HIGH LEVEL RADIOACTIVE WASTE AND COMMUNITIES' RISK PERCEPTIONS: A CASE STUDY OF AN ON-GOING VOLUNTARY SITING PROCESS

by

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University of Toronto, Mississauga, Ontario 2012

A thesis presented to Ryerson University
in partial fulfillment of the
requirements for the degree of
Master of Applied Science
in the Program of Environmental Applied Science and Management

Toronto, Ontario, Canada, 2016

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Abstract

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This study examined an on-going case study of communities that have been involved in the Nuclear Waste Management Organization's nuclear facility siting process. Interviews were conducted to examine whether communities no longer participating had higher perceptions of risk relative to communities that are still participating. In addition, this study examined the influence of other factors on communities to stay in the process or stop participating. Moreover, this study evaluated whether the siting process is consistent with the siting principles of a cooperative model. Results showed that eliminated communities had slightly higher risk perceptions compared to communities that are still participating. On the other hand, opted out communities had lower risk perceptions. It also showed that perceived potential benefits are the main factor controlling the communities' decisions at this stage. In addition, the siting process is not perfectly consistent with, but similar to a collaborative planning model at this stage.

Acknowledgements

I would like to express my appreciation to my thesis advisor Dr. Ron Pushchak. I appreciate his time and effort, as well as his constructive advice and editorial comments. I am also grateful for the 15 interview respondents who were kind enough and willing to participate in my study. Finally, I would like to thank my family, friends for their support and encouragement throughout the span of this study.

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Chapter 1: Introduction

The world is facing great difficulty finding suitable locations to dispose of high level nuclear waste. Spent nuclear fuel (high level radioactive waste) is not disposed permanently anywhere in the world. High level radioactive waste produced around the world has been accumulated and not buried anywhere yet. In 2009, there were almost 240,000 metric tons of worldwide spent fuel, most of it stored temporarily at reactor sites (International Panel on Fissile Materials, 2011). Many international attempts to dispose spent nuclear fuel have failed. Examples of these failures include the U.S. and Canada.

The U.S. started thinking about the issue in the late 1950s (Elliot Lake Standard, 2015b). At that time, U.S. research suggested disposing of high-level nuclear waste in underground repositories, but did not proceed with the plan. In the early 1980s, people were more concerned about the increasing piles of spent nuclear fuel. They wanted to deal with the nuclear waste issue, instead of leaving it for future generations to deal with. Many thought they needed to have a repository in the east and another in the west (Elliot Lake Standard, 2015b). However, when the Department of Energy started thinking about the nine possible locations for a repository; proposed sites were faced with opposition from the public who felt they were not involved in the project. State governments also opposed the project. In 1987, the U.S. federal government thought that it was best to dispose of the waste in the Yucca Mountain site in Nevada (Elliot Lake Standard, 2015b). In December 1987, the Congress amended the *Nuclear Waste Policy Act* of 1982 *(NWPA)* to limit the search only for Yucca Mountain site in Nevada (Kunreuther, Easterling, Desvousges, & Slovic, 1990). That was opposed by the citizens in Nevada because they expected the nine sites would be fully evaluated and, based on the evaluation, a final site

will be selected (Elliot Lake Standard, 2015b). In addition, State officials opposed the federal proposal (Kunreuther, Easterling, Desvousges, & Slovic, 1990). In 2009, President Obama stopped the process (World Nuclear News, 2009).

In Canada the production of high-level radioactive waste started in 1945, when the first nuclear reactor began operating (Edwards, 2004). The production of high-level radioactive waste in Canada has increased since 1954 because of nuclear electricity production. In 1977, the nuclear waste problem was officially noticed with the publication of "The Management of Canada's Nuclear Wastes" as cited in (Edwards, 2004). At that time, Canadian nuclear reactors were operating or were established in four provinces (Ontario, Manitoba, Quebec and New Brunswick) (Edwards, 2004). In 1978, the first independent assessment of the nuclear waste problem was established with the publication of "A Race against Time" as cited in (Edwards, 2004). Two months before the release of this independent assessment, the Government of Canada signed an agreement with the Government of Ontario to ask Ontario Hydro and Atomic Energy of Canada Limited to perform scientific and technical research related to the management of high level nuclear waste (Edwards, 2004). This research contained three phases: concept assessment, site selection and facility construction. Only the concept assessment part was completed (Sheng, 2005).

The research cost 700 million dollars over 15 years (Edwards, 2004). One part of the study was the establishment of an underground research laboratory in Manitoba. However, the Government of Manitoba issued a law prohibiting the import of nuclear waste into Manitoba for permanent storage (Edwards, 2004). In 1989, the federal government established an Environmental Assessment (EA) Panel (Seaborn Panel) to examine the social and economic aspects of disposal and to perform national public hearings for the proposed concept. The

purpose of Seaborn Panel was restricted to considering the proposed disposal concept and excluded the question whether Canada should stop producing irradiated nuclear fuel by stopping nuclear power (Edwards, 2004). This restriction was pointed out by politicians and the public. Therefore, the government promised to hold public hearings on nuclear power. The Seaborn Panel issued a public apology, because the government had no intention of keeping its promise (Edwards, 2004).

The Panel released the final report in 1998 (Sheng, 2005). The final report mentioned that the AECL concept for deep geological disposal didn't have high public support as Canada's method to manage nuclear waste (Edwards, 2004). In the panel's opinion, it was unlikely that a Canadian community could be found that would not oppose the project. The Seaborn Panel recommended the establishment of a Nuclear Fuel Waste Management Agency. However, the government established the Nuclear Waste Management Organization (NWMO) controlled by the nuclear industry. Today, the organization's board of directors consists of the producers of nuclear wastes: Ontario Power Generation, New Brunswick Corporation, Hydro-Quebec and AECL (Edwards, 2004). The NWMO was the result of previous failed attempts to site spent nuclear fuel and now it is responsible for managing used nuclear fuel in Canada. It established a siting process in 2010 and is now part way through its attempt to site a nuclear waste repository (NWMO, 2012b).

Failures to site nuclear repositories have been caused by public opposition due to their risk perceptions (Loewenstein, Weber, Hsee, & Welch, 2001). Risk perception is a subjective judgment formed by people when characterizing and evaluating hazards. Perceived risk, in turn, is the subject's estimate of the possibility of personally facing a hazard and the likelihood of encountering negative consequences (Knuth, Kehl, Hulse, & Schmidt, 2014). However, objective

risk is the estimates of risk using scientific knowledge and statistical reasoning (Loewenstein, Weber, Hsee, & Welch, 2001). It is the likelihood of adverse events and their negative effects occurring to the average person (Knuth, Kehl, Hulse, & Schmidt, 2014). Therefore, it is important to understand how risk perceptions of participating communities have affected their choices regarding the siting of a nuclear waste facility. This will help to understand the differences between communities that continue participating in the siting process and those who stop their participation, and understand the relationship between risk perceptions and siting decisions. This will help in siting future nuclear repositories to dispose of high level radioactive waste in a safe manner.

This study is an investigation of an on-going voluntary nuclear waste siting process that is being conducted by the NWMO. It is an on-going case study of communities that have been involved in the NWMO's siting process. These communities became involved in the process when the NWMO participated in a meeting of the Federation of Canadian Municipalities (FCM) that represents all Canadian municipalities and announced about their siting process (Parliament of Canada, 2010). This project was presented as an open invitation process for all Canadian communities (NWMO, 2013a). Later, a community identifies interest in learning more about the process by sending a request to the NWMO (NWMO, 2010l). The request had to be sent by responsible authorities (for example, elected representative bodies). This could involve an existing municipal council of a community, Aboriginal government, a community group established in response including community leaders, or another group considered appropriate by the community for learning more about the project (NWMO, 2010l). As a result, the NWMO would provide detailed briefings and an initial screening would be conducted for the interested community (NWMO, 2010l).

The perceptions of these communities were investigated by interviewing one representative from each community. Members of the community liaison committees (CLCs) are the best representatives of these communities because they have been informed to some extent by the NWMO about the facility and its risks and they are knowledgeable about their communities' involvement as well. However this study has not examined the information provided to the CLCs. Therefore, CLCs can clearly explain the position of their communities in the siting process. The overall purpose of this study is to examine whether communities' risk perceptions regarding nuclear waste have influenced the current siting choices being made; for communities to stay in the process, be excluded or opt out. The specific objectives of this study are summarized as follow:

1- To examine whether communities that have stopped participating (including being eliminated or having opted out) had higher perceptions of risk in comparison to communities that are still participating.

2- To discover the influences of other factors on communities to stay in the process or stop participating.

3- To evaluate whether the siting process is consistent with the siting principles of a cooperative model.

Used Nuclear Fuel Management in Canada

Used nuclear fuel is high-level radioactive waste that results from electricity generation by nuclear power plants (NWMO, 2014a). In Canada, used nuclear fuel is produced by the

nuclear reactors in Ontario, Quebec and New Brunswick and at Atomic Energy of Canada Limited's nuclear research sites in Whiteshell, Manitoba, and Chalk River Laboratories in Ontario (NWMO, 2014a). In Canada, nuclear power plants use natural uranium. Natural uranium, in the form of ceramic pellets, is placed in Zircaloy tubes, taking the shape of a fireplace log (NWMO, 2014a). When the fuel bundle has been used up to generate electricity, it is removed from the reactor. When the bundle is removed, it has the same appearance as it did when it was placed in the reactor; however, it is hot in temperature and contains several fission products that are both hazardous to human health and long-lived in terms of their radioactive half-lives (NWMO, 2014a).

After removal, the used nuclear fuel is considered radioactive waste that needs proper management. First it is placed in a water-filled pool that helps decrease its heat and radioactivity. After seven to 10 year, the used bundles are stored in dry storage containers, either silos or vaults (NWMO, 2014a). These storage containers have a minimum design life of 50 years. This is a temporary solution for used nuclear fuel storage. The radioactivity of used nuclear fuel decreases with time, but its chemical toxicity persists (NWMO, 2014a). Therefore used nuclear fuel remains a potential health risk for many hundreds of thousands of years and requires careful management (NWMO, 2014a).

Approximately 85,000 used nuclear fuel bundles are produced in Canada yearly. Currently, in Canada, more than 2 million used fuel bundles have been produced (NWMO, 2010c). Used nuclear fuel is stored temporarily at licensed facilities located where it is produced in Ontario, Quebec and New Brunswick, and at Atomic Energy of Canada Limited's nuclear research sites in Whiteshell, Manitoba, and Chalk River Laboratories in Ontario (NWMO, 2014a). The point can be made that opposition to new nuclear power generation has been based

to a significant degree on the argument that no new nuclear waste should be generated unless and until a safe disposal facility has been provided to deal with the present store of spent nuclear fuel. A long term solution is necessary in Canada; a nuclear waste facility to dispose of used nuclear fuel in a safe manner. The NWMO is searching for a site to locate the nuclear waste facility.

The Nuclear Waste Management Organization

Following the failure of the first disposal concept in 1998, and recognizing the record of failure by governments to impose nuclear waste sites on communities, the voluntary siting approach was chosen by the Nuclear Waste Management Organization (NWMO) in Canada. The NWMO was founded in 2002 under the *Nuclear Fuel Waste Act (NFWA)* (NWMO, 2010b). The *NFWA*, which came into force November 15, 2002 made the electricity generating companies that produce used nuclear fuel (Ontario Power Generation, New Brunswick Power and Hydro-Québec) responsible for establishing a waste management organization to provide suggestions to the Government of Canada on the long term management of used nuclear fuel (NWMO, 2010b). The act made the owners of nuclear fuel waste responsible for financing the long term management of the used fuel by establishing separate trust funds to finance the NWMO. In addition, the act required the NWMO to form an Advisory Council and that the Council's comments on the organization's study and triennial reports should be available to the public (NWMO, 2010b).

The act directs the NWMO to study, recommend and finally implement a plan for permanent management of used nuclear fuel in Canada (NWMO, 2010c). Within 3 years of its establishment, the NWMO had to submit a list of suggested approaches, and a recommended

approach (with the comments of the Advisory Council) for management of used nuclear fuel to the Minister of Natural Resources (NWMO, 2010b). *The Nuclear Fuel Waste Act* required the NWMO to study, at the least, three specific approaches: a) deep geological disposal, b) storage at nuclear reactor sites, and c) centralized storage – above or below ground. This did not prevent the consideration of other approaches that might have been suggested through the NWMO's work (NWMO, 2010e). Studying these approaches proved that each of these methods had certain strengths and limitations (NWMO, 2010c). This resulted in a search for an approach that would better meet Canadians' goals by being socially, technically, economically and environmentally acceptable. The approach that was finally adopted is called Adaptive Phased Management (NWMO, 2010c).

The NWMO concluded its study within 3 years and recommended the Adaptive Phased Management approach (APM) to the Minister of Natural Resources Canada in November 2005 (NWMO, 2010b). The act authorized the Federal Government of Canada to determine the used nuclear fuel management approach. In June 2007, the government chose the Adaptive Phased Management (APM) approach (NWMO, 2010b).

The Adaptive Phased Management (APM) approach is the method that resulted from the three year discussion (2002-2005) that the NWMO had with thousands of citizens, specialists and aboriginal people in every province and territory (NWMO, 2010c). The goal of this discussion was to establish a long-term management approach that is socially, technically, economically and environmentally acceptable (NWMO, 2010c). Incorporating public involvement, this dialogue led to the conclusion that Adaptive Phased Management plan is the method that should be followed by the NWMO for the long term management of used nuclear

fuel (NWMO, 2009). Adaptive phased management is both a management system and a technical method (NWMO, 2014a).

The technical aspect of the plan describes the technology to isolate Canada's used nuclear fuel, by storage in an adequate underground rock formation (NWMO, 2014a). This project includes the construction of a deep geological repository and a used fuel transportation system, to manage used nuclear fuel in Canada (NWMO, 2010c). The repository will be placed around 500 meters underground, based on the geology of the final site (NWMO, 2010c).

Similar approaches have been approved in the UK and France, and are already making progress in European nations like Finland and Sweden (NWMO, 2010d). Deep geological repositories have been constructed around the world for different types of radioactive wastes (NWMO, 2010g). A deep repository for used nuclear fuel is being constructed in Finland and similar repositories are planned for used fuel waste management in Sweden, the United Kingdom and France (NWMO, 2010g). Sweden and Finland are the most innovative countries in dealing with high-level nuclear waste. Both countries already have sites with volunteer communities (Elliot Lake Standard, 2015b).

The management aspect of the Adaptive Phased Management (APM) is a phased and adaptive decision-making process, responding to public involvement and constant learning (NWMO, 2014a). It is a phased process because it involves multiple phases (steps) with continuous participation of interested Canadian communities (NWMO, 2010d). The decision about a suitable site will be made in a series of steps (NWMO, 2014a). It is an adaptive process because it is flexible; offering for go, no-go choices at each step to consider new knowledge or changing societal priorities (NWMO, 2010d). The APM method suggests an adaptation to

changing preferences and perceptions of potential host communities. The participating communities will continue in the process at a pace and in a manner, depending on their choices and needs. The process is based on the developing and varying interests of participating communities. Any of the participating communities may opt out from the process at any point until the final agreement is signed (NWMO, 2014a).

The NWMO's goal is to find an informed and willing host community to store the used nuclear fuel permanently (NWMO, 2012b). Initially, 21 communities expressed interest in learning about the siting process and the benefits that will be offered by the project (NWMO, 2012b). However, the NWMO did not determine at the outset the final economic benefits to any participating community (NWMO, 2010f). Instead, the NWMO offered an estimate of the possible economic benefits to a host community, economic region, and host province, linked to the siting process. This cast the siting process as a negotiation. According to the NWMO, economic benefits would be greater in larger host communities (or an assembly of smaller communities working as a group). All host communities would receive major economic benefits including: Improved employment, greater employment income and overall wealth creation (NWMO, 2010f).

Chapter 2: Literature Review

The NWMO nine steps site selection process

The NWMO followed a nine step procedure to find an informed and willing host community (NWMO, 2012b). The following is a diagram of the NWMO's nine step process:

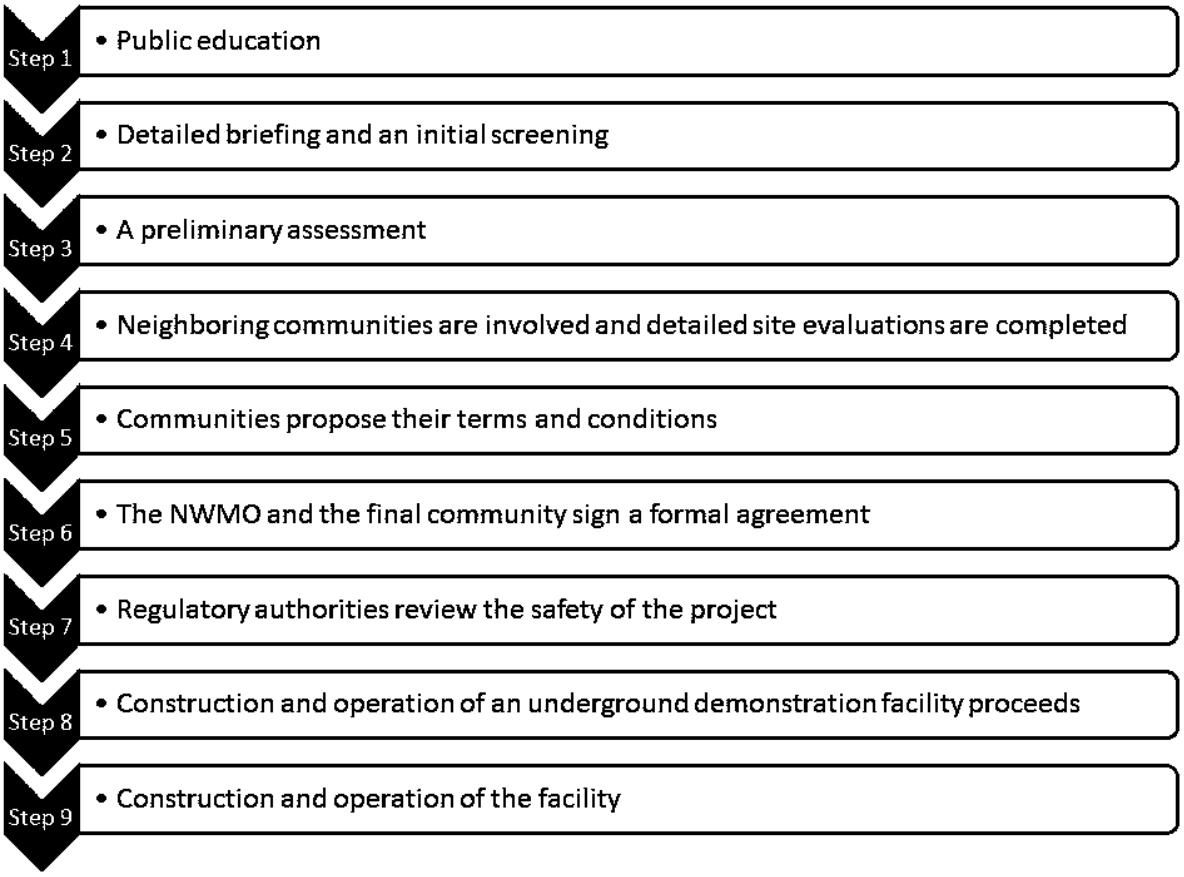

Figure 1: NWMO's nine step site selection process.

It is important to note that these steps are explained in detail in Appendix 1. The nine steps process includes the following:

Step 1: The NWMO starts the siting process with a program to educate the public, answer questions and ensure that Canadians are aware about the project and the siting process (NWMO,

2010a). This project is an open invitation process for all Canadian communities (NWMO, 2013a). It is driven by interested Canadian communities (Holt, 2012).

Step 2: Communities express their interest in learning more (NWMO, 2010a). As a result, the NWMO provides detailed briefings and an initial screening is conducted (NWMO, 2010l). A community will be excluded from the process if it does not meet all the requirements set out in the initial screening criteria at this stage (NWMO, 2010c).

Step 3: A preliminary assessment of potential suitability will be conducted for communities that continue to be interested to check if a geographic area or specific sites in the community have the potential to meet the more detailed requirements for the process (NWMO, 2010a). Preliminary assessments conducted by the NWMO will include both phase 1 and phase 2 (NWMO, 2010l). Phase 1 of Preliminary Assessments includes desktop studies (NWMO, 2013a). Phase 2 Preliminary Assessments include field studies (NWMO, 2013a). However, the NWMO encourages the involved municipalities to found a "community liaison committee" in step 3 of the siting process (NWMO, 2010h).

Step 4: Communities that surround the interested communities, which might be impacted by the nuclear facility siting are involved in the process if they have not been already, and detailed site evaluations are finalized (NWMO, 2010a).

