it should be noted that the amount of fuel could increase over the planning assumption used by the Assessment Team due to extended life of the plants.

The Pickering A station has had Unit 4 brought back into service with extended life and Unit 1 is currently being refurbished and will go back into service in 2005. Moreover, early planning has begun on refurbishment of Units 2 and 3 at Pickering. Similarly such plans are being made for the refurbishment of Bruce A Units 1&2 and at Point Lepreau in New Brunswick.

The Town of Ajax has several questions in regard to the extended life of the Pickering Nuclear Power Plant:

- At what time will the Pickering Power Plant be decommissioned?
- Can we assume that there is a high probability that the life of particular reactors at the Pickering Nuclear Power Plant could be extended for an additional 20 years or even longer?
- Does Pickering have the necessary approvals in place from the Canadian Nuclear Safety Commission to accommodate all of its dry storage requirements?

- What is the probability that the type of used nuclear fuel being produced now will be the same in the future? Will the storage requirements be the same?

There has also been some suggestion that new nuclear plants may be constructed in Ontario. While new nuclear plants are a future consideration due to the required planning time and the need to address plant site selection, the resulting increased volume of used fuel will need to be managed as well. The report focuses on the assumption of a fixed amount of used fuel to be managed and does not consider the potential of new reactor designs that may result in fuel having different and distinct characteristics from current fuels. New reactors will presumably have some different fuel designs, which may require alternative storage considerations.

Considering new reactor designs, there is some discussion in the industry of entertaining future proposals from suppliers of reactors that use the pressurised water and enriched fuel technology. Reactors of this design are known as Pressurised Water Reactors or "PWR" reactors and are commonly used in the United States and Europe. Used fuels from these reactors have very different characteristics from the used CANDU fuel. In the event that such reactors were to be built in Canada in the future, the used fuel would also have to be managed. It would be interesting to see how the Assessment Team scores would change if the assumptions included one or more of these reactors coming into service in Canada in the future.

In the event that new reactors based on different technology were established in Canada, the Town has some particular questions related to this scenario.

- How is used fuel from pressurised water and enriched fuel technology different from the CANDU used fuel?

- Is less or more used fuel produced?

- Would this type of used fuel take longer to cool down in the pools before placed in the dry storage containers? How is the timing of the used fuel management program impacted?

- Could the current dry storage technology be used to house such different used nuclear fuel?

The combined effect of plant life extension from refurbishment as well as new nuclear plants may impact how each of the three options are viewed by host and neighbouring communities. For example, in the case of at reactor storage, continued production of used fuel would mean that a large and more extensive facility would be built at the site. In the case of the centralized or deep geological

options, the transportation of the used fuel through the communities would be extended over a longer period compatible with extended life of the refurbished or new plants. Of course continued operation of the reactors will ensure that the necessary skills are available on a continuing basis to support the used fuel management program.

4.2 The Strengths and Weaknesses of Each Management Approach

The report discusses in great depth the strengths and weaknesses of the three primary management approaches; Deep Geologic Repository, Centralized Storage, and Reactor Extended Storage. The Town's perspective on the strengths and weaknesses presented are as follows:

4.2.1 Deep Geologic Repository

Strengths	Weaknesses
1. Facility can be located in remote location far from people	1. Used fuel must be transported to the used fuel management site over many years.
2. Enhances security as a result of facility design in deep rock	2. Concern about institutions and governance need to be addressed as the used fuel is transferred
3. All material can be located in one facility	3. Economic impacts on the community are not self evident and need further review.
4. Provides for dedicated staff on continuing basis	

4.2.2 Centralized Storage

Strengths	Weaknesses
1. Site can be chosen as best suited for used fuel management	1. Requires transportation through neighbouring communities for many years
2. Site can be located in remote location thereby reducing risk to environment, health and safety	2. Requires a willing host community to support the facility for a long period of time.
3. Enable dedicated trained staff on continuing basis	3. Requires institutional and financial framework to support the facility
4. Required technology is well established	

4.2.3 Reactor Site Storage

Strengths	Weaknesses
1. No transportation of the used fuel is required	1. Need for continued institutional and financial systems for thousand of years
2. Nuclear expertise is readily available on the sites	2. Reactor site not ideally suited to long term used fuel management
3. Technology is well established	3. Security is required for the multiple sites
	4. Possibility of extending the life of existing units at the Pickering Nuclear Power Plant increases amount of on site storage of used fuel.