Step 5: Communities with confirmed suitable sites decide if they want to accept the project and propose the terms and conditions on which they would have the project proceed (NWMO, 2010a). The NWMO requires a responsible decision-making body to send a formal expression of interest, supported by a compelling proof of willingness among citizens living in the local area

(NWMO, 2010l). Communities that are unwilling or cannot show willingness in a compelling manner will stop participating in the siting process (NWMO, 2010l).

Step 6: The NWMO and the selected community sign a formal agreement to host the facility (NWMO, 2010a). The NWMO chooses a final preferred site. The preferred site will be one that can prove to be able to safely store and isolate used nuclear fuel, protecting humans and the environment over the long run (NWMO, 2010l).

Step 7: Regulatory authorities review the results of the site assessment and the safety of the project through an independent, formal and public process and, if all requirements are met, give their approvals to proceed (NWMO, 2010a). In order for construction to take place, the NWMO will have to confirm that the project meets or exceeds strict regulatory criteria to maintain the health, safety and security of Canadians and the environment according to Canada's international commitments on the peaceful use of nuclear energy (NWMO, 2010c).

Step 8: Construction and operation of an underground demonstration facility proceeds (NWMO, 2010a). The NWMO will start implementing the project, after achieving the construction license (NWMO, 2010c). The NWMO will begin the construction and operation of an underground demonstration facility. The aim of building an underground demonstration facility is to confirm the characteristics of the site before construction of the deep geological repository (NWMO, 2010c).

Step 9: Construction and operation of the facility starts (NWMO, 2010l). The NWMO begins construction of the deep geological repository and related surface facilities. Afterwards, operation will take place after attaining an operating license (NWMO, 2010l). The NWMO will continue working in cooperation with the host community to ensure that the needs of the

community and the terms of the agreement continue to be met throughout the entire time of construction, operation and closure of the facility (NWMO, 2010l).

The participating communities in the siting selection process

In May 2010, the NWMO initiated a site selection process to find a safe site in an informed and willing host community (NWMO, 2012b). The site selection process was opened to all interested Canadian communities to learn more about the long-term management of Canadian used nuclear fuel, the NWMO and the site selection process. From that time, a number of communities expressed interest in learning more about the project, the NWMO and the site selection process (NWMO, 2012b). 21 communities in Saskatchewan and Ontario expressed interest in learning more about the process. These communities include: Arran-Elderslie, Blind River, Brockton, Central Huron, Ear Falls, Elliot Lake, Hornepayne, Huron-Kinloss, Ignace, Manitouwadge, Nipigon, North Shore, Saugeen Shores, Schreiber, South Bruce, Spanish, Wawa, and White River in Ontario; and Creighton, English River First Nation and Pinehouse in Saskatchewan (NWMO, 2012b). In addition to the 21 communities, the Township of Red Rock had also expressed interest in learning about the siting process, but the initial screening of technical suitability concluded that the Township was not a suitable host and it was not eligible to continue in the siting process (NWMO, 2010m).

On September 30, 2012, the NWMO suspended the expression of interest phase of the site selection process (NWMO, 2012b). The NWMO did so to focus its efforts in communities that formally expressed an interest on or before that date by conducting detailed site studies in these communities. A six-month notice of this suspension was issued in March 2012 (NWMO,

2012b). New interested communities after September 30, 2012 would receive information, regular updates and briefings when requested from the NWMO. However, additional screenings or preliminary assessment studies would not take place in communities that expressed interest after September 30, 2012, during the suspension period (NWMO, 2012b). If the studies conducted with the first set of communities, did not result in a successful option, the NWMO has the option of reopening the process to expressions of interest by new communities in the future. By reopening the process, the NWMO would be able to study other communities and sites as potential hosts (NWMO, 2012b). This may suggest the NWMO is not confident a voluntary host site can be secured in the first group.

Starting with 21 communities examining potential interest and suitability for hosting the facility, the siting process will gradually narrow the focus to communities with the highest potential to meet the project requirements until a single preferred site is chosen (NWMO, 2013a). The process of narrowing down participating communities in the selection process started in fall 2013 and will continue progressively over many years. Interested communities can stop their engagement in the site selection process at any time during this process until a final agreement is signed (NWMO, 2013a).

Out of the 21 communities, one community is still in Step 2 (Central Huron); the other 20 communities are in Step 3 (NWMO, 2013a). The first phase of Preliminary Assessment (step 3) started upon request from the 20 communities participating in the site selection process (NWMO, 2013a). These assessments aim to identify the communities with strong potential to meet certain technical, scientific and community well-being requirements for the process. Communities started their assessments at different times (NWMO, 2013a). Phase 1 Preliminary Assessments had been completed for eight communities in November 2013. These include: Ear Falls,

Hornepayne, Ignace, Schreiber and Wawa in Ontario; and Creighton, English River First Nation and the Northern Village of Pinehouse in Saskatchewan (NWMO, 2013a).

The Phase 1 Preliminary Assessments have concluded that all eight communities have the potential to meet project requirements in three safety-related areas (NWMO, 2013a). These areas include engineering, transportation, environment and safety. According to the NWMO, all eight communities also have some potential to meet project requirements related to geo-scientific suitability (important safety requirement), and social, economic and cultural concerns. However, there are main differences among communities (NWMO, 2013a). These differences have affected NWMO decision-making about where to focus more detailed studies among all 8 communities. These differences include two significant study fields. The first focuses on the geo-scientific features of the communities and area. These include geological settings and geologic structural histories, and related complexities and uncertainties (NWMO, 2013a). Second are differences in the potential for the project to meet the priorities and objectives of the community, and for the community to continue to be interested in learning about the project (NWMO, 2013a).

Creighton in Saskatchewan, and Hornepayne, Ignace and Schreiber in Ontario, were evaluated as strong potential candidates as they met siting requirements from different perspectives; including the potential to find a safe site in the area; and the potential for sustained interest in each community to learn more about the project (NWMO, 2013a). These communities have been identified for additional study and will continue to phase 2 studies (NWMO, 2013a). Later, Creighton and Schreiber were eliminated from the siting process during the second phase of Step 3 (Patterson, 2015). Both communities were eliminated due to geological reasons. Areas near both communities revealed geological problems that reduced the chance of finding a

suitable site for a nuclear waste facility (Patterson, 2015) .The communities of English River First Nation and Pinehouse in Saskatchewan, and Ear Falls and Wawa in Ontario, were not chosen for detailed study (NWMO, 2013b). The NWMO will finish working with these communities. Assessments for the remaining 12 communities are still in progress (NWMO, 2013a).

In January 2015, the NWMO finished the first phase of its preliminary assessments for six communities in Northern Ontario (NWMO, 2010i). These communities include: the City of Elliot Lake, Town of Blind River, townships of Manitouwadge and White River, The town of Spanish and township of The North Shore (NWMO, 2010i). In the Preliminary Assessments the City of Elliot Lake, the Town of Blind River, the Township of The North Shore and the Town of Spanish were referred to as the North of Huron area because they are neighboring communities (NWMO, 2015).

According to the geo-scientific desktop Preliminary Assessment, all 6 communities have broad areas with the potential to meet the NWMO's geo-scientific site evaluation requirements (NWMO, 2015). According to the Preliminary Assessments of these communities, all have the potential to satisfy safety-related requirements that include engineering, transportation, environment and safety. In addition, the project has the potential to enhance the well-being of all of these communities (NWMO, 2015). However, there are differences in the potential for the project to meet the priorities and objectives of some communities. The NWMO is uncertain whether the Project would be a good fit for Spanish and the North Shore while keeping the small-town character desired by both communities (NWMO, 2015). The small-town character of each of these two communities would be more strongly enhanced if project activity is focused on a neighboring community in the area instead. In this case, both communities will be able to

continue working with the NWMO on the project in a regional perspective (NWMO, 2015). This approach is expected to help reduce the local divisions over changes in their community character. In addition, it will ensure that the participating municipality, as a neighboring community, would attain economic growth and retain their small-town character (NWMO, 2015).

The City of Elliot Lake, Town of Blind River, and Townships of Manitouwadge and White River were evaluated as having strong potential to meet site selection requirements and have been selected for further study (Eliot Lake Standard, 2015a). These communities will continue to phase 2 studies (NWMO, 2015). The Town of Spanish and Township of The North Shore were not identified for more detailed study (Eliot Lake Standard, 2015a).

Saugeen Shores and Arran- Elderslie were eliminated by the NWMO. According to the NWMO, both communities did not meet the geo-scientific criteria required to site a deep geological repository for used nuclear fuel (NWMO, 2014b). In addition, Brockton was eliminated by the NWMO on December 2, 2014 and was not selected to continue in the siting process (Municipality of Brockton, 2015). However, the Township of Nipigon passed a resolution on June 17, 2014 to withdraw from the site selection process (NWMO, 2010j) . The town council of Nipigon decided to opt out of the siting process due to a group opposing the storage of high level radioactive waste in their community (tbnewswatch.com, 2014) . As of 2015, all communities that are still participating in the siting project are located in Ontario (Cornwell, 2015).

Opposition to the NWMO's project and risk perceptions

There have been divisions among the communities in response to the NWMO's project (Ramana, 2013). Northern councils at the communities of Ear Falls, Nipigon, and Wawa have disagreed over the deep geologic repository (DGR) (Ramana, 2013). Therefore, the communities of Ear Falls and Wawa were eliminated, but the community of Nipigon withdrew from the project. In Wawa, around 800 people signed a petition called "Take Wawa off the Study List- We do not want it" (Ramana, 2013). The petition resulted in eliminating Wawa from the process (MacInnes-Rae, 2014). In addition, Brockton was eliminated by the end of 2014 when Brockton's residents elected an anti-DGR council (Wilkins, 2015).

The aboriginal communities of Pinehouse and English River were eliminated from the site selection process due to a community argument about land and water issues, and because of their distrust of the NWMO (Wilkins, 2015). Tribal elders from Pinehouse who were against nuclear waste, formed the Committee for Future Generations (Wilkins, 2015). They planned for the "7,000 Generations Walk against Nuclear Waste". Participants walked around 1,000 kilometers from Pinehouse to the legislature in Regina and started collecting petitions against a nuclear waste dump to present to Premier Brad Wall (The Council of Canadians, 2011). On October 8, 2011 the Committee declared that it had collected more than 10,000 signatures on the petition and it would be presented when the legislature continued sitting (The Council of Canadians, 2011).

There was tension between specific stakeholders' communities that maybe interested in a nuclear waste facility for economic benefits, and the provinces that were opposed to the siting process (Ramana, 2013). Even though 3 communities in the province showed interest in the

siting process, Saskatchewan opposed the idea of hosting a repository (Ramana, 2013). The Métis Nation of Saskatchewan passed a resolution in November 5th, 2011 to "oppose and prohibit the storage and transportation of high level toxic nuclear waste in Saskatchewan." This resolution was the most visible action by aboriginal and northern communities opposing the NWMO's attempts to find a willing community to site a long-term nuclear waste in Saskatchewan (The Council of Canadians, 2011).

Local officials that expressed interest in the NWMO's process usually did not ensure that there was sufficient local support to be involved in the process (Ramana, 2013). An example of this was the community of Saugeen Shores. In 2011, the community of Saugeen Shores officials' met with NWMO staff without considering Saugeen Shores residents' opinions. This meeting aimed to help the officials learn more about Canada's plan for the long term management of used nuclear fuel (Ramana, 2013). When the residents discovered that the officials had meetings with the NWMO, opposition increased. However, in May, 2012, the town councilors voted in favor of learning more about the NWMO's process (Ramana, 2013).

The argument in Saugeen Shores was mostly about using an unproven technology to dispose of toxic waste next to Lake Huron (Wilkins, 2015). The NWMO replied that, according to the geological studies it did, the limestone was safe for storing nuclear waste because it has not moved in 400 million years (Wilkins, 2015). In mid-January, 2014, the NWMO had eliminated Saugeen Shores from the siting process. The NWMO's reasoning for the elimination was that geological research proved that the local rock was not appropriate for a deep geologic repository (Wilkins, 2015). However, an NWMO representative explained that Saugeen Shores was eliminated less for geological reasons than because the community was not considered a potential candidate by the NWMO. In addition, many residents of Ignace opposed siting the

nuclear facility in their community because of the stigma related to nuclear waste (Wilkins, 2015).

In Ontario, two organizations representing 88 First Nations were opposed to nuclear waste being sited in northern Ontario (Ramana, 2013). Hornepayne, Wawa, Schreiber and Nipigon all are communities of First Nations that were against nuclear waste storage. In addition, some chiefs stated that siting a nuclear waste facility would violate international law (Ramana, 2013). However, other Canadian provinces were opposed to importing nuclear waste. In October, 2008 the national assembly of Quebec approved a resolution banning nuclear waste storage in the province from other provinces (Ramana, 2013).

Anti-nuclear organizers noticed a coincidence (Cornwell, 2015). This coincidence was that towns that expressed opposition to the siting of a nuclear waste facility were often identified as "geo-scientifically unsuitable" by the NWMO and eliminated from the list of potential hosts for the project (Cornwell, 2015). When a community was eliminated by the NWMO, community activists celebrated their elimination from the siting process; but concerns about nuclear waste transportation remained (Cornwell, 2015). Local authorities were also quick to notice a potential economic loss for their communities. An example of this coincidence is the community of Schreiber (Cornwell, 2015). In interviews after the announcement, Schreiber's Mayor Mark Figliomeni, defined his reaction as "shocked." Although Mayor Figliomeni knew that being eliminated by the NWMO was a possibility, he realized that no longer being considered for the project meant new economic hardships for his community. He estimated that in the four years that Schreiber had participated in the NWMO’s process, the town had secured $800,000 in funding from the project (Cornwell, 2015).

The NWMO announced that Schreiber and Creighton were removed from the siting list due to geological complexities (Cornwell, 2015). However, this reason did not convince Joe Kutcher, a member of the group citizens concerned about nuclear waste siting in Schreiber. According to Kutcher, it can't be concluded that Schreiber is not geologically suitable based on the NWMO's research. However, he thought Schreiber was eliminated because of ongoing efforts to oppose the siting process (Cornwell, 2015).

In addition, Brennain Lloyd in the group Northwatch, a group responsible for the interests of northern Ontario communities; suggested that it is not a coincidence that the NWMO labeled communities with opposition to the process as geologically unsuitable (Cornwell, 2015). According to Lloyd, the NWMO would not recognize opposition and usually announced that the elimination is due to geo-scientific reasons. In addition, Lloyd suggested that it is not a coincidence that the communities that have been eliminated are all communities where opposition to the project reached a certain level (Cornwell, 2015). In addition, the NWMO was looking for a community to say yes to the project more than anything else. According to Lloyd, the project would bring economic benefits to participating communities, but at the same time it caused divisions among people in a potential host community regarding siting nuclear waste (Cornwell, 2015).

It can be suggested that the elimination of many of the participating communities in the siting process was not only due to geological complexities as was mostly claimed by the NWMO as the reason for the communities' elimination from the process. Rising opposition in these communities might be an important reason for their elimination; as reflected in the views of many communities mentioned above, especially Saugeen Shores. Rising opposition in these communities may have reflected higher risk perceptions of the proposed nuclear waste facility.

Risk Perception

People are often opposed to unfavorable land uses and facilities in their neighborhoods (Greenberg, Lowrie, Burger, Powers, Gochfeld, & Mayer, 2007). These unwanted facilities are referred to LULUs (locally unwanted land uses) and cause opposition usually referred to as NIMBY (not in my back yard). The most dreaded facilities include new nuclear research facilities, nuclear waste management facilities, and nuclear-power stations (Greenberg, Lowrie, Burger, Powers, Gochfeld, & Mayer, 2007). Nuclear facilities are usually opposed by the public due to their perceived risks. Risks perceived by the public, are normally higher than "objective" risk which causes opposition to siting nuclear facilities (Loewenstein, Weber, Hsee, & Welch, 2001). Objective risk is the estimates of risk using scientific knowledge and statistical reasoning (Loewenstein, Weber, Hsee, & Welch, 2001). It is the likelihood of adverse events and their negative effects occurring to the average person (Knuth, Kehl, Hulse, & Schmidt, 2014). However, risk perception is a subjective judgment formed by people when characterizing and evaluating hazards. Perceived risk, in turn, is the subject's estimate of the possibility of personally facing a hazard and the likelihood of encountering negative consequences (Knuth, Kehl, Hulse, & Schmidt, 2014).

People have high perceptions of a risk when they anticipate catastrophic outcomes and when they realize that these catastrophic outcomes have high probability of occurring (Greenberg, Lowrie, Burger, Powers, Gochfeld, & Mayer, 2007). Some might think that financial incentives can help change the public response towards unwanted facility sitting. On the contrary, financial incentives are not always an effective means to shift the public's perception in the case of unwanted facility siting (Greenberg, Lowrie, Burger, Powers, Gochfeld, & Mayer, 2007). In Nevada, 1,001 residents were asked if they would accept a high–level

nuclear waste storage facility, located almost 90 miles north of Las Vegas, with the offer of annual tax rebates of $ 1,000, $3,000 or $5,000 per year for 20 years. Most of them opposed the facility (Greenberg, Lowrie, Burger, Powers, Gochfeld, & Mayer, 2007). Public perception is affected by many factors including what have been termed the heuristic devices (representative judgments, availability judgments, the affect heuristic, anchoring and adjustment) that people use to judge unfamiliar risks, economic concerns of the community, governmental performance.

Different factors that affect risk perception

Risk is thought about and acted upon in two ways (Slovic, Peters, Finucane, & MacGregor, 2005). Risk as feelings refers to a person's fast, instinctive and intuitive response to danger. On the other hand, risk as analysis brings reason to help in the process of risk management (Slovic, Peters, Finucane, & MacGregor, 2005). The dominant way people evaluate risk is based on their intuitive feelings. In the case of risk depending on feelings, it is referred to as "the affect heuristic". Affect is the feeling state of an individual. Affective responses are rapid and automatic. These experienced feelings are used as input in the decision process (Slovic, Peters, Finucane, & MacGregor, 2005).

An early study (Zajonc, 1980) showed that the first reaction to a stimulus is an affective reaction. Affective reactions are automatic and responsible for information processing and judgment. Therefore, affective reactions assist people in making fast decisions. According to Damasio, the experiential form of thinking and the analytic form of thinking are constantly active (Damasio, 1994). Even though people are capable of doing the right thing without analysis, it is unusual for them to use analytic thinking without depending on affect. Affect is

important to rational action (Damasio, 1994). Affective responses depend on an individual's personality. Individuals differ in their affective reactions and their dependence on experiential thinking. Different stimuli induce different images (symbolic interpretations) in different individuals. As a result, the affective qualities of a stimulus image are understood differently (Damasio, 1994). All these images in people's mind are attached to affect. People consult their affective images when they take decisions. Affect is similar to imaginability and memorability that help in the process of making judgments. Consulting the available affective impression is easier and more efficient than thinking about the advantages and disadvantages of a required decision (Damasio, 1994).

While risk and benefit are positively correlated in many situations in the world, they are negatively correlated in people's mind (Slovic & Peters, 2006). This inverse relation between perceived risk and perceived benefit of a certain activity is related to the strength of positive or negative affect with that activity. This shows that people don't only rely on their thinking but also their feelings in the process of judging a certain activity or technology (Slovic & Peters, 2006). If people have a positive feeling regarding a specific activity, then they judge that risks are low, and benefits are high. If they have a negative feeling regarding a specific activity, then they judge that risks are high and benefits are low. Affect comes earlier than judgment and helps in making decisions about risks and benefits (Slovic & Peters, 2006).

In a study to investigate the effect of the experiential system, individuals were offered to win $1 by pulling a red jelly bean from a container (Slovic & Peters, 2006). Mostly, individuals choose to draw from the container that contains a greater number but a smaller proportion of red beans than from a container that has fewer red beans but a higher probability of winning. These individuals said that felt of a better chance of winning when there were more red beans even

when the probabilities were against them (Slovic & Peters, 2006). This experiment demonstrates a mental strategy of imaging the numerator (the number of red beans) and ignoring the denominator (the number of beans in the container). This research is an example of the affect heuristic. Images of winning beans produce positive affect that stimulates choice (Slovic & Peters, 2006).

Relying on the affect heuristic may lead decision makers to ignore considering the probability of a certain event (Slovic, Peters, Finucane, & MacGregor, 2005). In other cases, affect can produce insensitivity to probability instead of ignoring it. In the case of a lottery jackpot, consequences have a strong affective meaning. The outcomes (numerator) overpower the probability of winning (denominator) (Slovic, Peters, Finucane, & MacGregor, 2005). As a result, variation in the probability doesn't have much importance. An individual's images of and feelings for winning the lottery are similar if the probability of winning is 1 in 10 million or 1 in 10,000 (Slovic, Peters, Finucane, & MacGregor, 2005). This shows that perceived risk about hazards with a high numerator such as nuclear power and exposure to little quantities of toxic chemicals fail to decrease when they are informed about the very small probabilities of the feared results from these hazards (Slovic, Peters, Finucane, & MacGregor, 2005).

The heuristics of judgment include representatives, availability and anchoring. The representativeness heuristic is an intuitive method in which probabilities are assessed by the level to which the given sample matches, or represent a class of samples (or population) (Hall, 2002). As a result respondents use a judgment of similarity (representativeness) for the required judgment of probability (Kahneman, 2003). The availability heuristic is an intuitive technique in which the perceived probability of an event is affected by the ease of remembrance (Hall, 2002). More easily recalled events are given a greater probability. Therefore, recent events are recalled

more easily. In addition, more frequent events are usually the most easily recalled. However, the most easily remembered are not certainly the most frequent (Hall, 2002). The heuristic device of anchoring and adjustment is used when a series of estimates is needed to attain the final prediction. People often make a prediction based on the initial information (anchoring) and later adjust the result when further information is given (adjustment) (Hall, 2002). However, adjustments will be inadequate, because final judgments will be too close to the initial anchor (Epley & Gilovich, 2004). Therefore, risk perceptions are adjusted slightly with new information when they are already anchored. Differences in risk perceptions are affected economically.

There are economic reasons for the difference in public perception toward new facilities (Jenkins-Smith & Kunreuther, 2001). Citizens that reside close to the facility are exposed to higher risk and thus, should have stronger opposition compared to residents that live far away from the facility. However, in reality, the citizens that live closer to the facility generally have higher acceptance than the ones who live far away. Local citizens have higher acceptance to these facilities due to the local benefits they receive from the facility (Jenkins-Smith, Silva, Nowlin, & deLozier, 2011). These local benefits include employment, increased local tax revenues and infrastructure development (Jenkins-Smith & Kunreuther, 2001). Moreover, perceived risks are reduced and acceptance of the facilities increases when local residents are familiar with the technology and the people involved in the facility (Jenkins-Smith, Silva, Nowlin, & deLozier, 2011).

Risk perception is dependent on the trust of the government as an effective factor for managing environmental risk. The lower the confidence in politicians, the lesser is the ability of the citizens to accept hazardous facilities (Jenkins-Smith, Silva, Nowlin, & deLozier, 2011). Past studies showed that people did not accept hazardous facilities, especially nuclear power plant

facilities. They relate them with possible nuclear accidents, waste disposal, negative health impacts, and negative effects to the environment and communication of risk. Effective communication of risk is important during and after an accident (Jenkins-Smith, Silva, Nowlin, & deLozier, 2011). People will form risk perception associated with these accidents because societies are involved in decisions on future facility siting. Moreover, political ideology is an essential factor in the siting of hazardous facilities. Although the siting of hazardous facilities is informed by science, majorly it is a political process. Siting decisions are taken, regulated and enforced by politicians. As a result, citizens' perception of the governmental performance will impact their acceptance of risky facility siting (Jenkins-Smith, Silva, Nowlin, & deLozier, 2011). A previous study showed that citizens' trust in their government impacts the acceptance of the facility siting in a positive way (Schively, 2007). Citizens' satisfaction in governmental performance produces a lower level of perceived risk and higher level approval of risky facilities (Jenkins-Smith, Silva, Nowlin, & deLozier, 2011).

In addition to these factors, according to (Covello, Sandman, & Slovic, 2001) public risk perception will increase when: 1- Fatalities/ injuries are grouped in space and time. 2- The public is unfamiliar with the risk source. 3- Technology/ processes not understood. 4- Risks scientifically unknown or uncertain. 5- Risks are personally uncontrollable. 6- Involuntary acceptance of risks. 7- Children specifically at risk. 8- Delayed effects. 9- Risk to future generations. 10- Victims are identifiable. 11- Effects dreaded. 12- Lack of trust in responsible authority. 13- High media attention. 14- Frequent accidents. 15- Inequitable distribution of risks and benefits. 16- Unclear benefits. 17- Effects irreversible. 18- Individual is personally at risk. 19- Origin of risk caused by human actions or failures. It is important to understand siting of hazardous facilities and the solution it offered for opposition caused by risk perception.

Siting of nuclear facilities

In the past, several regulations were added to the traditional permit process in Canada (Rabe, 1994). According to the conventional rational decision making model, politicians choose a number of siting criteria, technical, economic, social and political to determine where the facility should be located (Rabe, 1994). After the criteria have been determined, selection of one or more preferable sites is made, and then the government and the general public are consulted. Afterwards a variety of methods could be used, either compulsory or methods seeking approval from the communities, to force the siting or gain public support for these facilities (Rabe, 1994). Increased public opposition in recent years has led politicians to favor public involvement. However, most proposed facility siting fails because of public opposition (Wiedemann & Femers, 1993).

Proposed sites for hazardous facilities will inevitably face great opposition (LaGrega, Buckingham, & Evans, 1994). Many factors lead to increased public opposition including risk perception, public mistrust, and inequities in risk sharing (LaGrega, Buckingham, & Evans, 1994). In the proposed sites for hazardous waste facilities, people in these communities perceive the proposed facilities as imposed on them, having no actual benefits, and representing an unknown risk to them. All these perceptions cause a tremendous public response (LaGrega, Buckingham, & Evans, 1994). Even though public concern regarding hazardous facilities has motivated regulatory initiatives for hazardous waste facility siting, the same concern still motivates opposition to new hazardous facilities. However, scientists and engineers have a different perception of risk from that of the public (LaGrega, Buckingham, & Evans, 1994). They think that they follow technically acceptable risk limitations in constructing, operating, and

monitoring safe waste management facilities. But, the public doesn't share the same beliefs due to its distrust in the government and industry (LaGrega, Buckingham, & Evans, 1994).

The majority of the affected public typically finds out about the new facility siting after the identification of the proposed site in a certain community (LaGrega, Buckingham, & Evans, 1994). In the regulatory siting method, it is challenging to allow public involvement in the initial stages and it is not often done. Later, when the public is allowed to participate, they will feel that their participation will not make a difference at that stage and they usually do not participate (LaGrega, Buckingham, & Evans, 1994). At this stage, discussion between the facility developer and the public will not lead to a successful agreement. When a decision regarding a siting outcome is reached without consultation with the community, it will lead the public to feel that all they can do is oppose the new hazardous facility. In order to avoid great opposition, an alternative siting method that is based on public involvement may lead to facility siting success (LaGrega, Buckingham, & Evans, 1994). An alternative method of siting success incorporating public involvement is the voluntary method of siting.

The voluntary approach has recently been more successful in North America in comparison to the regulatory approach in siting. The voluntary approach has led to the construction of many facilities (Gowda & Easterling, 2000). An example of voluntary siting success is the Swan Hills integrated hazardous waste facility, located in north central Alberta (Baxter, 2007). The process started in the 1981 and ended in 1984. In addition, the facility was sited with 5 million dollars. The siting approach was successful, because the province of Alberta sited a facility at a low cost, and a short period of time in comparison to other siting attempts (Baxter, 2007). In the voluntary approach, the public is openly invited to participate. According to this method, the participating communities, when they agree to participate in this process,

express some willingness to be educated regarding the siting of hazardous facilities. Communities that have technically suitable locations will be invited to host the facility (Gowda & Easterling, 2000).

Communities that accept the invitation will be educated regarding the facility siting process and the risk associated with these facilities (LaGrega, Buckingham, & Evans, 1994). In addition, citizens are completely involved in the decision making procedure. After citizens have been educated regarding the facility siting, they have the right to continue or withdraw from the process (LaGrega, Buckingham, & Evans, 1994). Interested communities in cooperation with the developer, reach an acceptable proposal for both parties. The proposal will contain the conditions required of the facility, and the benefits for the host community. If this process ends up with many interested communities, the developer usually chooses the proposal that has lower cost or less risk. The voluntary approach ensures fairness and equity for the communities involved (Gowda & Easterling, 2000).

The voluntary approach ensures procedural equity by allowing potential communities to enter into the siting process or withdraw from the process until the proposal is submitted to the government (Gowda & Easterling, 2000). The voluntary process results in distributional equity (outcome equity), because both parties will have a mutual agreement that is perceived fair by both sides (Gowda & Easterling, 2000). In the voluntary approach, environmental justice is ensured, because this approach does not force the building of a facility in a certain community. In addition, it does not specifically target minority or poor communities. Therefore, the voluntary siting approach is better than the regulatory siting approach that resulted in multiple failures (Gowda & Easterling, 2000). That is why the voluntary siting approach has been used to manage radioactive waste in Canada.

According to (Armour, 1992) a collaborative siting process should follow 5 siting principles and 5 safeguards. The principles determine what a cooperative process should do. The safeguards are meant to make sure that the voluntary process is followed without bias or manipulation. The 5 siting principles include: 1- The Community must volunteer and have the right to opt-out at any time. 2- The community should be a partner during the process in problem-solving and decision-making. 3- Compensation and reward are given to the community for accepting the risk. 4- The community has the opportunity to select technology options and risk management measures. 5- Assure the community that human & environmental health is retained for every site. Therefore, a community will not be accepted as a volunteer if safety is not maintained.

The 5 safeguards include: 1- Disclosure of Impact management options at the initial stages of the process confirms transparency. 2- The community hires its own advisors so they can trust them about risks. 3- Performing site and technology assessments jointly with the community helps increase trust and focus on the communities concerns. 4- When the community is represented by a broadly-based citizen liaison group in the decision-making process; that is able to understand the interests and concerns of their community. 5- When participation is paid by the responsible authority, the community does not go through immediate loss. These principles and safeguards form the ideal voluntary siting process.

The relation between risk perception and high level nuclear waste facility siting

Previous studies examined the public attitude and their risk perception towards siting high level nuclear waste facilities. In one of these studies, the public attitude was evaluated towards siting a high level nuclear waste facility in Nevada (Kunreuther, Easterling, Desvousges, & Slovic, 1990). In the 1987, the federal government narrowed their search for a site to store high level nuclear waste permanently and selected Yucca Mountain in Nevada. As a result, politicians in Nevada generally were against the repository and tried to stop its construction. The dispute regarding siting high level nuclear waste repository in Nevada was due to disagreement between state and federal officials (Kunreuther, Easterling, Desvousges, & Slovic, 1990). Therefore, in this study the public attitudes were studied from 2 telephone surveys: a national survey of 1201 U.S. households and a survey of 1001 residents of Nevada. The results of this study showed that siting of high level nuclear waste facility in Nevada is extremely difficult under the proposed institutional plans. The survey showed that Nevada residents are interested in siting a repository at Yucca Mountain only if they are sure that the facility will not cause serious risks to themselves and to future generations (Kunreuther, Easterling, Desvousges, & Slovic, 1990). Therefore, it is important to implement a siting process that ensures trust and public confidence in order for the repository to be perceived as safe to residents and future generations. This study proves that risk perception of the public is important in determining the attitude towards siting a local nuclear waste facility in their community. In addition, confidence in responsible authorities and risks to oneself and to future generations are important factors affecting the public siting decision.

Another study in Finland examined local residents' attitudes regarding the siting of a high level nuclear waste facility in 3 municipalities (Litmanen, 1999). In 1992, three sites were selected in Finland for more detailed investigations to voluntary site high level nuclear waste facility. These three sites include: Eurajoki, Kuhmo and Aanekoski. After the investigation, the municipalities have the right to accept or refuse the facility (Litmanen, 1999). A questionnaire was mailed to 1500 randomly chosen people in these 3 municipalities that were considered potential hosts for the high nuclear waste facility in Finland, and 200 people as the control group. The survey showed that two of the municipalities are strongly against the facility, but Eurajoki had a division of opinion between accepting and opposing (Litmanen, 1999). In Eurajoki, the number of supporters and opponents of the facility was approximately equal. The nuclear power station in Eurajoki contributed to the division in opinions regarding the facility siting. The results showed that Kuhmo and Aanekoski opposed the facility siting mainly because they were unfamiliar with nuclear technology (Litmanen, 1999). This study shows that familiarity with the nuclear technology affects the public risk perception. When the public is unfamiliar with the nuclear technology, this will cause higher risk perception. As a result, higher risk perception will lead to a negative attitude toward local nuclear facility siting. This will definitely affect the communities' final decision in a voluntary siting process. This study shows that public risk perception will eventually affect the communities siting decisions regarding nuclear waste facilities.

Another study in Sweden examined local acceptance for siting a high level nuclear waste repository (Sjöberg, 2004). In Sweden, the Swedish Nuclear Fuel and Waste Management Co. (SKB) that is owned by the Swedish nuclear power companies was responsible for finding a voluntary host community to site used nuclear fuel on the long run. In 2000, SKB selected 6

communities with potentially suitable sites. These communities include: Hultsfred, Nyköping, Oskarshamn, Tierp, Älvkarleby, and Östhammar. Nyköping, Tierp later chose to opt out from the process (Sjöberg, 2004). In 2001, a survey was conducted only in the four communities to evaluate local risk attitudes in these communities. This study aimed to explain the public attitude regarding the proposed siting process and the possible future final siting decisions. Since previous studies on the public's risk perception regarding nuclear waste facilities proved the importance of risks and benefits of a local facility. Therefore, perceived risks and benefits were used as explanatory variables in this study (Sjöberg, 2004). Previous Swedish studies on nuclear waste attitudes sampled the whole population of Sweden. However, not all people will live close to the proposed high level nuclear waste facility and distance from the facility is an important factor. For that reason previous work was not relevant in understanding siting attitudes in local policy making. Therefore, this study focused on studying the local public attitudes of the four communities that are participating in the siting process (Sjöberg, 2004).

This study was conducted when the siting process reached an important decision point (Sjöberg, 2004). At that time, the local councils of the four communities had to make a final decision about the facility siting almost six months after finishing this study. In this study they focused on asking about the public policy attitudes and their voting intentions, which is a good predictor of actual voting. The study showed that in all 3 communities except Tierp would vote in favor of a local repository (Sjöberg, 2004). The attitude in Tierp was mostly negative. This study showed more positive attitudes in Sweden toward nuclear facilities compared to previous studies. These findings may be due to a general trend toward a more positive attitude to nuclear power in Sweden. In addition, the mean risk ratings were similar for all communities except Tierp. Tierp had higher risk perceptions compared to other communities. The research results

were consistent with the actual siting decisions. Three communities accepted the siting plans except Tierp. Tierp opted out from the siting process in 2002 (Sjöberg, 2004). This study proves that local risk perceptions affect siting decisions of participating communities regarding nuclear waste facilities.

All of the three studies mentioned above, focused on studying public attitudes and evaluating their risk perceptions toward siting a proposed local nuclear waste facility. These studies tried to predict the potential communities' final decision regarding siting the local nuclear waste facility. Specifically, by studying risk perceptions of accepting but not rejecting communities of nuclear waste facilities. For example in the study that was conducted in Sweden only four communities were examined that were participating in the siting process and the two communities that decided to opt out were not examined (Sjöberg, 2004). It was not confirmed if the communities that decided to stop participating in the siting process was due to their risk perception or any other factor. Therefore, the relation between risk perceptions and siting a nuclear waste facility is still incomplete and not fully understood.

Chapter 3: Method

This study examined the responses of community representatives to NWMO's voluntary siting process and the perceptions they had of the waste repository. In addition it examined the communities' characteristics to understand if these characteristics affect the communities' decisions in staying in or leaving the process. The method included the following:

Responses for this study were obtained through in-depth interviews with the Chairs and members of each Community Liaison Committee; representing the initial 21 communities involved in the siting process conducted by the NWMO. These members represented communities that are continuing to participate and those who have stopped their participation in the nuclear waste siting process. Communities that have stopped participating in the siting process include both communities eliminated by the NWMO and communities that decided to opt out of the process. One representative was interviewed from each community in the sample. The interviews included both closed-ended and open-ended questions. The following section describes the design of the interview. The interview questions were based on risk perceptions and siting principles of a cooperative model derived from the literature.

Sampling

The community liaison committees (CLCs) represent the communities involved in the NWMO siting process (NWMO, 2013m). They were appointed by the municipality. They are intended to be independent of the NWMO and include only local residents (NWMO, 2010h).They have a consultative role for both NWMO and the municipality (NWMO, 2013m).

The community liaison committees (CLCs) usually meet monthly and all their meetings are open to the public (NWMO, 2013m). The goal of the CLCs is to gather information from the NWMO to their communities and notify their councils and residents. In addition, they bring the municipality's and residents' questions to the NWMO to get a response (Elliot Lake Standard, 2013). CLCs are responsible for helping local residents learn about the process and encouraging them to be involved in the project (NWMO, 2013m). Their role involves planning open houses, informing residents about ongoing studies and new information when it becomes available; ensuring that residents' concerns are taken into consideration, tailoring information sessions to meet local needs and include the whole community in learning about the process (NWMO, 2013m). The CLCs are responsible for educating their communities about the nuclear waste siting process and familiar with their communities' concerns. The CLCs are familiar with the NWMO's siting process and their communities' involvement in the siting process. Therefore, the community liaison committees are the target population for this study of the communities involved in the NWMO's siting process.

Purposive sampling was applied, and Chairs and members of the community liaison committees of all 21 communities involved in the NWMO's siting process were the target subjects. Key study respondents were CLCs Chairs who had an extensive knowledge of the NWMO's siting process and their residents' perception of the siting process. Approval by the Research Ethics Board was approved on April 13, 2015.

The CLCs' contact information was obtained from CLC websites and by contacting their municipalities. This list was used to establish the sampled group of CLCs for all 21 communities involved in the NWMO's siting process. A participant was defined as a CLC member that represents his community in terms of the NWMO's siting process. For CLC members

representing communities that are still participating in the siting process, their contact information was available on the CLC websites but for communities that stopped participating in the siting process, contact information was provided by their municipalities.

Since this study investigated communities not populations, the sample of respondents representing these communities was very small. The sample of respondents representing the communities that are still participating in the siting process was even smaller than that of the communities that stopped participating; since the study aims to investigate the differences between communities that are still participating and communities that stopped participating in the siting process out of the 21 involved communities. However, the targeted sample was most likely to reveal risk arguments and perceptions in the relevant communities. A significant effort was made to contact both communities that continue participating and communities that have stopped their participation, through repeated emails and by telephone.

Structured Interviews

Interviews were considered to be a suitable means to obtain information and opinions from key respondents in the Canadian communities involved in the siting process and the official representatives of the initial 21 communities involved in the nuclear waste siting process. Interest groups included CLC members representing both communities that are still participating in the siting process and communities that stopped participating.

The interviews were structured and consisted of both closed-ended and open-ended questions. The interviews included mostly closed-ended questions. Closed-ended questions were used for specific questions that required specific answers to in sections 1 and 3. On the other

hand, open-ended questions were used for general qualitative responses from the participants as presented in section 2. All 21 communities were contacted to participate but only 15 agreed to respond. A total of 15 interviews were conducted via telephone, and responses were recorded using a recording device. The recorded responses were then transcribed by listening to the text and typing it out. The closed-ended questions consisted of multiple choice questions and rated questions. Rated questions asked respondents to identify the level of risk perception in reference to the question asked. The responses for rated questions were scaled from strongly agree = 5 to strongly disagree = 1. Open-ended questions were then coded for similarities based on the responses and were categorized by communities that are still participating and communities that stopped participating in the siting process. The number of interviewees in each interest group is summarized in Table 1.

Table 1: Interest Groups and Number of Interviews on the communities' involvement in the NWMO's nuclear waste siting process.

Interest Groups	**Number of interviews**
CLC members of communities that are still participating	6
CLC members of eliminated communities	8
CLC members of opted out communities	1
Total	**15**

Section 1: Initial interest to participate in the siting process

The first section of the interview contained only one multiple choice question to understand the reasons given for initially joining the NWMO's siting process for both communities that are still participating and communities that stopped participating in the siting process. This question

is derived from the themes in literature of voluntary siting of a high level radioactive waste facility (Sjöberg, 2004). The themes included communities in the process that decided to join and they had a reason for joining. This question included different choices including the choice other; that enabled the respondent to mention any other factor that was not one of the choices listed. The possible choices were:

- Being informed about NWMO's voluntary approach
- Learning about the process for choosing a host community
- Learning about the technology involved
- Being told about the benefits: job opportunities, etc.
- Other

Section 2: Reasons for staying in or leaving the NWMO's siting process

This section of the interview included the open-ended questions. In this section respondents representing communities that are still participating in the project were asked about their reasons for continuing in the nuclear waste siting process and if they expect to stay in the process in the future. Respondents representing communities that stopped participating in the process were asked about their reasons for not continuing in the siting process and if there was an event that led them to stop. In addition, respondents representing both communities that are still participating and communities that stopped participating in the process were asked about their communities' overall general opinion about the siting process.