4.3 Specific Elements for the Implementation Plan – Phased Approach

Discussion Document 2 notes that a major activity due in the next phase of NWMO's work is to develop an implementation plan for the used fuel management options. In particular, it notes that Canadians have advised that the plan must be "phased" with opportunities for public input on a continuing basis as the plan is implemented.

There is little discussion at this stage of the mechanism to ensure on-going public input during implementation. This should be further explored and developed by the NWMO. It is recommended that a key element of the implementation plan is to include ongoing consultation with existing and new host communities as well as communities in close proximity to nuclear facilities.

It is important to note that there are some aspects of used nuclear fuel management that warrant particular attention. First is the matter of the used nuclear fuel remaining on the existing reactor sites through reactor on-site storage. While conceptually this may seem to be a workable solution, Discussion Document 2 notes that storage at site, while feasible, is not ideal. The sites of operating reactors are chosen on the basis of what is best for an operating reactor site rather than a used fuel management site. This means that an operating reactor site needs to be near a large body of water which is used as a source for cooling the reactors.

Another issue to monitor is the need for transportation of the used nuclear fuel. Since the used nuclear fuel is currently stored at the reactor site, the used nuclear fuel will need to be transported to a centralized site or a repository if either of these options is selected. This means that the community will have to

be prepared for the process of transportation of the fuel for the duration of the life of the power plant and some years thereafter. As noted earlier this could become a continuing process depending on how long the reactors operate through their program of refurbishment and life extension. The process will likely take some decades.

However, there are some concerns with the transportation of the used fuel that NWMO needs to address:

- How frequently would trucks carrying the used nuclear fuel be leaving the power plant and transporting the material through the community to its destination?
- Will transportation of the used fuel be in dry storage containers?
- What are the safety, security, and risks of transporting the used fuel and the related procedures and impacts on the community?

A further point is that the Town of Ajax will need to plan for, and be involved in, a continuing process of information gathering and exchange with the authorities and the organizations responsible for the management of the used nuclear fuel. The NWMO has a comprehensive communication program that is an excellent starting point for this feedback. However, the affected communities are in a unique position, in the sense that they are more likely to be directly concerned by the presence and transportation of the material through their jurisdictions to a management site. Hence these communities will likely have a strong need for in-depth information, on a continuing basis, and input to the management process. As part of the implementation and management process, NWMO should create a mechanism to ensure that knowledge and information are passed onto future generations.

5.0 Management Approaches Used in Other Countries

In evaluating the options for long term management of used nuclear fuel it is instructive to briefly look into the activity in this regard in other countries.

Many countries have nuclear power programs and they are therefore affected by the same issue of long term management of used nuclear fuel. While in many cases the specific nuclear power technology is different than that used in Canada the problem is essentially the same since their used nuclear fuel will be hazardous for a very long time and will need to be managed for many thousands of years. In most cases, the countries are using dry storage on site followed by long term storage at a centralized location. In most cases the repository method is used or proposed.

5.1 The United States

In the United States they have selected a site for the long term management of the used nuclear fuel. The U.S. has 106 operating nuclear reactors on 60 sites. Many of these sites are running out of room for the on site storage of the used fuel. In a few cases, the reactors have been taken out of service at the end of their life and the used fuel remains in dry storage on the reactor site. The plan is for the removal of this used material from the site and ultimately transport to the centralized repository site at Yucca Mountain in Nevada. The U.S. is still in the process of qualifying Yucca Mountain for the application, but the trend is clearly in this direction. There have also been some proposals for centralized above ground storage in large dry storage facilities. In one case this has been proposed by Aboriginal people on land that they control in New Mexico.

5.2 In Europe

In Europe each country operating reactors is at various stages of development of long term management sites. In Germany, they have selected a site near the town of Gorleben which is located on a salt dome. The presence of salt in the ground means that no water is present and therefore the site is a good location for long term storage of used nuclear fuel. Germany is currently storing used nuclear material at this site. Similarly, France and Sweden have selected sites and other countries are making similar plans.

5.3 Asia

In Asia the nuclear power plant operators are also planning on the basis of some form of centralized or repository concept. Dry Storage at the reactor site is in use

in Japan, South Korea, and Taiwan, and will likely be applied in China as their reactors log more years of operation. Japan, South Korea, and Taiwan are planning sites for long term management of spent nuclear fuel. South Korea has recently looked at establishing a centralized storage facility on a remote island. Similarly, Japan is looking into a facility on its North Island. Considering population densities in Asia one can understand that locating such facilities is, as with most infrastructure projects, a challenging task.