The sources for these questions were themes found in the literature of voluntary related to siting of a high level radioactive waste facility (Sjöberg, 2004). According to (Sjöberg, 2004) there are discussions of themes regarding communities not wishing to be participants in the siting process and communities wishing to be. This is a qualitative study method of thematic analysis. Open-ended questions were then coded by searching for themes found in the interview responses. They were coded according to the following themes: Preference of eliminated communities to stay, the communities' perceptions about their exclusion, risk perceptions of the communities according to the risk perception factors by (Covello, Sandman, & Slovic, 2001) and the heuristic devices. The heuristic devices include: representative judgments, availability judgments, the affect heuristic, anchoring and adjustment. The following questions were asked:

1- A. Communities that are still participating: 1.What are your reasons for continuing in learning more about the nuclear waste siting process? 2. Do you expect to stay in the siting process in the future? Why?

B. Communities that stopped participating: What are your reasons for not continuing with the siting process? Was there an event that led you to stop?

2- For all respondents: What do you think the community's overall general opinion regarding the project?

Section 3: CLC's perception of risk and the nuclear waste siting process

The final section attempted to evaluate the CLC's risk perception regarding siting a nuclear waste facility and their perception of the siting process that is held by the

NWMO. The possible responses for this section are scaled from strongly agree = 5 to strongly disagree = 1. Armour's model of cooperative facility siting was used as the source for the perceptions of the siting process questions. Armour developed her cooperative model following the initial low level radioactive waste voluntary siting approach in Ontario in which she identified 5 principles and 5 safeguards (Armour, 1992).

The CLC's perception of the nuclear waste siting process was evaluated based on 2 factors (Armour, 1992):

- If their community was a partner in the siting process
- If they had the right to select the technology option

Armour's principles and safeguards will be used to interpret the actions of communities in this study. The 5 siting principles include:

1- The Community must volunteer and have the right to opt-out at any time.

2- The community should be a partner during the process in problem-solving and decision-making.

3- Compensation and reward are given to the community for accepting the risk.

4- The community has the opportunity to select technology options and risk management measures.

5- Assure the community that human & environmental health is retained for every site. Therefore, a community will not be accepted as a volunteer if safety is not maintained.

The 5 safeguards include:

1- Disclosure of impact management options at the initial stages of the process confirms transparency.

2- The community hires its own advisors so they can trust them about risks.

3- Performing site and technology assessments jointly with the community helps increase trust and focus on the communities concerns.

4- When the community is represented by a broadly-based citizen liaison group in the decision-making process; that is able to understand the interests and concerns of their community.

5- When participation is paid by the responsible authority, the community does not go through immediate loss.

The questions intended to reveal risk perception responses were derived from the factors that are associated with elevated or decreased risk responses to a threat established in the literature by (Covello, Sandman, & Slovic, 2001). These are factors that have been constantly associated with social responses to risks. The ten risk perception factors adopted in this study were (Covello, Sandman, & Slovic, 2001):

- Benefits
- Effects in time
- Uncertainty of risks
- Controllability of risks
- Certainty of fatalities should event occur (dread)
- Impression of fair distribution of benefits and risks

- Catastrophic potential
- Effects on future generations
- Effects on children
- Trust in institutions

Community characteristics

Community characteristics were examined in this study because their characteristics may have influenced communities to stay in or leave the process. Therefore, Statistics Canada and the NWMO's preliminary assessments of the communities have been used in this study. Statistics Canada for the year 2006 was used (2006 community profiles) since they have the complete data for all the communities that are involved in the siting process except for Community 4. Aboriginal Affairs and Northern Development Canada was used for the statistics of Community 4 for the year 2006. The 2011 National Household survey was not used for this study since it doesn't include the complete data for all the communities.

NWMO's preliminary assessments were conducted by the NWMO for all involved communities except for the opted out community (Community 5). Preliminary assessments are the best source to track the communities' participation and opposition in these communities and their surrounding communities at this stage of the process; since the process is not complete yet. Preliminary assessments have been used to understand the communities' goals, level of support towards this project, opposition in the involved communities and in their neighboring communities.

Limitations

This study relied on one response from a community CLC member to represent community views. CLC members were interviewed because they are familiar with the NWMO's siting process and their communities' involvement in the siting process. In addition, review materials provided to communities by NWMO were not reviewed. Therefore, this study could not judge if the information provided to communities was sufficient. This study did not review the technical geological information about exclusions, to evaluate if geological exclusions were legitimate. Instead, this study reported perceptions of those criteria and evaluations by respondents. In addition, this study did not investigate levels of opposition. However, opposition was examined from local press reports, NWMO's assessments and responses of subjects.

Chapter 4: Community Characteristics

This section examines community characteristics for all 15 interviewed communities. Community characteristics were examined to investigate if these characteristics have influenced communities to stay in or leave the process. These characteristics include the community timeline, type and NWMO's preliminary assessment for all 15 interviewed communities. However, detailed community profiles and their aboriginal neighboring communities will be included in the appendix. The following tables summarize the timelines and the characteristics of these communities:

Table 2: A timeline table for all eliminated and opted out communities

Community name	Date joined the process	Elimination date	Elimination phase
Community 1	September 2010	March 3, 2015	Second phase of step 3
Community 2	December 2009	November 2013	First phase of step 3
Community 3	November 2009	November 2013	First phase of step 3
Community 4	March 2010	November 2013	First phase of step 3
Community 5 (opted out)	November 9, 2011	June 17, 2014	
Community 6	February 2011	November 2013	First phase of step 3
Community 7	April 2011	January 2015	First phase of step 3
Community 8	April 2011	January 2015	First phase of step 3
Community 9	February 2010	March 3, 2015	Second phase of step 3

Table 3: A timeline table for communities that are still participating

Community name	Date joined the process	Current stage in the process
Community 10	January 2012	First phase of step 3
Community 11	April 2011	Second phase of step 3
Community 12	February 2012	Second phase of step 3
Community 13	November 2009	Second phase of step 3
Community 14	December 2010	Second phase of step 3
Community 15	January 2012	First phase of step 3

Table 4: Characteristics of opted out and eliminated communities

Community name	Community size	Unemployment rate	Major industries	Main source of employment
Community 1	Small	High	Mining, forestry, rail industries	Business services
Community 2	Small	High	Uranium mining, municipal administration, education, health and social service	Educational services
Community 3	Small	Low	Forestry and mining	Agriculture, other resource based industries and other services
Community 4	Small	High	Education, housing, health and social services, outfitters and regional uranium mines	Other services
Community 5 (opted out)	Small	High	Mining, manufacturing and other services, retail trade and educational services	Manufacturing and other services
Community 6	Small	Average	Mining, forestry, health and social services	Other services

Community 7	Small	High	Logging, sawmills, fishing, uranium mining	Other services
Community 8	Small	High	Natural resources including agriculture, mining, logging and fishing	Business services and other services
Community 9	Small	Average	Mining and exploration companies	Manufacturing and other services

Table 5: Characteristics of communities that are still participating

Community name	**Community size**	**Unemployment rate**	**Major industries**	**Main source of employment**
Community 10	Small	Low	Agriculture and primary industry involves nuclear power generation	Agriculture and resource based industries
Community 11	Large	High	Mining activities	Other services
Community 12	Small	Low	Mining, forestry and tourism	Agriculture and other resource-based industries
Community 13	Small	High	Forestry and mining	Agriculture and other resource based industries
Community 14	Small	Low	Forestry and railroad	Business Services
Community 15	Small	Low	Agriculture	Agriculture and other resource-based industries

Excluded Communities

The communities in this section have all been excluded from the siting process by the NWMO and that includes the following:

Community 1

Community 1 timeline: In September 2010 the Mayor and Council sent a request to the NWMO to learn more about the program regarding the open invitation to learn more about the project

(NWMO, 2013d). Community 1 was eliminated from the siting process on March 3, 2015 (Cornwell, 2015). It was eliminated from the siting process through the second phase of Step 3. It was eliminated by the NWMO due to geological reasons as claimed by the NWMO. Areas near this community showed to have geological problems that reduce the chance of finding a suitable site to have a nuclear waste facility (Patterson, 2015).

Community 1 type: Community 1 is a small community (approximately 900 people) with a high unemployment rate (Statistics Canada, 2007a). Community 1 depends on mining, forestry, rail industries and a history of economic rises and falls in those industries (NWMO, 2013d). The main source of employment was business services (Statistics Canada, 2007a). There are several aboriginal communities in the immediate vicinity (NWMO, 2013d).

Important Findings from the NWMO's Preliminary Assessment of Community 1: The preliminary assessment concluded that Community 1 vision is growth for their community. A primary concern for the people of Community 1 is Population decline, and there is a desire and ability to grow (NWMO, 2013d). This concern is due to the out-migration as youth and mainly young families pursue other employment opportunities due to the loss of retail and other services. Through the multiple engagement activities, interests and questions raised by Community Liaison Committee members and community members were documented (NWMO, 2013d). The majority of people engaged in Community 1; were perceived to be supportive of the Project and were interested in learning more. Through desktop research, discussions with community members and leaders, and ongoing investigation, it is evident that Community 1 is interested to consider the project in their community to recognize growth opportunities within their community and neighboring area (NWMO, 2013d). There is high potential for sustained interest in Community 1. That is evident by strong community leadership. Community leaders

and many residents are supporting the process and interested to proceed with this project. However, there are some safety and security concerns regarding the APM Project. There are some people in the community who wonder if development related with this project is consistent with the values and goals of their community. In order to sustain interest in the Project in this community, it will be essential to discuss questions about safety and security. In addition, there is concern related to the natural areas surrounding the community and its closeness to the shoreline (NWMO, 2013d). In order to stay in the process, residents in Community 1 will need to be certain that sensitive areas will be protected. Community 1 shares similar goals with many neighboring communities in the area. Surrounding communities aim for growth, stability and sustainability. Therefore, the APM project benefits can help the area around Community 1. Neighboring communities have also expressed their interest in protecting the natural environment. There is potential for sustained interest in the neighboring communities. Schreiber has recently involved its neighbors – including Pays Plat First Nation, Jackfish Métis Association, Terrace Bay and Rossport – in learning more about the process (NWMO, 2013d). Community 1 has shown a strong working relationship with non-Aboriginal neighbors as they have close ties and share several services with Terrace Bay and Rossport; they also share some services with Nipigon like the Ontario Provincial Police Department. Community 1 has started to develop and build relationships with the closest First Nations and Métis communities. Representatives of the Jackfish Métis Association have participated in the CLC meetings in the community (NWMO, 2013d). Interest recently exists in some surrounding communities that are also involved in the NWMO "Learn More" process (including Manitouwadge and Nipigon). Uncertainties and challenges of Community 1 include: Opposition groups, mostly from outside

the area, might try to influence community decision-making, and community leaders will need to respond to these challenges (NWMO, 2013d).

Community 2

Community 2 timeline: In December 2009 the Mayor and Council sent a request to the NWMO to learn more about the program regarding the open invitation to learn more about the project (NWMO, 2013k). In November 2013 the NWMO concluded the first phase of preliminary assessments (step3) for Community 2, Community 3, Community 4, and Community 6 (The Council of Canadians, 2013). According to the NWMO, based on the results of the preliminary assessments these communities were eliminated from the siting process (NWMO, 2013b). The preliminary assessments for these communities showed that they have higher geo-scientific uncertainties and complexities compared to the communities that were chosen for detailed study. In addition, this project may not meet the priorities and objectives of the eliminated communities, and the ability to sustain interest is weak or uncertain (NWMO, 2013a).

Community 2 type: Community 2 is a First Nation small rural village (approximately 1000 people) (Statistics Canada, 2007b). Its unemployment rate was greater than 20%. Community 2 depends on uranium mining, municipal administration, education, health and social services (NWMO, 2013k). The primary employment was in educational services (Statistics Canada, 2007b). There are several aboriginal communities in the immediate vicinity (NWMO, 2013k).

Important Findings from the NWMO's Preliminary Assessment of Community 2: Community 2 has not expressed a need to grow, but there is a strong desire to bring back former residents and retain youth (NWMO, 2013k). Due to high unemployment rates, many residents

and families leave their community to find employment or look for other opportunities, especially youth. The engagement program shows that generally some people are willing to learn more about the project, but there is a degree of demonstrated controversy within the community about this project at this time (NWMO, 2013k). There is division in the community regarding the project, and this is exacerbated by historic divisions in this community. Community 2 has some uncertain interest to continue in the process. There appears to be limited potential to sustain interest in this community at present. There has been some support for the NWMO project, but there are many community members who have not participated in the process. Some community members, including some elders opposed the project. Even if more effort was made for future community participation, it will be uncertain if interest in the process will be improved. Preliminary discussions have showed interest in the potential economic development of this project, even though there are high levels of misinformation and concern about this project (associated to health, safety and environment). There are many challenges facing Community 2 including: economic hardship, limited infrastructure, young/growing population, lower (but improving) education levels, limited health and social services, and the large number of small isolated and remote communities (NWMO, 2013k). The project might be not consistent with Aboriginal values and culture as followed by neighboring communities. There is a high level of misinformation about the Project in neighboring First Nations/communities. There is concern by some individuals, if not direct opposition, and more formal opposition expressed by some organizations (example: petitions, marches, resolutions passed against the project). Therefore, division and misinformation about the project have affected participation in the surrounding area, resulting in uncertainty about the potential interest in neighboring communities. Therefore, uncertainties and challenges for Community 2 include: opposition groups that are concerned with

the nuclear industry, including mining, both within and outside the community, will continue to affect community decision-making (NWMO, 2013k).

Community 3

Community 3 timeline: In November 2009 the Council passed a resolution and the Mayor sent a letter requesting to learn more about the project regarding the open invitation to learn more about the process (NWMO, 2013c). In November 2013 the NWMO concluded the first phase of preliminary assessments (step3) for Community 2, Community 3, Community 4, and Community 6 (The Council of Canadians, 2013). According to the NWMO, based on the results of the preliminary assessments these communities were eliminated from the siting process (NWMO, 2013b). The preliminary assessments for these communities showed that they have higher geo-scientific uncertainties and complexities compared to the communities that were chosen for detailed study. In addition, this project may not meet the priorities and objectives of the eliminated communities, and the ability to sustain interest maybe weak or uncertain (NWMO, 2013a).

Community 3 type: Community 3 is a small township (approximately 1000 people) with a low unemployment rate (Statistics Canada, 2007c). Community 3 depends on forestry and mining activities (NWMO, 2013c). The main source of employment was agriculture and other resource-based industries and other services (Statistics Canada, 2007c). There are several aboriginal communities in the immediate vicinity (NWMO, 2013c).

Important Findings from the NWMO's Preliminary Assessment of Community 3: Population decline is a main concern for the community (NWMO, 2013c). The community has

expressed that they would like to grow in terms of population, business activity, employment, and career opportunities. In addition, the community aims to reverse the trend of youth and skilled labor out-migration (NWMO, 2013c). Dialogues with community leaders and residents suggest different employment opportunities that would bring back and retain youth in this community. In Community 3, some of the people participating in discussion were positive about the Project. Many were neutral and were interested in learning more about the process, and some were opposed to the process (NWMO, 2013c). According to the NWMO there is some potential for sustained interest in Community 3, but the community is not consistent in its support to continue learning about the project and the benefits it offers for the community (NWMO, 2013c). According to the NWMO preliminary assessment for Community 3; one of the challenges and uncertainties they list is opposition. Opposition groups, mostly from outside the area, may actively influence the community decision-making, and community leaders will need to handle opposition pressures. Ongoing negotiation between some leaders of Aboriginal communities shows that there may be limited potential for regional unity and willingness to work together towards implementing the project (NWMO, 2013c).

Community 4

Community 4 timeline: In March 2010 the Chief and Council sent a request to the NWMO to learn more about the program regarding the open invitation to learn more about the project (NWMO, 2013f). In November 2013 the NWMO concluded the first phase of preliminary assessments (step3) for Community 2, Community 3, Community 4, and Community 6 (The Council of Canadians, 2013). According to the NWMO, based on the results of the preliminary

assessments these communities were eliminated from the siting process (NWMO, 2013b). The preliminary assessments for these communities showed that they have higher geo-scientific uncertainties and complexities compared to the communities that were chosen for detailed study. In addition, this project may not meet the priorities and objectives of the eliminated communities, and the ability to sustain interest maybe weak or uncertain (NWMO, 2013a).

Community 4 type: Community 4 is a small First Nation community (approximately 600 people). Its unemployment rate was greater than 30% (Aboriginal Affairs and Northern Development Canada, 2014). Community 4 depends on education, housing, health and social services, outfitters and regional uranium mines (NWMO, 2013f). The main source of employment was other services (Aboriginal Affairs and Northern Development Canada, 2014). There are several aboriginal communities in the immediate vicinity (NWMO, 2013f).

Important Findings from the NWMO's Preliminary Assessment of Community 4: Population growth may not be an objective of Community 4; instead the community desire to retain youth and young families, also have members return to their area (NWMO, 2013f). Reserve communities of this whole community have faced out-migration due to individuals and families looking for employment and opportunities somewhere else. Community 4 has employment challenges, including limited employment options and high levels of unemployment (NWMO, 2013f). Many members, especially youth, leave their community to find employment elsewhere. Unemployment in the two reserve communities still high (even though rates are improving over time), and incomes are relatively low. Therefore, there is a stronger dependence on government transfers compared to the region or province as a whole (NWMO, 2013f). Desktop research, discussions with community members and leaders, and ongoing analysis, showed that Community 4 has some tentative interest to continue in the Project to realize

economic development opportunities for their community and surrounding area. There is division in the community regarding the project, and this is exacerbated by historic divisions in this community. There is some limited potential for sustained interest in Community 4 at this time (NWMO, 2013f). Community 4 stated that they need more information and dialogue before committing to the project. Community 4 leaders have been cautious about continuing in the process. Preliminary discussions have showed interest in the potential economic development of this project, even though there are high levels of misinformation and concern about this project (associated to health, safety and environment). Community 4 faces many challenges including: economic hardship, limited infrastructure, young/growing population, lower (but improving) education levels, limited health and social services, and the large number of small isolated and remote communities (NWMO, 2013f). In addition, the project may not be compatible with the traditional way of life and Dene culture that are experienced by Community 4. A small group in the community is interested in the NWMO process and tried to advance dialogue in the community. But, there are many community members who have not participated in the process until now (NWMO, 2013f). There is opposition to the process by some community members that includes some elders. Even if more effort was made for future community participation, it will be uncertain if there would be a successful result in terms of improved understanding or interest in the project. However, it is uncertain if interest will be persistent in the neighboring communities. There is a high level of misinformation about the Project in neighboring First Nations/communities (NWMO, 2013f). There is concern by some individuals, if not direct opposition, and more formal opposition expressed by some organizations (example: petitions, marches, resolutions passed against the project). Therefore, division and misinformation about the project have affected participation in the surrounding area, resulting in uncertainty about the

potential interest in neighboring communities. Therefore, uncertainties and challenges for Community 4 include: Opposition groups that are concerned with the nuclear industry, including mining, both within and outside the community, will continue to affect community decision-making (NWMO, 2013f).

Community 6

Community 6 timeline: In February 2011 the Chief Administrative Officer sent a request to the NWMO to learn more about the program regarding the open invitation to learn more about the project (NWMO, 2013e). In November 2013 the NWMO concluded the first phase of preliminary assessments (step3) for Community 2, Community 3, Community 4, and Community 6 (The Council of Canadians, 2013). According to the NWMO, based on the results of the preliminary assessments these communities were eliminated from the siting process (NWMO, 2013b). The preliminary assessments for these communities showed that they have higher geo-scientific uncertainties and complexities compared to the communities that were chosen for detailed study. In addition, this project may not meet the priorities and objectives of the eliminated communities, and the ability to sustain interest maybe weak or uncertain (NWMO, 2013a).

Community 6 type: Community 6 is a small community (approximately 3000 people). Its unemployment rate was around 6% (Statistics Canada, 2007e). Community 6 depends on mining and forestry industries and health and social services, and a history of economic rises and falls in those industries (NWMO, 2013g). The main source of employment was other services (Statistics

Canada, 2007e). There are several aboriginal communities in the immediate vicinity (NWMO, 2013g).

Important Findings from the NWMO's Preliminary Assessment of Community 6:

Population decline is a main concern for the people of Community 6, and they expressed a strong desire to grow (NWMO, 2013e). "Boom and bust" cycles in natural resource-based industries have reduced employment opportunities. Therefore, the community has been facing out-migration as youth and mostly young families looking for other employment opportunities. The Project has the potential to increase the population and stimulate growth in Community 6 and other neighboring communities. In Community 6, most people who participated were neutral to supportive about the Project. Many of them were interested in learning more about the project. Some people engaged were initially opposing the Project; but, when questions were raised in the "Learn More" process, their positions changed. In some cases, people were still opposed. Throughout desktop research, discussions with community members and leaders, and ongoing study, it is evident that Community 6 has some interest in learning about the Project to understand growth and development prospects in the community and surrounding area. There is some potential for sustained interest in Community 6 (NWMO, 2013e). This is shown by support from some community leaders to continue participating in the process. The project is consistent with many community goals, including the objective to see growth, development and stability. However, for some community members the process may not be consistent with community objectives especially in regard to the natural environment and the community's ecotourism goals. This will cause a challenge to sustain interest in learning more about the project. However, preliminary dialogues with residents and officials of the neighboring communities have shown an interest in the potential economic development benefits presented by the project. There is

potential for sustained interest in neighboring communities, including members of the Northeast Superior Mayors' Group. However, When Community 6 engaged neighboring communities; some of these communities have demonstrated concern regarding this project. Opposition groups, mostly from outside the community, may actively try to effect community decision-making, and community leaders will need to respond to these concerns (NWMO, 2013e).

Community 7

Community 7 timeline: In April 2011 ELNOS (the economic development corporation representing the area communities of Blind River, Elliot Lake, Spanish, The North Shore and Serpent River First Nation) sent a request to the NWMO to learn more about the program regarding the open invitation to learn more about the project (NWMO, 2014i). In January 2015, the NWMO finished the first phase of preliminary assessment for Community 7 (NWMO, 2010i). Based on the results of the first phase of preliminary assessment Community 7 was eliminated by the NWMO (Eliot Lake Standard, 2015a). The preliminary assessment for Community 7 showed that the Project might not be a good fit for Community 7 because this community would like to retain the small-town character of their community (NWMO, 2015).

Community 7 type: Community 7 is a small township (approximately 500 people) with a high unemployment rate (Statistics Canada, 2007f). Community 7 depends on logging, sawmills, and some commercial fishing. Many citizens in Community 7 are familiar with radiation, uranium mining, uranium processing and transportation, and long term management of uranium mining tailings (NWMO, 2014i). The main source of employment was other services (Statistics Canada, 2007f). There are several aboriginal communities in the immediate vicinity (NWMO, 2014i).

Important Findings from the NWMO's Preliminary Assessment of Community 7:

Community 7 values and objectives include: Recreational activity improvement, employment opportunities offers and encouraging the young population to stay and work in their community, housing opportunities development (NWMO, 2014i). According to Community 7, the community values its current businesses, small town character, and their distinctive natural environment. According to Community 7, their present challenges include the maintenance of existing businesses and jobs in their community and drawing new businesses to their community in a controlled, healthy and safe environment. Community 7 has experienced population loss due to out-migration of trained and young citizens. Young citizens left their community for school and work. Since 1996, the population has been aging in Community 7 and in other neighboring communities along the north shore of Lake Huron. In Community 7, the people that participated were mostly interested in learning more and were supportive of their community to participate in the siting process and look forward to the following steps. Throughout desktop research, discussions with community members and leaders, and on-going investigation, it is evident that Community 7 has an interest in learning more about the Process to find out about growth and development opportunities within their community and neighboring area. There is a concern in regard to keeping the rural and small town character preferred by the community if Community 7 were to be the focus of the project (NWMO, 2014i). Therefore, the overall character of Community 7 will be maintained if project activity is focused on an interested nearby community in the same area. This way, the community will be able to work with the NWMO to engage in the project in a regional context. That would help the North Shore to engage in the APM Project and the socio-economic benefits of economic growth and demographic stability, these are Community 7 goals, and retain their small community character, which is also essential to the

community. Many community leaders in Community 7 demonstrated that they are supportive of learning about the project (NWMO, 2014i). Preliminary dialogues with neighboring communities have showed a strong interest in the economic improvement potentials that is given by the project to the broad area. More discussion will be required to understand the viewpoint of First Nation and Métis communities, and others, in the area. There is a high potential for sustained interest in the neighboring communities. Three neighboring communities are actively participating in the siting process as interested communities, and support continuing to learn more about the Process. These 3 communities include: Community 8, community 11 and Blind River. These interested communities represent a region and are connected through government relations and joint planning. In addition, they share facilities and services, and have a mutual heritage with uranium mining (NWMO, 2014i). They come together for community events and have established some relationships with First Nation and Métis communities in their area. They are willing to share common opportunities to benefit from the Project which has encouraged unity among these communities. In Community 7 and the other regional communities, many citizens are familiar with radiation, uranium mining, uranium processing and transportation, and long term management of uranium mining tailings (NWMO, 2014i).

Community 8

Community 8 timeline: In April 2011 ELNOS (the economic development corporation representing the area communities of Blind River, Elliot Lake, Spanish, The North Shore and Serpent River First Nation) sent a request to the NWMO to learn more about the program regarding the open invitation to learn more about the project (NWMO, 2014j) .In January 2015,

the NWMO finished the first phase of preliminary assessment for Community 8 (NWMO, 2010i). Based on the results of the first phase of preliminary assessment Community 8 was eliminated by the NWMO (Elliot Lake Standard, 2015b). The preliminary assessment for Community 8 showed that the Project might not be a good fit for Community 8 because this community would like to retain the small-town character of their community (NWMO, 2015).

Community 8 type: Community 8 is a small town (approximately 700 people). Its unemployment rate was greater than 20% (Statistics Canada, 2007g). Community 8 depended on the area's natural resources, including agriculture, mining, logging, and commercial fishing (NWMO, 2014j). The main source of employment was business services and other services (Statistics Canada, 2007g). There are several aboriginal communities in the immediate vicinity (NWMO, 2014j).

Important Findings from the NWMO's Preliminary Assessment of Community 8: Community 8 values and objectives include: Recreational activity improvement, employment opportunities offers and encouraging the young population to stay and work in their community, housing opportunities development (NWMO, 2014j). According to Community 8 the community values its present affordable lifestyle, small town feature with easy access to close by regional centers. Community 8 indicated that recent community challenges include absence of economic diversity, and the need to support growth and development while preserving the small town character and their natural environment. In Community 8, population loss is due to the out-migration of skilled and young residents searching for more job opportunities and benefits. Since 1996, the population has been aging in Community 8 (NWMO, 2014j). This is also a general trend in the area. The existence of a population 65 years and over also shows that older citizens are retiring in Community 8. The increased presence of elders is due to seniors preferring to live

permanently at cottages. In Spanish, most of the people who participated were interested in learning more and were supportive of their community to be involved in the siting process and look forward to following steps in the process (NWMO, 2014j). Throughout desktop research, discussions with community members and leaders, and on-going investigation, it is evident that Community 8 has an interest in learning more about the Process to find out about growth and development opportunities within their community and neighboring area. There is a concern in regard to keeping the small town character preferred by the community if Community 8 were to be the focus of the project. Therefore, the overall character of Community 8 will be maintained if project activity is focused on an interested nearby community in the same area. That will help to reduce the potential for divisions in the community over changes in community character .This way, the community will be able to work with the NWMO to engage in the project in a regional context (NWMO, 2014j). That would help Community 8 to engage in the APM Project and the socio-economic benefits of economic growth and demographic diversity, and retain their small community character, which is also essential to the community. There is a high potential for sustained interest in Community 8. There is support from the community for learning more about the Project and interest to continue in the siting process. The objectives of neighboring communities involved in the siting process are consistent with Community 8, especially when viewing the Project as a regional plan. They realize the importance for another industry to provide economic variation to achieve area development goals and to sustain/increase their life quality. Preliminary dialogues with neighboring communities have showed a strong interest in the economic improvement potentials that is given by the project to the broad area (NWMO, 2014j). Leaders in one community east of community 8 has showed opposition to the Project, and more discussion and participation will be required to understand questions and concerns of

that community, also First Nation and Métis communities, and others, in the area. There is a high potential for sustained interest in the neighboring communities (NWMO, 2014j). Three neighboring communities are actively participating in the siting process as interested communities, and support continuing to learn more about the Process. These 3 communities include: Community 8, Community 11 and Blind River. These interested communities represent a region and are connected through government relations and joint planning. In addition, they share facilities and services, and have a mutual heritage with uranium mining. They come together for community events and have established some relationships with First Nation and Métis communities in their area. They are willing to share common opportunities to benefit from the Project which has encouraged unity among these communities (NWMO, 2014j).

Community 9

Community 9 timeline: In February 2010 the Mayor and Council sent a request to the NWMO to learn more about the program regarding the open invitation to learn more about the project (NWMO, 2013h) . Community 9 was eliminated from the siting process on March 3, 2015 (Cornwell, 2015). It was eliminated from the siting process through the second phase of Step 3. It was eliminated by the NWMO due to geological reasons as claimed by the NWMO. Areas near this community showed to have geological problems that reduce the chance of finding a suitable site to have a nuclear waste facility (Patterson, 2015). However, according to Dave Taylor (freelance writer and anti-nuclear activist) Community 9 was eliminated due to opposition not only to geological reasons as claimed by the NWMO (Jonathon, 2015). Saskatchewan's

Committee for Future Generations (anti-waste group), and the Peter Ballantyne Cree Nation opposed the deep geological repository.

Community 9 type: Community 9 is a small town (approximately 1000 people). Its unemployment rate was almost 6% (Statistics Canada, 2007h). Many citizens of Community 9 work in mining and exploration companies (NWMO, 2013h). The main source of employment was manufacturing and other services (Statistics Canada, 2007h). There are several aboriginal communities in the immediate vicinity (NWMO, 2013h).

Important Findings from the NWMO's Preliminary Assessment of Community 9: Community 9 values and goals include: Economic development, Infrastructure and Facilities Development, Provide Employment Opportunities by encouraging the younger population to live and work in their community, and develop training, youth centers and educational prospects to motivate youth to stay in their community after high-school graduation (NWMO, 2013h). Some residents of Community 9 are uranium miners that are familiar with radiation or are skilled miners familiar with robotic mining techniques. In Community 9, most of participating citizens were interested in learning more and were supportive of their community to participate in the siting process and look forward to the next step (NWMO, 2013h). Through desktop research, dialogues with community members and leaders, and ongoing analysis, it is shown that Community 9 has high interest in hosting the Project to recognize growth and development opportunities within the community and nearby area. There is a high potential for sustained interest in Community 9. There is support from the community to proceed in the siting process. Community 9 realizes that this siting process will help their community over time to get the information they need to reflect evaluate their willingness to continue in the siting process and to decide if they are interested in continuing to the next phase of studies. Neighboring

communities' goals are consistent with Community 9 (NWMO, 2013h). They understand the need for another industry to offer industrial diversification to achieve community development objectives and to maintain/increase their quality of life. Preliminary negotiations with neighboring communities showed a strong interest in the economic development potentials suggested by the project. At this point, there is some potential for sustained interest in neighboring communities. Community 9 had engaged the surrounding local communities, including Aboriginal peoples. There is initial positive interest in the local neighboring communities, and negotiations are still taking place (NWMO, 2013h). Further negotiations will be necessary to understand the potential interest in neighboring communities. Some of the challenges that Community 9 might face is Opposition groups, mostly from outside the area, may try to affect community decision-making, and community leaders will need to respond to these concerns (NWMO, 2013h).

Communities that are still participating

The communities in this section are all still participating in the siting process and that includes the following:

Community 10

Community 10 timeline: is a Township in Ontario. In January 2012 the Mayor and Council sent a request to the NWMO to learn more about the program regarding the open invitation to learn more about the project (NWMO, 2014e). Community 10 is at step 3, phase1 (NWMO, 2013a).

Community 10 type: Community 10 is a small township (approximately 6000 people) with a low unemployment rate (Statistics Canada, 2007i). Community 10 depends on agriculture and agricultural services. The primary industry in Community 10 involves power generation at the nuclear site in the region (NWMO, 2014e). The main source of employment was agriculture and other resource-based industries (Statistics Canada, 2007i). There are several aboriginal communities in the immediate vicinity (NWMO, 2014e).

Important Findings from the NWMO's Preliminary Assessment of Community 10: Community 10 Strategic Plan shows that Community 10 supports the nuclear industry and would like to continue to learn about the Deep Geological Repository project (NWMO, 2014e). Community 10 goals include: 1- Sustainable growth and keeping the younger citizens and increasing employment and opportunities for local residents, including youth in Community 10. 2- Increase community wealth by retaining and developing existing businesses and bringing in new ones to diversify their economy; and developing and diversifying tourism/recreational opportunities; also improving the agricultural sector; and investing in infrastructure. Community 10 location near Lake Huron attracts cottagers, recreationists and retirees (NWMO, 2014e). Retirees contribute to the population growth occurring in the 45 to 64 years old and the 85 years old. The primary industry in Community 10 involves power generation at the nuclear site in the region. The nuclear industry is recognized by many residents as an important employment base for many households in Community 10 and the community population is influenced by activity levels at the site. The community is aware and approving of the nuclear industry and encourages investments in this local industry. In Community 10, most of the citizens engaged were interested in learning more, and supported the idea of their community to participate in the siting process and look forward to next steps (NWMO, 2014e). Through desktop research, discussion

with community members and leaders, and on-going investigation, it is evident that Community 10 has an interest in learning about the APM Project but also knows that benefits can also be recognized if the project were to be placed in a neighboring municipality (NWMO, 2014e). Community 10 realizes that this siting process will help their community over time to get the information they need to reflect upon their willingness to stay in the site selection process and to decide if they are interested in continuing to the next step. The project will enable community priorities and goals, and is viewed by leaders and many residents to assist the socio-economic growth and development they need. There is high potential for sustained interest in Community 10. This is shown through the strong, active commitment community leaders and residents have demonstrated towards their continued engagement in the site selection process. At this time, there is no proof that Community 10 will not continue to learn through the following steps (NWMO, 2014e). Preliminary negotiations with neighboring communities have showed interest in the economic growth potential offered by the project. There is high potential for sustained interest in neighboring communities. The neighboring communities have experience with existing nuclear activities operating in the area which helps establish the basis for further productive consideration of the Project and its opportunities (NWMO, 2014e). Various neighboring municipalities also entered the siting process. Further negotiations will be needed to understand the potential interest in surrounding communities. The municipalities that entered the site selection process in the area represent a region. These communities are related through government ties and shared planning. They share facilities and services and share a common nuclear experience since they are close to the nuclear facility in the area. They are willing to share common opportunities to benefit from the Process; which has encouraged unity across the Bruce communities (NWMO, 2014e).

Community 11

Community 11 timeline: is a city located in Ontario. In April 2011 ELNOS (the economic development corporation representing the area communities of Blind River, Elliot Lake, Spanish, The North Shore and Serpent River First Nation) sent a request to the NWMO to learn more about the program regarding the open invitation to learn more about the project (NWMO, 2014f). Community 11 is at step 3, phase 2 (NWMO, 2015).

Community 11 type: Community 11 is a large city (approximately 11,000 people) with a high unemployment rate (Statistics Canada, 2007j). Community 11 depends on mining activities (NWMO, 2014f). The main source of employment was other services (Statistics Canada, 2007j). There are several aboriginal communities in the immediate vicinity (NWMO, 2014f).

Important Findings from the NWMO's Preliminary Assessment of Community 11: Community 11 values and goals include: Economic development, retail and facility development, provide employment opportunities by encouraging the younger population to live and work in their community, and develop training and educational prospects to motivate youth to stay in their community after high-school graduation (NWMO, 2014f). According to Community 11, the community values its affordable lifestyles, direct access to natural areas and various recreational resources, housing and services to support retirement living for elders. Community 11 expressed that recent community challenges involve shortage of economic diversity, improving services such as growth and maintenance of the downtown and other community characteristics, increasing and improving retail services, growing population and developing connectivity to solve the problem of isolation and geographic separation. Community 11 is a 'new town' specifically established to house uranium miners, support workers, and their

families. The community had periods of expansion and contraction, largely due to the boom and bust cycles related with resource extraction operations (NWMO, 2014f). The population decline in Community 11 was the result of out-migration of skilled and young residents. The population loss in Community 11 slowed by 2006 because Community 11 established itself as a retirement community. Since 1996, the population of Community 11 has been aging. The existence of an older population is because of the success of the ongoing growth of a retirement community and the out-migration of the younger residents to southern Ontario. In Community 11 most of the people who participated were interested in learning more and supportive of their community to be engaged in the siting process and look forward to next steps (NWMO, 2014f). Through desktop research, discussions with community members and leaders, and ongoing investigation, it is evident that Community 11 has an interest in learning more about the project to recognize growth and development opportunities within the community and neighboring area. Community 11 has recent and previous experience with the nuclear industry that attracts and tolerates a large workforce. The communities' nuclear heritage helped it to be well informed. Neighboring community goals are consistent with Community 11, especially when considering the Project as a regional initiative. Preliminary negotiations with neighboring communities have showed a strong interest in the economic development potential presented by the project to the area (NWMO, 2014f). At this point, there appears to be high potential for sustained interest in the neighboring communities. Three neighboring communities are actively participating in the siting process as interested communities, and support continuing to learn more about the Process. These 3 communities include: Community 8, Community 11 and Blind River. These interested communities represent a region and are connected through government relations and joint planning. In addition, they share facilities and services, and have a mutual heritage with uranium

mining that assist in establishing the knowledge required to consider the project (NWMO, 2014f). They come together for community events and have established some relationships with First Nation and Métis communities in their area. They are willing to share common opportunities to benefit from the Project which has encouraged unity among these communities. Local community leaderships have stated that it is important to have the engagement of First Nation and Métis communities in the project. Further negotiations will be essential to gain a full understanding of the potential interest in neighboring communities (NWMO, 2014f).

Community 12

Community 12 timeline: is a township located in Ontario. In February 2012 the Mayor and Council sent a request to the NWMO to learn more about the program regarding the open invitation to learn more about the project (NWMO, 2014g). Community 12 is at step 3, phase 2 (NWMO, 2015).

Community 12 type: Community 12 is a small township (approximately 2,000 people). Unemployment rate was almost 7% (Statistics Canada, 2007k). Community 12 depends on mining and forestry and has a small tourism sector (NWMO, 2014g). The main source of employment was agriculture and other resource-based industries (Statistics Canada, 2007k). There are several aboriginal communities in the immediate vicinity (NWMO, 2014g).

Important Findings from the NWMO's Preliminary Assessment of Community 12: Community 12 has currently established itself as a retirement community (NWMO, 2014g). Community 12 started as a mining community, and even after the mines in the community have closed, many citizens still work in the mines elsewhere in northern Ontario or elsewhere in

Canada. Forestry in the area started to improve from recent downturns. The community is facing population loss due to families and youth moving elsewhere for employment and educational opportunities. The community aims to maintain, if not grow their population (NWMO, 2014g). In addition, Community 12 is aiming to diversify the economy and to improve local employment opportunities for new and current residents, and to address the problem of the out-migration of community members (especially youth) looking for employment or education. A better municipal finance position is needed to redistribute the tax burden, and to develop community facilities, programs and services. Overall, Community 12 aims to solve the problem of population loss through sustainable economic development, diversification and stability (NWMO, 2014g). According to Community 12, recent community challenges involve founding and retaining an effective work environment and healthy financial status for the municipality by identifying new or improved revenue sources. Community 12 aims to position the community for economic growth targeting new economic improvement opportunities and to strengthen the mining, forestry, tourism, retail and service sectors. Community 12 aims to have local or regional employment opportunities for existing or returning residents, especially youth or younger families (NWMO, 2014g). Community 12 is also aiming to continue to maintain a unique quality of life by adapting to the needs of an aging population. Community 12 and many northern Ontario communities have faced major population loss. The community is facing an aging population because of the outmigration of youth and other workers, and due to seniors moving to the community (interested due to low housing costs). Population loss is a main concern for the residents of Community 12, and they aim to grow (NWMO, 2014g). The community indicated a desire to go back to previous population levels and former wealth. Community 12 has faced out-migration because of mine closures and forestry cycles. Out-migration started after the GECO

Mine closed in 1995, continued with the closure of the Golden Giant Mine in 2006 because of job loss. Community 12 financial state has been influenced by population loss, business closures, unoccupied properties, and tax arrears, which caused the community to have a weak revenue base (NWMO, 2014g). Throughout the different meeting activities, interests and questions stated by Community Liaison Committee members and community members were documented. In Community 12, most of the people engaged show they are supportive of project and interested in learning more. Through desktop research, discussions with community members and leaders, and ongoing study, it is evident that Community 12 has an interest in learning more about the Project to recognize growth and development opportunities within the community and neighboring areas. The project is consistent with community goals, including the goal of sustainable economic growth, diversification, and stability (NWMO, 2014g). The project is considered by residents and leaders a way to achieve the overall community development. There is a high potential for sustained interest in Community 12. This is shown by strong community leadership for continued engagement in the site selection process and interest stated by community members in learning. At this time, there is no sign that Community 12 would not stay interested in learning through the next steps in the process. Preliminary negotiations with residents and leaders of the neighboring communities have indicated an interest in the potential economic development benefits offered by this project. There is high potential for sustained interest in the neighboring communities. For example, nearby communities of Community 14 and White River are also participating in the Learn More process. Community 12 has shown an active approach to engage their neighbors including members of the Northeast Superior Mayors' Group (NWMO, 2014g).