5.4 General Comment on the International Scene

Based on activity in other countries it is clear that the trend is toward some form of centralized or repository approach. The Town recommends that:

- NWMO continues to monitor the used fuel management approaches in other countries;

- NWMO should use examples from other countries to support the 3 long-term management approaches (e.g. transportation methods used; how used fuel is transported in other countries; how do they ensure safety and security)

The lessons from other countries indicate there is a lot of international experience being developed and accumulated in the field of long term management of used nuclear fuel. As NWMO approaches its final recommendation it should make a special point of including the best practices from other countries in its analysis.

6.0 Observations and Recommendations

In reviewing NWMO's Discussion Document #2, the Town makes the following observations and recommendations.

6.1 Observations

The following observations are based on the Town's review of Discussion Document 2:

- Overall, the document is comprehensive and balanced by taking into account the values of Canadians and establishes a workable method that provides for the consideration of diverse aspects of the long term management of used nuclear fuel. The assessment methodology should allow the NWMO to arrive at a considered and balanced recommendation.

- The description of the various management methods is thorough and well set out. In particular, the discussion of strengths and weaknesses of each approach is useful although additional background would help readers to better understand the relative importance of the strengths and weaknesses.

- When taken together with Discussion Document 1, the background research papers, and the public and expert consultations, Discussion Document 2 provides an adequate next step in laying out the complexity of the decision-making process and issues, and ultimately moving toward a considered recommendation.

- The report raises a concern with the volume of used nuclear fuel to be managed since it assumes the amount of used fuel to be managed is limited to the amount projected for the life of the current facilities.

6.2 Recommendations

The following are recommendations for NWMO to consider:

- Since the Town of Ajax is not a host community for used nuclear fuel but is in close proximity to the Pickering Nuclear Power Plant, it will be very important for the Town to engage the NWMO and other authorities, in comprehensive discussions concerning implementation of the recommended management approach. The Town should

engage in an ongoing discussion with the NWMO in 2005 when the draft recommendation is released for public comment.

- The Town should request the NWMO to undertake studies to address the potential life extension of the existing reactors. The study should identify the effects on the existing host communities and communities in close proximity to nuclear power plants.

- Similarly, the NWMO should study the prospect for new reactors being built and the consequences associated with the new reactor used fuel production. The construction of new reactors is a significant challenge in site selection, particularly for a new site. For this reason there is often an incentive for nuclear power plant developers to focus on existing sites for new plant construction if there is sufficient space. This could result in continued use of current nuclear power plant sites indefinitely and result in different used fuels to be managed. New reactor types were identified during the Manley Commission review as something to be considered in the future development of Ontario's nuclear power program.

- NWMO should continue to monitor developments in other countries and, if applicable, use the best practices and experiences of other countries to support the recommended approach that the NWMO will provide to Natural Resources Canada on the long term management of used nuclear fuel.

- NWMO should continue to keep individuals, communities, and organizations informed of their work and plans as well as continue to seek input from communities that are likely to be most impacted by the used nuclear fuel management option selected.

7.0 Summary and Conclusion

In reviewing Discussion Document 2 and NWMO's activities to date and future plans, NWMO has done a thorough job in laying solid groundwork to arrive at a balanced decision and recommendation. However, there is still much work to do in consulting with individuals, organizations, and communities to address their concerns in implementing a recommended long term management approach. The Town anticipates that NWMO will take into consideration the Town's concerns and comments in the draft study report which is to be released in spring 2005.

Appendix 1

ADH Technologies Inc.

ADH Technologies Inc. provides management consulting, project management, and engineering services to the international nuclear industry. The firm provides specialized services advising clients in strategic matters involving the nuclear sector with particular emphasis on project assessment, evaluation, and oversight. Specific capabilities include project management, project cost estimating, and engineering as well as social and economic evaluations. The company is founded and led by individuals that have more than 25 years experience in the Canadian and international nuclear industry at the executive level. In particular, the company is experienced in the development and project management of major nuclear projects up to the billion-dollar range. The company is expert in all aspects of the nuclear industry including waste management technology and programs. The company is familiar with both government and private sector practices relating to nuclear projects and is familiar with the applicable regulatory and legal regulations relating to the industry.

The company has recently completed some projects for the NWMO involving the review of cost estimates for the long term spent fuel management options under consideration. It has also undertaken reviews of the conceptual designs that the NWMO has developed for each of the options. The company also acts as a reviewer for a number of background papers that have been commissioned by the NWMO.

Appendix 2

Security Influence Diagram