Community 13

Community 13 timeline: is a Township in Ontario. In November 2009 the Mayor and Council sent a request to the NWMO to learn more about the program regarding the open invitation to learn more about the project (NWMO, 2013i) .Community 13 is at step 3, phase 2 (NWMO, 2013a).

Community 13 type: Community 13 is a small township (approximately 1000) with a high unemployment rate (Statistics Canada, 2007l). Community 13 depends on forestry and mining industry and there are current plans to develop new mining and forestry activities in the area (NWMO, 2013i). The main source of employment was agriculture and other resource-based industries (Statistics Canada, 2007l). There are several aboriginal communities in the immediate vicinity (NWMO, 2013i).

Important Findings from the NWMO's Preliminary Assessment of Community 13: Community 13 values and goals include: 1- The community has indicated that they would like to grow their population, business activity, and employment opportunities. Negotiations with community leaders and residents show a desire to at least recover its former peak population of over 2,200 residents (NWMO, 2013i). 2- The community aims to solve the problem of youth and skilled labor migration. It is acknowledged by the community that this can only be solved if employment and career opportunities are available. An important goal for Community 13 is to retain its youth. 3- The community aims for diversified economic opportunities in their region. Since 1981, Community 12 has faced a major population loss. This trend has been occurring in most small communities in northern Ontario. Most of these towns have historically been dependent on resource-based activities and have been going through "boom-bust" cycles

(NWMO, 2013i). Mass migration has happened in northern communities to other centers with better employment opportunities; including Community 13. The population loss in Community 13 is due to the migration of mostly youth and young families looking for employment opportunities. In addition, immigration has been on the part of retirees preferring to enjoy the peaceful nature and the beautiful natural environment of this community. The loss of youth and increased percentage of retirees have resulted in an aging population and loss of workforce. This decline is caused by a lack of economic and employment opportunities. Information gained from dialogues with leaderships and residents show that if job opportunities did exist in Community 13, many of the youth and other citizens might prefer to return to or remain in Community 13 (NWMO, 2013i). However, with limited job opportunities, the population has and will continue to decline. Population loss is the main issue concerning Community 13. Community 13 has indicated a goal to at least double its present population by attracting previous residents back to the community, retaining its current population and attracting new residents to their community. This will occur mainly by economic opportunities. Without the job opportunities to attract potential residents, population loss will continue. In Community 13, most of the people engaged were interested in learning more and supported their community to participate in the siting process and look forward to the next step (NWMO, 2013i). Through desktop research, discussions with community members and leaders, and current investigation, it is evident that Community 13 has a strong interest in hosting the project in the area to recognize growth and development opportunities within the community and the broad area. The project is realized to achieve community priorities and goals, and is viewed by leaders and residents to be a potential opportunity for the socio-economic growth in their community (NWMO, 2013i). Community 13 realizes that this siting process will help their community over time to get the information they

need to recognize if they are willing to stay in the site selection process and to decide if they are interested in continuing to the next step. There is a high potential for sustained interest in Community 13. This is shown through the strong, active commitment community leaders and residents have demonstrated towards their continued engagement in the site selection process. At this time, there is no sign that Community 13 would not stay committed in the process. Preliminary negotiations with neighboring communities have showed a strong interest in the economic development potentials offered by the project (NWMO, 2013i). There is a high potential for sustained interest in the neighboring communities. Community 13 has initiated to involve its neighbors, including Aboriginal peoples. These initial steps have produced positive interest from some neighboring communities, and discussions are still going (NWMO, 2013i).

Community 14

Community 14 timeline: is a township in Ontario. In December 2010 the Mayor and Council sent a request to the NWMO to learn more about the program regarding the open invitation to learn more about the project (NWMO, 2013l). Community 14 is at step 3, phase 2 (NWMO, 2013a).

Community 14 type: Community 14 is a small township (approximately 1000) with a low unemployment rate (Statistics Canada, 2007m). Community 14 depends on forestry and railroad industries (NWMO, 2013l). The main source of employment was business services (Statistics Canada, 2007m). There are several aboriginal communities in the immediate vicinity (NWMO, 2013l).

Important Findings from the NWMO's Preliminary Assessment of Community 14:

Community 14 faces many recent challenges that involve changes in their economy and closure of the town mall. In addition, the community has an aging and population loss (NWMO, 2013l). Therefore, their goal is economic development and population growth. Community 14 has faced population loss recently. This has been occurring in most small communities in northern Ontario. Many of these towns have been dependent on resource-based economies and have all been facing "boom-bust" cycles. Mass migration has happened in northern communities (mainly younger generation) moving to other centers with better employment opportunities. Community 14 is part of this trend. Community 14 has faced out-migration due to loss of employment opportunities (NWMO, 2013l). The population is aging, and the community has a problem in attracting and retaining younger people of working age. Population loss is a main concern for the people of Community 14, and they aim to grow. The community stated that it would prefer its population increase to about double its present size. At this time, employment in Community 14 is at a point of equilibrium. The economy has been in decline with the closure of many industries, which had a huge effect on this community. Generally, employment levels within the community have stayed relatively stable. Municipal fiscal conditions are recently challenging. Business closures, out-migration and empty properties led the community to have a weak revenue base (NWMO, 2013l). The project will increase municipal revenues to maintain community infrastructure and services. In Community 14, most people engaged were interested in learning more and were supportive of their community to participate in the siting process and look forward to next step. A small number of residents continue to be concerned about their community's participation in the process. Through desktop research, discussion with community members and leaders, and ongoing investigation, it is evident that Community 14 has some interest to consider hosting the

Project in the area to recognize growth and development opportunities in their community and neighboring area (NWMO, 2013l). The project is recognized by residents and leaders as a chance for sustainable growth in their community. The community realizes that this siting process will help their community over time to get the information they need to reflect if they are willing to stay in the site selection process and to decide if they are interested in continuing to the next steps. There is a high potential for sustained interest in the community. This is shown by strong community leadership to continue being involved in the site selection process. There is also a strong support to continue in the process as there is no sign at this time that Community 14 would not continue participating in the siting process (NWMO, 2013l). Preliminary negotiations with residents and leaders of the neighboring communities have showed an interest in the potential economic benefits offered by the project. There is strong potential for sustained interest in the neighboring communities when Community 14 engaged its neighbors, including members of the Northeast Superior Mayors' Group. There are three other communities (White River, Wawa, Manitouwadge) in the immediate region (Northeast Superior Mayors' Group) engaged in the siting process. Some of the challenges that Community 14 will face is Opposition groups, mostly from outside the area, may try to affect community decision-making, and community leaders will need to handle these concerns (NWMO, 2013l).

Community 15

Community 15 timeline: is a municipality in Ontario. In January 2012 the Mayor and Council sent a request to the NWMO to learn more about the program regarding the open invitation to

learn more about the project (NWMO, 2014h). Community 15 is at step 3, phase1 (NWMO, 2013a).

Community 15 type: Community 15 is a small community (approximately 5000) with a low unemployment rate (Statistics Canada, 2007n). Community 15 depends on agriculture (NWMO, 2014h). The main source of employment was agriculture and other resource-based industries (Statistics Canada, 2007n). There are several aboriginal communities in the immediate vicinity (NWMO, 2014h).

Important Findings from the NWMO's Preliminary Assessment of Community 15: Community 15 aims to increase and keep its younger population, bring investment, and diversify its industry (NWMO, 2014h). The municipality is trying to sustain a strong agricultural field. In addition, trying to renew and revitalize its downtown urban centers, offer more senior housing and care programs. Community 15 faces the problem of population loss and an increase in aging population that led to economic and social challenges that are obvious in the community today, creating problems in different areas like retail and service businesses, seniors' housing, and community programming for residents. Balancing the population base and growing the population are goals of the community (NWMO, 2014h). The nuclear industry is considered as an essential employment driver for many households in Community 15 and the community population level is influenced by activity levels at the site. The importance of the relation to the nuclear industry in the area has been recognized as an important factor for the community by community residents in dialogue with the NWMO. Activities at a nuclear site in the area are an important basis of employment for some residents of Community 15. Therefore, the community has a high nuclear awareness and recognition for the risks and benefits of these activities. In Community 15, many people involved were interested in learning more and supported their

community to participate in the siting process and look forward to next step (NWMO, 2014h). Through desktop research, discussion with community members and leaders, and on-going investigation, it is evident that Community 15 has an interest in learning about the project but also recognizes that benefits can be realized if the project were placed in a surrounding municipality. The community of South Bruce understands that the siting process will help their community over time to get the information they need to reflect if they are willing to continue in the site selection process and to decide if they are interested in continuing to the next step (NWMO, 2014h). The project is recognized to support community priorities and goals, and is recognized by leaders and many residents to help the socio-economic growth they are looking for. There is high potential for sustained interest in this community. This is shown through the high commitment community leaders and residents have demonstrated towards their continued engagement in the site selection process. At this time, there is no sign that Community 15 will not continue to be interested in learning more about the process and continuing to the next step (NWMO, 2014h). Preliminary negotiations have shown interest in the economic development potential offered by this project. There is high potential for sustained interest in the neighboring communities. The neighboring communities have experience with existing nuclear activities in the area, contributing to the knowledge to consider the project. Some nearby municipalities also participated in the siting process. These interested communities represent a region and are connected through government relations and joint planning. In addition, they share facilities and services, and have a common experience by living proximate to a nuclear facility in the area. They come together for community events. They are willing to share common opportunities to benefit from the Project which has encouraged unity among these communities (NWMO, 2014h).

Opted out Community

The community in this section had opted out from the siting process and that includes:

Community 5

Community 5 timeline: On November 9, 2011, Community 15 expressed interest to the NWMO to learn more about the site selection process (Statistics Canada, 2012a). Community 5 passed a resolution on June 17, 2014 to withdraw from the site selection process (NWMO, 2010j). Town council of Community 5 decided to opt out from the siting process due to a group opposing the storage of high level radioactive waste in their community (tbnewswatch.com, 2014).

Community 5 type: Community 5 is a small township (approximately 1000 people) with a high unemployment rate (Statistics Canada, 2007d). Community 5 has been involved in mining activities (DPRA Canada, 2014). The main source of employment was Manufacturing and Other services, second was retail trade and third was educational services (Statistics Canada, 2007d). There are several aboriginal communities in the immediate vicinity (Government of Canada, 2012).

Chapter 5: Results

In the study information it was found that learning about the process and the benefits offered by the project were the main factors for communities that are still in the process to join the siting process. However, for both opted out and excluded communities; learning about the technology and the benefits offered by the project were the main factors for them to join the siting process. It is evident that benefits offered by the project was the main factor that interested communities that are still participating, excluded communities and opted out community to initially join the siting process by having the highest responses in comparison to all other factors.

In general, communities that are still participating had a more positive perception of the NWMO's voluntary siting process in comparison to opted out and excluded communities. Excluded communities mostly had higher risk perceptions compared to communities that are still participating. This is evident by the higher negative views they expressed (lower response scale). Surprisingly enough, the opted out community had mostly positive responses which implies low risk perception. Low risk perception could be caused by a group in Community 5 opposing the storage of high level radioactive waste in their community (tbnewswatch.com, 2014). This group might be a small group that demonstrated opposition towards the project and might not represent the community as a whole.

Section 1: Analysis of Interview Question 1

Table 6: Response chart to question 1

Which of the following factors interested you the most to initially participate in the nuclear waste siting process? This question is meant to elicit what motivated people to participate in the process.

Question 1					
Communities that are still participating					
Community Name	Being informed about NWMO's Voluntary Approach	Learning about the process for choosing a host community	Learning about the technology involved	Being told about the benefits: job opportunities, etc.	Other
Community 10	YES	YES	YES	YES	No
Community 11	No	YES	No	YES	No
Community 12	YES	YES	YES	YES	No
Community 13	YES	YES	YES	YES	No
Community 14	No	No	No	No	YES
Community 15	YES	YES	YES	YES	No
Excluded Communities					
Community Name	a	b	c	d	e
Community 1	YES	No	No	No	No
Community 2 (First Nation)	YES	YES	YES	YES	No
Community 3	No	No	YES	YES	No
Community 4 (First Nation)	YES	YES	YES	YES	No
Community 6	YES	YES	YES	YES	No
Community 7	No	No	No	YES	No
Community 8	No	No	No	YES	No
Community 9	No	YES	YES	No	No
Opted Out Community					
Community Name	a	b	c	d	e
Community 5	No	No	YES	YES	No

Referring to table 6; communities that are still participating had higher interest in all factors compared to excluded and opted out communities (these factors include: Being informed about NWMO's voluntary approach, learning about the process for choosing a host community, learning about the technology involved, being told about the benefits and other). Two thirds of

the communities that are still participating initially participated in the process because they were being informed about NWMO's voluntary approach. Half of the excluded communities initially participated in the process because they were informed about NWMO's voluntary approach. This shows that communities that are still participating feel being more informed about the approach than excluded communities and that encouraged them to join the process. Feelings of being informed about NWMO's voluntary approach were higher in communities that are still participating but the difference between communities that are still participating and excluded communities was higher in learning about the process for choosing a host community.

Almost all communities that are still participating initially participated in the process because of their interest, in learning about the process for choosing a host community. Half of the excluded communities initially participated in the process because of their interest in learning about the process for choosing a host community. This shows that communities that are still participating had higher interest in learning about the process for choosing a host community compared to excluded communities, that encouraged them to join the process. Communities that are still participating had a little higher interest in learning about the technology involved compared to excluded communities but not a huge difference. Two thirds of the communities that are still participating initially participated in the siting process because of their interest in learning about the technology involved. Five out of eight of the excluded communities initially participated in the siting process because of their interest in learning about the technology involved. This shows that both communities that are still participating and excluded communities had almost same level of interest in learning about the technology and that encouraged them to join the siting project.

Both communities that are still participating and excluded communities had very high interest in the benefits offered by the project but higher interest was shown in communities that are still participating. Almost all of the communities that are still participating initially participated in the siting process; because of being told about the benefits. Three quarters of the excluded communities initially participated in the siting process because of being told about the benefits. Only one community (Community 14) of the participating communities had initially participated in the siting process due to another factor. According to Community 14 the decision to participate was largely based on the social and economic impact that an additional industry would have on their small community.

The opted out community initially participated in the siting process because of their interest in learning about the technology involved, also being told about the benefits. This is consistent with the excluded communities by having the benefits factor the highest (3/4) and second learning about the technology (5/8). The highest interest factors for communities that are still participating to join the siting process were learning about the process for choosing a host community and being told about the benefits. The highest interest factor for excluded communities to join the siting process was being told about the benefits. For the opted out community the highest interest factors to join the siting process were learning about the technology involved and being told about the benefits.

Section 2: Analysis of open ended interview questions

Risk perceptions of the communities

Risk perception is evident at this stage of the process and can be noted in the open-ended interview responses. For example:

"Almost 100% rejection of this project on those bases; due to the number one important thing, due to limited educational standards in our community that is uninformed individuals, because this project is a very complex technological issue." (Community 2)

This suggests Community 2 did not understand the technology of the process that leads to a higher risk perception (Covello, Sandman, & Slovic, 2001) .

"We have a lot of seniors in this community (old school) so it takes more time to educate them because so much of people's decisions on nuclear waste are based on perceptions. Perceptions evolved through the years back in the late 40's when it was used as a bomb." (Community 3)

"But in learning more about it, it was a controversial subject because people in their mind they remember the bombing of Hiroshima. They were more in that mindset so the people were not ready for such a controversial topic". (Community 4)

Both communities demonstrate an "anchoring" effect (one of the heuristic devices in risk perceptions), because their perceptions are based on past events. Therefore, these perceptions are anchored to these past events and resist adjustment given new information.

"I think that there were numerous reasons that the NWMO decided to remove us from the list. I honestly felt that that the reasons they gave us were not exactly the reasons why we got eliminated but it was their decision". (Community 3)

This shows that Community 3 lacked trust in responsible authorities which leads to higher risk perception (Covello, Sandman, & Slovic, 2001).

"The science was ignored because that small group of people went around with misinformation (that is lies)." (Community 5)

This is an example of the affect heuristic.

"But I think initially, there was a lot of opposition because of lack of understanding about the project. We are a mining community, when they first talked about burying nuclear waste, people vision dumping it down in an old mine and bury it there." (Community 6)

Community 6 doesn't understand the technology of the process that leads to a higher risk perception (Covello, Sandman, & Slovic, 2001).

"Because of this project a lot of people will move to the area (especially young people) and that means more crime probably. They don't want the area disturbed by many people causing problems." (Community 7)

"People are not worried about the radiation (that is not the problem), rather worried about the new people coming in, but new people coming in and young people. These are old retires (retired people) they don't need more people." (Community 7)

"When new people come will bring benefits; economic benefits, like building houses, construction jobs. But this will bring social risk; like higher increase of crime and unplanned development that is a big concern." (Community 8)

"This region has a long history with the nuclear industry. But there is the issue of trust. Over the past few months, this issue came up more than once that is trust in the NWMO and government in general." (Community 8)

Communities 7 and 8 both demonstrated a social risk to the project. In addition, Community 8 lacks the trust in responsible authorities which leads to higher risk perception (Covello, Sandman, & Slovic, 2001).

"It is a social thing and stigma of having the community associated with a nuclear type of facility." (Community 14)

Community 14 risk perception is related to fair distribution of risks and benefits. According to Community 14 it is unfair to have the facility in their community which leads to higher risk perception (Covello, Sandman, & Slovic, 2001).

Preference of eliminated communities to stay

Some of the eliminated communities showed that they preferred to continue in the siting process. This was demonstrated in the interviews. For example:

"The overwhelming feedback I got from the public that they want to learn more about it before making a decision." (Community 1)

"I would think people probably had the opinion that yes we oppose the project, but with very basic information near the very beginning people kind of very quickly took a "we will wait and see attitude". (Community 1)

"It wasn't our decision, it was NWMO's decision like, through their siting process at the stage where we were at and they came to the determination that we were no longer good candidates. Our committee at that time, we were willing to continue, we would have continued in the site selection process." (Community 3)

"I was pushing for allowing the community enough time to be educated on this whole process and give an opportunity to say yes or no on this. Then, the NWMO can decide if majority of the community is in favor or against the project, and use it as part of their decision to eliminate or keep the community." (Community 3)

"The community needed more time to learn about the process and to be able to view concrete evidence to the facts (if it is safe?)." (Community 3)

"We disagreed with NWMO findings that Blind River and Elliot Lake are better; we are similar to them." (Community 8)

"We have decided to put in a draft ourselves as a neighboring community. Spanish community has become officially a neighboring community. North Shore community didn't realize they can apply too; they want to do it but didn't do it yet and support us as we go forward." (Community 8)

"The reason is that we got dropped from the process after all their studies (geological findings). They couldn't find a large enough safe spot to suit their needs. Unfortunately we were dropped from it." (Community 9)

All these eliminated communities showed that they would have preferred to not be eliminated by the NWMO and continue in the siting process because they needed more time to learn about the process and the benefits offered. This interest was shown by Community 8; when eliminated by the NWMO, it applied as a neighboring community in the process to get the chance to learn more about the benefits and continue to be part of the process.

The Communities' perceptions about their exclusion

Interview responses showed that some of the eliminated communities were not convinced by the reasons for their exclusion. For example:

"I think that there were numerous reasons that the NWMO decided to remove us from the list. I honestly felt that that the reasons they gave us were not exactly the reasons why we got eliminated but it was their decision. We got eliminated because of geography but they did not have definite evidence to that fact, they haven't done enough research. They haven't done any drilling, only desktop research to make that decision, but we had First Nations community not very far from our community, they are about 30-40 kilometers away and I think that was part of the problem because they were vocal, transportation wise that was another issue." (Community 3)

"There is a cost factor involved. You get at step 3 and they have to start spending a fair bit of money in each of the communities so they start shortlisting their communities or break the bank in terms of money that they need to do the research." (Community 3)

"No, we were shortlisted. It was a decision made by the NWMO, not our community itself. NWMO's decisions not to bring us forward to the next phase because they can't bring everybody forward because the next phase is costly, so they want to bring the best available forward." (Community 6)

"No, the NWMO eliminated us, and if we go for one more year then they need to give us more money, and didn't want put more money to our area. They want get away from local concerns. If there are native concerns they would make things difficult." (Community 7)

"We disagreed with NWMO findings that Blind River and Elliot Lake are better; we are similar to them." (Community 8)

The responses show that these communities did not agree with the reasons for their elimination. They thought that opposition and the cost were the main reasons for their elimination. This is also evident in the preliminary assessments as mentioned previously in the results analysis. According to the preliminary assessments and (Jonathon, 2015) , eliminated communities had lower community engagement and higher demonstrated concerns and opposition; while communities that are still participating had higher engagement in the process and supported their community in continuing in the siting process (In the NWMO's assessments none of the included communities were identified as having opposition). This suggests that all 8 communities may have been eliminated due to opposition in their communities and their

surrounding communities as well and that geological exclusion may have not been the significant reason for their exclusion.

This observation was also made by Anti-nuclear organizers, some community members and the group Northwatch. They concluded that towns with opposition to the siting of a nuclear waste facility were often identified as "geo-scientifically unsuitable" by the NWMO and eliminated from the list of potential hosts. They recognized that these communities were all eliminated when opposition about the project reached a discernible level (Cornwell, 2015). Moreover, according to Dave Taylor, the NWMO announced to the public that Community 9 was eliminated for geological reasons but in his view; opposition played an important role in its being excluded from the process (Jonathon, 2015).

Section 3: Perception Rating Responses

Table 7: Response chart to question 3

I feel like I have been a partner in the siting decision process. This question is meant to elicit whether people perceive their community as a partner in the siting process.

Question 3	
Communities that are still participating	
Community Name	Response Code*
Community 15	5
Community 12	5
Community 10	5
Community 14	5
Community 11	5
Community 13	4
Excluded Communities	
Community Name	Response Code*
Community 8	5
Community 1	5
Community 2 (First Nation)	5
Community 7	5
Community 9	5
Community 6	4
Community 4 (First Nation)	4
Community 3	4
Opted Out Community	
Community Name	Response Code*
Community 5	4

Responses to question 3 showed that communities that are still participating had more positive responses than excluded communities. Communities that are still participating felt more as partners in the siting process compared to excluded communities. In the participating communities only 1 out of 6 was somewhat less responsive. In the excluded communities 3 out

of 8 were somewhat less responsive. However, the opted out community did not have a strongly negative response.

Table 8: Response chart to question 4

I feel that when I have made comments about the best technology to dispose the nuclear waste, they have been taken into consideration. This question is meant to elicit whether people think they had the right to select the technology option.

Question 4	
Communities that are still participating	
Community Name	Response Code*
Community 11	5
Community 14	5
Community 10	5
Community 13	4
Community 12	4
Community 15	4
Excluded Communities	
Community Name	Response Code*
Community 9	4
Community 3	2
Community 4 (First Nation)	4
Community 7	5
Community 2 (First Nation)	2
Community 1	3
Community 8	3
Community 6	4
Opted Out Community	
Community 5	4

Responses to question 4 showed that communities that are still participating had more positive responses than excluded communities. Communities that are still participating felt more positive regarding the right to select the technology option compared to excluded communities. In the excluded communities 4 out of 8 had either marginal or negative views. However, the opted out community did not have a strongly negative response.

Table 9: Response chart to question 5

I think that a nuclear waste facility would increase job opportunities in our community. This question is meant to elicit whether people perceive benefits as high.

Question 5	
Communities that are still participating	
Community Name	Response Code*
Community 11	5
Community 14	5
Community 10	5
Community 13	4
Community 12	5
Community 15	5
Excluded Communities	
Community Name	Response Code*
Community 9	4
Community 3	5
Community 4 (First Nation)	5
Community 7	5
Community 2 (First Nation)	5
Community 1	5
Community 8	5
Community 6	4
Opted Out Community	
Community Name	Response Code*
Community 5	5

Responses to question 5 showed that all three groups of communities (communities that are still participating, excluded and opted out) had similar perceived benefits. Communities in all three groups had high perceived benefits, because at this stage in the process communities are still in discovery of the benefits that will be offered.

Table 10: Response chart to question 6

If any nuclear release were to happen, I expect the effects would happen far in the future. This question is meant to elicit whether people perceive effects in time as delayed effects.

Question 6	
Communities that are still participating	
Community Name	Response Code*
Community 11	4
Community 14	3
Community 10	4
Community 13	3
Community 12	5
Community 15	3
Excluded Communities	
Community Name	Response Code*
Community 9	3
Community 3	4
Community 4 (First Nation)	5
Community 7	5
Community 2 (First Nation)	5
Community 1	2
Community 8	3
Community 6	2
Opted Out Community	
Community Name	Response Code*
Community 5	5

Responses to question 6 showed that communities that are still participating had slightly more positive responses than excluded communities. Communities that are still participating perceive the consequences as long term compared to excluded communities. In the communities that are still participating 3 out of 6 communities had marginal views. In the excluded communities 4 out of 8 had either marginal or negative views. However, the opted out

community had a strongly positive response. The opted out community perceived the consequences as long term.

Table 11: Response chart to question 7

The risks of nuclear waste are well known in our community. This question is meant to elicit whether people perceive risks as known.

Question 7	
Communities that are still participating	
Community Name	Response Code*
Community 11	5
Community 14	2
Community 10	5
Community 13	3
Community 12	4
Community 15	4
Excluded Communities	
Community Name	Response Code*
Community 9	4
Community 3	4
Community 4 (First Nation)	4
Community 7	5
Community 2 (First Nation)	2
Community 1	3
Community 8	4
Community 6	4
Opted Out Community	
Community Name	Response Code*
Community 5	1

It is interesting that there is a wide range of responses. Responses to question 7 showed that in both groups (communities that are still participating and excluded) a small number had not learned enough to be certain of the risks. However, the opted out community had a strongly negative response. The opted out community perceived risk to be highly uncertain.

Table 12: Response chart to question 8

If there were to be an accident, I believe the emissions will be controlled by the NWMO operators. This question is meant to elicit whether people perceive risks as being controllable.

Question 8	
Communities that are still participating	
Community Name	Response Code*
Community 11	4
Community 14	5
Community 10	5
Community 13	2
Community 12	4
Community 15	4
Excluded Communities	
Community Name	Response Code*
Community 9	4
Community 3	5
Community 4 (First Nation)	4
Community 7	5
Community 2 (First Nation)	2
Community 1	4
Community 8	4
Community 6	4
Opted Out Community	
Community Name	Response Code*
Community 5	5

Responses to question 8 showed that communities that are still participating and excluded communities had the same perception for the controllability of risks. However, the opted out community had a strongly positive response.

Table 13: Response chart to question 9

If there were nuclear emissions, I do not believe they would produce additional long term illnesses. This question is meant to elicit whether people perceive effects as dreaded.

Question 9	
Communities that are still participating	
Community Name	Response Code*
Community 11	4
Community 14	3
Community 10	5
Community 13	3
Community 12	2
Community 15	3
Excluded Communities	
Community Name	Response Code*
Community 9	3
Community 3	4
Community 4 (First Nation)	2
Community 7	5
Community 2 (First Nation)	2
Community 1	2
Community 8	1
Community 6	2
Opted Out Community	
Community Name	Response Code*
Community 5	5

Responses to question 9 showed that communities that are still participating had more positive responses than excluded communities. Excluded communities had a higher perception that effects are dreaded compared to communities that are still participating. In the communities that are still participating only 1 out of 6 had a negative view. In the excluded communities 5 out of 8 had negative views and one of them is a strongly negative response. However, the opted out community had a strongly positive response.

Table 14: Response chart to question 10

I think it is fair for our community to accept some of the responsibility for storing the waste that is produced by the electricity we use. This question is meant to elicit whether people perceive fair distribution of benefits and risks.

Question 10	
Communities that are still participating	
Community Name	Response Code*
Community 11	5
Community 14	4
Community 10	5
Community 13	4
Community 12	4
Community 15	4
Excluded Communities	
Community Name	Response Code*
Community 9	4
Community 3	1
Community 4 (First Nation)	4
Community 7	5
Community 2 (First Nation)	2
Community 1	4
Community 8	4
Community 6	2
Opted Out Community	
Community Name	Response Code*
Community 5	5

Responses to question 10 showed that communities that are still participating had more positive responses than excluded communities. Communities that are still participating had a higher perception of fair distribution of risks and benefits compared to excluded communities. In the communities that are still participating negative views hadn't been expressed. In the excluded communities 3 out of 8 had negative views and one of them is a strongly negative response. However, the opted out community had a strongly positive response.

Table 15: Response chart to question 11

I think that the effects of an accident at the facility would not harm many individuals in our community, if any. This question is meant to elicit whether people perceive the risk souce can cause a disaster (catastrophic potential).

Question 11	
Communities that are still participating	
Community Name	Response Code*
Community 13	3
Community 15	4
Community 12	4
Community 10	4
Community 14	4
Community 11	4
Excluded Communities	
Community Name	Response Code*
Community 9	3
Community 3	5
Community 4 (First Nation)	2
Community 7	5
Community 2 (First Nation)	2
Community 1	5
Community 8	2
Community 6	4
Opted Out Community	
Community Name	Response Code*
Community 5	5

Responses to question 11 showed that communities that are still participating had more positive responses than excluded communities. Excluded communities had a higher perception that the risk source can cause a disaster compared to communities that are still participating. In the communities that are still participating negative views had not been expressed. In the excluded communities 3 out of 8 had negative views. However, the opted out community had a strongly positive response.

Table 16: Response chart to question 12

I believe this facility will provide safe disposal for our future generations. This question is meant to elicit whether people perceive effects on future generations.

Question 12	
Communities that are still participating	
Community Name	Response Code*
Community 11	5
Community 14	4
Community 10	5
Community 13	5
Community 12	5
Community 15	4
Excluded Communities	
Community Name	Response Code*
Community 9	4
Community 3	5
Community 4 (First Nation)	4
Community 7	5
Community 2 (First Nation)	5
Community 1	5
Community 8	4
Community 6	3
Opted Out Community	
Community Name	Response Code*
Community 5	4

Responses to question 12 showed that communities that are still participating had more positive responses than excluded communities. Communities that are still participating had a higher perception that future generations won't be affected compared to excluded communities. However, the opted out community did not have a strongly negative response.

Table 17: Response chart to question 13

I think if an accident were to happen, our children would be safe. This question is meant to elicit whether people perceive that children are specifically at risk.

Question 13	
Communities that are still participating	
Community Name	Response Code*
Community 11	4
Community 14	4
Community 10	5
Community 13	3
Community 12	3
Community 15	4
Excluded Communities	
Community Name	Response Code*
Community 9	4
Community 3	5
Community 4 (First Nation)	4
Community 7	5
Community 2 (First Nation)	2
Community 1	5
Community 8	3
Community 6	3
Opted Out Community	
Community Name	Response Code*
Community 5	5

Responses to question 13 showed that communities that are still participating had more positive responses than excluded communities. Communities that are still participating had a higher perception that the children would be safe compared to excluded communities. In the communities that are still participating 2 out of 6 expressed marginal views. In the excluded communities 3 out of 8 expressed either a marginal or negative views. However, the opted out community had a strongly positive response.

Table 18: Response chart to question 14

I think that the NWMO can be trusted to make the facility as safe as possible. This question is meant to elicit whether people trust the NWMO

Question 14	
Communities that are still participating	
Community Name	Response Code*
Community 11	5
Community 14	4
Community 10	5
Community 13	5
Community 12	4
Community 15	4
Excluded Communities	
Community Name	Response Code*
Community 9	5
Community 3	4
Community 4 (First Nation)	4
Community 7	5
Community 2 (First Nation)	5
Community 1	5
Community 8	3
Community 6	3
Opted Out Community	
Community Name	Response Code*
Community 5	5

Responses to question 14 showed that communities that are still participating had more positive responses than excluded communities. Communities that are still participating had a higher trust in the NWMO compared to excluded communities. In the communities that are still participating negative views had not been expressed. In the excluded communities 2 out of 8 communities expressed marginal views. However, the opted out community had a strongly positive response.

Chapter 6: Discussion

Reasons for the communities' involvement

According to the NWMO's preliminary assessments and Statistics Canada, all 15 communities involved in the NWMO siting process joined the project because they shared similar characteristics and had similar goals for their communities. All 15 communities faced the problem of youth and young family out-migration seeking better work opportunities. This resulted in the problem of population loss in most of these communities. Many of these communities had high unemployment rates. Most small communities in northern Ontario have historically been dependent on resource-based activities and have been going through "boom-bust" cycles (NWMO, 2013i). High rate of out-migration has happened in northern communities compared to other centers with better employment opportunities (NWMO, 2013i).

All 15 communities stated that their main goal was to retain youth in their communities and believed the project would help create work opportunities and diversify their economies. Therefore, community members believe work opportunities provided by the project will bring back their youth. Increasing population by retaining youth was identified as the main objective for these communities in joining the project.

Communities' participation and opposition

Of 15 communities, 6 are still participating, 8 have been eliminated and 1 had opted out. According to the NWMO's preliminary assessments of communities that are still participating, there is active participation of leaders and residents through their continued engagement in the

site selection process. Most of the citizens engaged in the process were interested in learning more and supported their communities' position to continue participating.

Many residents and leaders think that this project will help achieve the socio-economic growth and development needed for their communities. According to NWMO's assessments, these communities were interested to continue in the process to recognize the benefits and opportunities that will be offered by the project to their community and neighboring areas. Also, neighboring regions of the communities that are still in the process had showed initial interest demonstrated in the preliminary discussions held with these communities. These neighboring communities are also interested in the economic growth potential of the project coming to their area.

According to NWMO's assessments and (Jonathon, 2015) each of the excluded communities shared some or all of the following in comparison to the communities that are still participating: they had lower engagement in the process by community members, higher internal divisions about the siting process, higher concerns and opposition presented by these communities and their neighboring communities. Some of these concerns include concerns of Community 1. Community 1 demonstrated safety and security concerns regarding the project. Also, there were concerns related to the natural areas surrounding the community and its closeness to the shoreline expressed by Community 1 and its neighbors. Community 2 expressed concerns related to health, safety and environment. Community 4 as well showed concerns about this project related to health, safety and environment. Community 6 had concerns related to the natural environment and the community's ecotourism goals. Community 7 and 8 were concerned about keeping the rural and small town character preferred by the community.

According to the preliminary assessments, the highest opposition and internal division over the project were demonstrated in both Communities 2 and 4. Both communities are First Nations communities. It can be concluded that First Nations communities involved in the siting process were highly opposed to the project. However, only Community 5 opted out from the process; in that case town council of Community 5 decided to opt out from the siting process due to a group opposing the storage of high level radioactive waste in their community (tbnewswatch.com, 2014).

The importance of the potential benefits

All communities involved in the process expressed an interest to stay in to learn more about the project and to recognize the growth and development opportunities. According to the NWMO's preliminary assessments, all communities still participating are interested to continue in the process to recognize the benefits and opportunities that will be offered. Also, neighboring regions of those communities showed initial interest as demonstrated in the preliminary discussions they held with candidate communities about the economic growth potential for their area.

According to the NWMO's preliminary assessments, eliminated communities and their neighbors, although they were concerned about the project still expressed interest in learning more about growth and development opportunities. Surprisingly enough, eliminated communities with the highest opposition that included Communities 2 and 4 showed interest in the potential economic development despite their concerns about high levels of misinformation

and risks. All the communities involved in the siting process would have liked to learn about the potential benefits offered including communities with high opposition.

Familiarity with the nuclear industry

According to the preliminary assessments all excluded communities had been involved in mining activities but not as their primary industry. However, communities that are still participating are mainly based on the nuclear industry, for example Community 10, 12 and 15. The primary industry in Community 10 involves power generation at the nuclear site in the region. The nuclear industry is recognized by many residents as an important employment base for many households in Community 10 and the community population is influenced by activity levels at the site. The community is aware and approving of the nuclear industry and encourages investments in this local industry (NWMO, 2014e). The industry of Community 12 is mainly based on mining. Community 12 started as a mining community, and even after the mines in the community have closed, many citizens still work in the mines elsewhere in northern Ontario or elsewhere in Canada (NWMO, 2014g).

The nuclear industry is considered an essential employment driver for many households in Community 15 and the community population level is influenced by activity levels at the site. The relation to the nuclear industry has been recognized as an important factor for the community by residents in dialogue with the NWMO. Activities at a nuclear site in the area are an important basis of employment for some residents of Community 15. Therefore, the community has a high nuclear awareness and recognition of the risks and benefits of these activities (NWMO, 2014h).

This was also apparent in the community profile. Out of all excluded and opted out communities, only in Community 3 was resource based industry considered the primary industry (mining activities) (NWMO, 2013b). Most communities that are still participating consider the resource based industry (nuclear industry) as their primary industry and that includes Communities 10, 12, 13 and 15.

Risk perception

At this stage of a protracted siting process, communities are guided by their risk perceptions which affect their participation and support for or opposition towards this project. It is evident in the interviews that risk perceptions in eliminated communities were higher than in communities that are still participating. That is consistent with the preliminary assessments results as mentioned previously in the results analysis.

According to the preliminary assessments and (Jonathon, 2015) all eliminated communities had lower community engagement and higher demonstrated concerns and opposition; while communities that are still participating had higher engagement in the process and supported their community to continue in the siting process. In the NWMO's assessments none of the included communities were identified as having opposition. Therefore, it can be concluded that excluded communities had higher risk perceptions in comparison to communities that are still participating in the process.

However, this study shows a weak tendency to reflect risk perceptions, because risk perception differences among communities (communities that are still participating, excluded and opted out) at this stage of the siting process are small. In addition the small difference is also

due to the high perceived benefits for all different groups of communities (still participating, excluded and opted out).

Perceived benefits

At this stage generally communities are still interested in learning about the benefits offered by the project. The interviews also revealed the importance of this factor to these communities. The potential benefits were the main factor that interested all the communities to join the process. In addition, all communities interviewed revealed high perceived benefits. Some of the eliminated communities were disappointed to be eliminated by the NWMO and wanted to continue in the siting process because they needed more time to learn about the process and the benefits offered by the project.

In general, most communities, regardless of their risk perception, were interested to stay in to learn more about the potential benefits of the project for their community. This was shown in the preliminary assessments for the various communities including the ones with the highest opposition; Communities 2 and 4. Regardless of all the concerns and opposition expressed by opted out and eliminated communities; out of all the 21 communities involved in the siting process, only one community decided to opt out (Community 5). Some had very high demonstrated opposition but didn't want to opt out at an early stage of the process and lose the opportunity of investigating the benefits. For that reason it is evident in both the preliminary assessments and the interviews that they preferred to stay to investigate the benefits and were not satisfied with their exclusion.

This shows that risk perceptions of these communities cannot be considered alone to understand their behavior, without studying the effect of the potential benefits factor. It appears at this stage that the benefit factor is more effective than risk perception in determining the communities' decisions. The study by (Chung & Kim, 2009) examined the factors of the local acceptance for a radioactive disposal repository in Korea. These factors include: perceived economic benefit, risk perception, trust and perceived competition. This study showed that the most important factor of all factors was perceived economic benefits. The benefits factor was more important than potential risks for the residents of Gyeongju city in Korea. This study show that risk perceptions shouldn't be considered alone but should be taken into account with the perceived benefits and it have revealed that perceived benefits have more effective role than risk perception in understanding acceptance of the nuclear facility (that is contrary to western studies that focuses on risk perceptions).

Familiarity with the nuclear industry

It is evident that all excluded and opted out communities are mining communities but that mining was not their primary economic activity (except for Community 3). Therefore, they are somewhat familiar with the nuclear industry that encouraged them to participate in the process but not as highly familiar with it in comparison to the communities that are still participating and consider it their primary industry. Therefore, communities that are still participating and have the nuclear industry as their primary industry have lower risk perceptions and higher perceived benefits (Covello, Sandman, & Slovic, 2001).

As a result of less familiarity with the nuclear industry; some excluded and opted out communities revealed higher opposition in comparison to the communities that stayed in the process and eventually got excluded or opted out (Community 5). That is consistent with the studies of (Baxter & Lee, 2004) and (Jenkins-Smith, Silva, Nowlin, & deLozier, 2011) who found perceived risks are reduced and acceptance of the facilities increased when local residents are familiar with the technology.

At this stage, the siting process is left with communities that are most familiar with the nuclear industry and have it as their primary industry. This will lead to higher siting success since higher familiarity with the risk source leads to lower risk perception (Covello, Sandman, & Slovic, 2001). However, this study is not concluding the final outcome of this process. Since the process is still on-going and the final result is still unknown.

Siting principles of a voluntary process

In order to understand if the approach followed by the NWMO is a voluntary siting process, it is important to compare it to the principles and safeguards of a voluntary process by (Armour, 1992). The widely recognized model of voluntary siting was developed by Armour. In it, the proposed 5 principles and 5 safeguards of a cooperative voluntary siting process. These principles and safeguards were mentioned previously in the literature review and methods sections. The first principle is that the community must volunteer and have the right to opt-out at any time. This principle applies to the NWMO because all communities got involved in the process are volunteers and have the right to opt out at any time until the final agreement is signed (Community 5 opted out) (NWMO, 2014a). The second is that the community should be a

partner during the process in problem-solving and decision-making. Referring to question 3, Table 7 the responses were high for this question and that shows that these communities felt they were partners in the siting process. Communities that are still participating had the highest response and felt more as a partner, while the opted out community felt the least as a partner out of all communities.

The third principle is that Compensation and reward are given to the community for accepting the risk. This principle cannot be judged at the moment since the communities are only given an estimate of the benefits. The actual benefits have not been discussed yet (NWMO, 2010f). The fourth is that the community has the opportunity to select technology options and risk management measures. This principle has been partially applied in this case because the NWMO discussed these options with Canadians in general in different provinces and not specifically with the communities that participated in the site selection process (NWMO, 2010c). This is also supported by the result of question 4, Table 8 which shows lower results in comparison to question 3 (regarding principle 3). Communities had lower responses and more extreme values in comparison to question 3. Opted out and eliminated communities had extreme lower values than communities that are still participating. Principle 5 is to assure the community that human & environmental health is maintained for every site. Therefore, a community will not be accepted as a volunteer if safety is not maintained. According to the NWMO, this criterion has been followed as they have excluded some communities for technical and geological reasons to maintain their safety.

Regarding the safeguards, first disclosure of Impact management options at the initial stages of the process confirms transparency. Impact management options may include compensation and negotiated agreements (Armour, 1992). These options were not offered by the

NWMO at the early stages. Therefore, this safeguard does not apply to the NWMO. In addition, many participants stated that the NWMO was not transparent in its decisions and not convinced by the reasons given for their exclusion. Referring to the results section; some of the eliminated communities were not convinced the reasons for their exclusion were valid; that includes Communities 3,6,7,8 (as mentioned in the interviews). These communities did not agree with the reasons for their elimination and thought that opposition and the cost factor were the main reasons for their elimination. According to the preliminary assessments and (Jonathon, 2015) all 8 communities were eliminated because opposition was observed in their communities and their surrounding communities as well. Therefore, geological exclusion doesn't reveal significant reasoning for exclusion. This was mentioned directly by Community 3 about transparency:

> "I found NWMO, they were very very conservative and seemed to shy away from any confrontation and did not want be involved in any confrontation. So as far as I was concerned, a lot of their decisions weren't transparent. So we feel we weren't being told everything that we should be or informed of".

In Armour's second safeguard the community hires its own advisors to inform them about risks. According to the NWMO, communities at step 2 can ask for and receive resources (funding and information) from the NWMO for requesting independent expert advice regarding the project and/or the results of the multiple site screening and site evaluation stages (NWMO, 2010c). This shows that the second safeguard applies to the NWMO. Armour's third safeguard is performing site and technology assessments jointly with the community helps increase trust and focus on the communities concerns. Since the NWMO siting process is still on-going it is hard to examine this factor at this moment.

The fourth safeguard is when the community is represented by a broadly-based citizen liaison group in the decision-making process; that is able to understand the interests and concerns

of their community. The NWMO encouraged the involved municipalities to found a "community liaison committee" in step 3 of the siting process (NWMO, 2010h) and these members were interviewed in this study. The fifth safeguard is when participation is paid by the responsible authority; the community does not go through immediate loss. This safeguard was applied by the NWMO because the NWMO provides a budget to the CLCs to cover the administrative costs of a CLC, and the salary for a halftime administrative assistant. Funding is also available for other activities as well (NWMO, 2013m).

At this stage it is hard to evaluate the NWMO's siting process since it is still on-going and not all criteria can be examined. At this point it seems that the NWMO's siting process is almost ideal but does not completely follow all the principles and safeguards according to (Armour, 1992). The NWMO's process didn't satisfy the fourth principle because the involved communities did not get the chance to select the technology option. In addition, the NWMO was not transparent enough in its decisions. At this stage it can be concluded that the NWMO's siting process is not ideal.

Chapter 7: Conclusion

This study set out to examine an on-going case study of communities that have been involved in the NWMO's nuclear facility siting. It sought to know whether communities' risk perceptions regarding nuclear waste influenced the current siting choices being made; for communities to stay in the process, be excluded or opt out. This study fills a gap in the literature in that opted out and excluded communities have not been asked about the effects of their perceptions on not being included in the siting process for nuclear waste facilities. This study aimed to: 1- Examine whether communities no longer participating (including being eliminated and having opted out) had higher perceptions of risk in comparison to communities that are still participating. 2- Discover the influences of other factors on communities to stay in the process or stop participating. 3- Evaluate whether the siting process is consistent with the siting principles of a cooperative model. This study answered these questions: 1- Eliminated communities mostly had higher risk perceptions compared to communities that are still participating. On the other hand, opted out communities had lower risk perceptions. 2- Perceived potential benefits are the main factor controlling the communities' decisions at this stage. 3- The siting process is not perfectly consistent, but similar to Armour's model at this stage.

I expected to find an early affective response but I did not find a strong affective response in my results. The results revealed that communities' decisions (to stay in the process, opt out, being eliminated) have been affected partially by their risk perception that is shown in both the interviews and the NWMO's preliminary assessments. It is evident that several of the communities that are still participating have lower risk perceptions than communities that are not

participating. However, the difference in risk perceptions at this stage is small due to the small sample size and the effect of the perceived benefits factor.

The effect of perceived benefits is larger at this stage in the process than risk perceptions on community's decisions. That is apparent by the high perceived benefits for all interviewed communities. High perceived benefits by all communities are due to the fact that actual benefits are still unknown. Therefore, communities do not want to lose the opportunity of investigating the benefits that might be offered by the project. Regardless of opposition, none of the communities decided to opt out (except Community 5) to learn more about the benefits. It is clear that perceived potential benefits are the main factor controlling the communities' decisions at this stage. It is important to note that this might not be the main factor affecting community decisions at later stages of the process as the communities get the chance to learn more about the process and the actual benefits that are being offered.

The process carried by the NWMO has not followed all the principles and safeguards of a cooperative process according to (Armour, 1992) at this stage. The NWMO's siting process has applied most of the principles and safeguards but failed on the selection of technology options by the involved communities and the process was not transparent. In addition some criteria were hard to evaluate at this stage. It can be concluded that the NWMO's voluntary siting is not ideal at this point of time.

Although this study cannot shed light on revealing which community will be the final candidate; it does suggest that the final candidate will be highly familiar with the nuclear industry. However, since this study is an on-going process, the results found at this stage may change in regard to the main factors determining communities' decisions, and if the siting

process is voluntary as claimed by the NWMO. Future research on this topic may include examining the validity of the geological exclusions by the NWMO, and studying the relation between exclusions and levels of opposition.

Appendices

Appendix 1: The NWMO nine steps site selection process

The nine-step site selection process starts from communities learning about the project to construction and finally operational repository. In step 1 of the process, the NWMO starts the siting process with a program to educate the public, answer questions and ensure that Canadians are aware about the project and the siting process (NWMO, 2010a). This project is an open invitation process for all Canadian communities (NWMO, 2013a). It is driven by interested Canadian communities (Holt, 2012). The NWMO did not approach the Canadian communities (Holt, 2012). The siting process started with information mailings, briefings and activities to help build awareness and understanding of the NWMO, the project, steps in the siting process and the criteria to evaluate suitability of potential host communities (NWMO, 2010l).

The NWMO worked on building awareness by participating in the Federation of Canadian Municipalities (FCM) that represents all Canadian municipalities (Parliament of Canada, 2010). All Canadian provinces were welcomed to participate in the project (Parliament of Canada, 2010). However, the NWMO will focus its activities on nuclear provinces (Ontario, Quebec, New Brunswick, and Saskatchewan), including municipalities, the broad public, interested individuals and organizations, and First Nations, Métis and Inuit who have expressed interest in learning more about the process. Saskatchewan is involved in the nuclear industry through uranium mining, which is used in the fabrication of nuclear fuel (NWMO, 2013a). Ontario, Quebec and New Brunswick are involved by using nuclear power plants to produce electricity (NWMO, 2013a). The information shared in the educational program is posted on the

NWMO website for the public knowledge. This kind of activity will continue throughout the site selection process (NWMO, 2010c).

In step 2, communities express their interest in learning more (NWMO, 2010a). As a result, the NWMO provides detailed briefings and an initial screening is conducted. A community identifies interest in learning more about the process by sending a request to the NWMO (NWMO, 2010l). In terms of expressing interest, "community" is defined as a political structure such as a city, town, village, municipality, region or other municipal structure, Aboriginal government or a combination of these. The request must be sent by responsible authorities (for example, elected representative bodies). This can involve existing municipal council of a community, Aboriginal government, the community establishing a new group including community leaders, or other group considered appropriate by the community for learning more about the project (NWMO, 2010l).

The NWMO assesses potential suitability of an interested community against a list of initial screening criteria. Initial screening of the potential suitability of the community depends on available information and a short list of initial screening criteria; that will be completed in 2 to 3 months. The community will be excluded from the process if it does not meet all the requirements set out in the initial screening criteria at this stage. Third-party review is optional; it will take place based on the community request (NWMO, 2010c).

Afterwards, The NWMO provides a detailed briefing or multiple briefings about the project and the steps in the process to responsible authorities in communities that are interested and not excluded in the initial screening. Communities with potentially suitable sites decide whether they are interested in continuing to the next step (preliminary assessment) (NWMO,

2010l). The NWMO will support the communities beginning with this step. The community at this step can ask for and receive resources (funding and information) from the NWMO for: 1) requesting independent expert advice regarding the project and/or the results of the multiple site screening and site evaluation stages; 2) enhancing long-term vision for sustainability; and 3) Performing activities to inform residents and evaluate interest in the project, in the community (NWMO, 2010c).

In step 3, a preliminary assessment of potential suitability will be conducted for communities that continue to be interested (NWMO, 2010a). The community notifies the NWMO of its interest in performing a preliminary assessment of its potential suitability. A community, through its responsible authorities represent and communicate with the NWMO on behalf of the communities to request preliminary information (in the form of a feasibility study) to check if a geographic area or specific sites in the community have the potential to meet the more detailed requirements for the process. The NWMO performs feasibility studies in collaboration with the community to evaluate whether the community has potentially suitable sites (NWMO, 2010l).

The NWMO and responsible authorities from the community develop a memorandum of understanding; determining in it the scope of work, the method by which the NWMO and the community will work together through the feasibility studies, terms of reference for the third-party review process, the method that citizens will be engaged, and the nature of the funding provided by the NWMO to the community to maintain the process. Preliminary assessments conducted by the NWMO will include both phase 1 and phase 2 (NWMO, 2010l).

Phase 1 of Preliminary Assessments: Assessments have been concluded for all communities that successfully completed an Initial Screening and expressed an interest in conducting a Preliminary Assessment (NWMO, 2013a). This phase includes desktop studies to assess the potential to meet safety requirements, and involves studies of engineering, geo-scientific suitability, environment and safety, and transportation. Moreover, this phase includes community-learning about the project, engagement and consideration on the potential for the process to encourage the well-being of the community and fit with its long-term goal. Working with communities in this phase evaluates early indications if it would be possible to maintain interest in learning through following phases of work. This phase starts to engage surrounding communities and Aboriginal people in a discussion about the project that would continue in future steps as well. This phase of work will be concluded in a year or more (NWMO, 2013a).

Starting in 2014, Phase 2 Preliminary Assessments will take from three to four years with a smaller number of interested communities (NWMO, 2013a). In this step, field studies will begin, community-focused engineering and design studies will progress, and engagement will be expanded. Building on earlier studies, phase 2 will involve: preliminary geo-scientific and environment-focused field studies; preliminary safety assessments; more detailed social, economic and cultural studies; awareness building and reflection by the interested community; and broadening of participation to involve nearby communities and Aboriginal peoples in learning and assessment of area suitability by holding discussions about the potential suitability of the community and the site, and interest in hosting the project to confirm that their issues and concerns are addressed. This engagement will continue throughout the siting process (NWMO, 2013a).

The NWMO will publish on its website the results of the feasibility studies, the results of the third-party review and its conclusions on the extent to which sites within the proposed areas are considered appropriate (NWMO, 2010c). Communities with potentially suitable sites evaluate if they are interested in continuing to detailed site evaluation. For communities that decide not to continue participating by not conducting a preliminary assessment, their involvement will end in the siting process (NWMO, 2010c).

At the beginning of this step, the community (responsible authorities) can demand and receive resources (funding and information) from the NWMO for: 1) founding a community office for the project; and, 2) performing activities to inform residents and evaluate interest in surrounding areas, including First Nations, Métis and Inuit as required. Beginning with this step, the NWMO will make funding available to accountable authorities in potentially affected surrounding areas, including First Nations, Métis and Inuit, to support their involvement (NWMO, 2010l).

The NWMO encourages the involved municipalities to found a "community liaison committee" in step 3 of the siting process (NWMO, 2010h). These committees are appointed by the municipality. The NWMO provides a budget to the committees. The committees have an advisory role for both NWMO and the municipality (NWMO, 2013m). The Community liaison committees (CLCs) are independent of the NWMO and include only local residents (NWMO, 2010h). They represent some of the host communities; hold monthly meetings and some NWMO staff join each meeting (NWMO, 2013m).

CLCs are responsible to help local residents learn about the process and encourage them to be involved in the project. Their role involves planning open houses, informing residents

about ongoing studies and new information when it becomes available; ensuring that residents' concerns are taken into consideration, tailoring information sessions to meet local needs and include the whole community in learning about the process (NWMO, 2013m).

Interested communities deciding to move into Step 3 may ask the NWMO for funding to cover the administrative costs of a CLC, and the salary for a halftime administrative assistant. Funding is also available for other activities as well. Each community's Council establishes the committee's mandate, and members are selected by the Council. Committees usually meet at least once a month, and all their meetings are open to the public. Two of the ways the CLCs keep their communities informed about the site selection process are newsletters and websites. Local residents wanting to learn more can achieve this by posting questions to their CLC's website, attending its meetings or dropping by their local office (NWMO, 2013m).

In step 4, communities that surround the interested communities, which might be impacted by the nuclear facility siting are involved in the process if they have not been already, and detailed site evaluations are finalized (NWMO, 2010a). Responsible authorities; representing communities with potentially suitable sites notify the NWMO of their interest to continue in a detailed site evaluation. These authorities express formal interest in being considered for the project and ask for detailed evaluation of their suitability (NWMO, 2010l). At a certain point during the siting process, the NWMO will declare the closing of the formal expression of interest phase, a minimum of six months' notice in advance of the closing date. The NWMO will choose one or more suitable sites from communities expressing formal interest for regional study and/or detailed multi-year site evaluations. For potentially suitable communities not interested in continuing, their participation in the siting process ends (NWMO, 2010l).

The NWMO performs multi-year, detailed site evaluations, in cooperation with the community to further evaluate and confirm the suitability of sites (NWMO, 2010c). The NWMO will conduct detailed field investigations including geophysical surveys, description of the existing environment, drilling and sampling of boreholes, field and laboratory testing and monitoring activities over a 5-year period at the site. The NWMO will also perform studies to identify and evaluate the potential environmental, social, economic and cultural effects related with implementing the project in the community. The NWMO will announce on its website the results of the detailed investigations and its conclusions on the suitability of the proposed sites (NWMO, 2010c).

A center of expertise is founded at or near the potential site. A center of expertise will be established in each community with a site under consideration, or nearby as decided with the community, to support the multi-year testing and assessment of the site on technical safety and community well-being (NWMO, 2010l). Technical and social research will take place in these communities. In addition technology demonstration program will take place. The technology demonstration program will include researchers and other experts in various areas including geoscience, engineering, and environmental, social, economic and cultural impact assessment. The center of expertise will engage members of the community to learn more about the project, and to see the scientific and engineering work related to site assessment in progress through public viewing galleries and interactive displays (NWMO, 2010c). In cooperation with the community, the center of expertise could be established to include a small science center concerned with the design, construction and implementation of a deep geological repository and various related activities, a meeting place and learning center for the community, and a

destination for visitors from the region and outside. Communities with confirmed suitable sites evaluate if they are willing to accept the project (NWMO, 2010c).

The NWMO will work with the community to involve potentially affected surrounding communities (that includes potentially affected municipal and/or Aboriginal governments, and the provincial government) in a study of the environmental, social, economic and cultural effects at the wide regional level related with locating the project (NWMO, 2010l). This would involve effects that can be related with transportation and potential transportation methods and routes. The NWMO will establish preferred transportation methods and potential routes and will encourage communities along the transportation route to raise questions or concerns to be discussed in the process (NWMO, 2010l).

Communities with confirmed suitable sites evaluate if they are willing to accept the project, by engaging the community to evaluate and reveal their willingness. In this step, the NWMO will provide funding to communities along the transportation route to obtain independent advice that can help them in formulating questions or concerns to be discussed in the process (NWMO, 2010c).

In step 5, Communities with confirmed suitable sites decide if they want to accept the project and propose the terms and conditions on which they would have the project proceed (NWMO, 2010a). The NWMO requires an accountable decision-making body to send a formal expression of interest, supported by a compelling proof of willingness among citizens living in the local area. Communities that are unwilling or cannot show willingness in a compelling manner will stop participating in the siting process (NWMO, 2010l).

The community makes and offers to the NWMO the terms and conditions on which they would like the project to proceed (NWMO, 2010c). These terms may include the methods by which the NWMO and community will work together through the regulatory approval process and the implementation of the project; the nature of providing resources for technical review and other assistance; the nature of any decision-making and/or advisory bodies to support the process; methods to be used for dispute resolution; approach that would be followed through the project to ensure the long-term sustainability and well-being of the community, determining specific inclusions; and approach to managing impacts related to the project (NWMO, 2010c).

In step 6, the NWMO and the selected community sign a formal agreement to host the facility (NWMO, 2010a). The NWMO chooses a final preferred site. The preferred site will be one that can prove to be able to safely store and isolate used nuclear fuel, protecting humans and the environment over the long run (NWMO, 2010l). Locating the facility at the preferred site will ensure the local community well-being. The NWMO and community confirm the formal agreement to host the project. The accountable decision-making body signs a formal agreement with the NWMO based on the conditions under which the project will proceed, subject to all regulatory requirements being met and regulatory approval received. Representatives chosen by local and regional governments and Aboriginal organizations that are affected are appointed to the NWMO Advisory Council (NWMO, 2010l).

In step 7, Regulatory authorities review the results of the site assessment and the safety of the project through an independent, formal and public process and, if all requirements are met, give their approvals to proceed (NWMO, 2010a). In order for construction to take place, the NWMO will have to confirm that the project meets or exceeds strict regulatory criteria to

maintain the health, safety and security of Canadians and the environment according to Canada's international commitments on the peaceful use of nuclear energy (NWMO, 2010c).

The requirements established by regulatory authorities for this project have been included in the criteria. The criteria that are used to evaluate the suitability of potential sites from the beginning of the siting process (NWMO, 2010c). The regulatory review will include the documentation produced to address earlier steps in the siting process, as well as other documentation that might be required. The project will advance only after all regulatory approvals are achieved (NWMO, 2010l).

The regulatory process may develop over time (NWMO, 2010c). It currently involves the following components in evaluating the safety and acceptability of the project (each step provides the public an opportunity to participate): The execution of the deep geological repository will be regulated under the Nuclear Safety and Control Act and its related regulations. This project will undergo the Canadian Nuclear Safety Commission's (CNSC) comprehensive licensing system (NWMO, 2010c). This system covers the full lifetime of the deep geological repository – from site preparation, construction, operation and decommissioning. This approach will require a license for each phase of the project. Once a site has been chosen as the final site, the NWMO will submit an application for a license to the CNSC to prepare the site, or both prepare the site and construct (NWMO, 2010c).

A licensing decision by the CNSC will take place only after the successful completion of the environmental assessment process (NWMO, 2010l). The environmental assessment, involving public hearings, would be done under the Canadian Environmental Assessment Act to confirm that the project will not cause major harmful environmental effects throughout the

project. When the license is issued, the regulator will oversee the project through site inspections and audits to ensure regulatory compliance. After the facility construction, the NWMO will need to submit an operating license application to the CNSC, including a public hearing. Moreover, different modes of transport that will be used for transporting used nuclear fuel will require regulatory approval (NWMO, 2010l).

In step 8, Construction and operation of an underground demonstration facility proceeds (NWMO, 2010a). The NWMO will start implementing the project, after achieving the construction license. The NWMO will begin the construction and operation of an underground demonstration facility. The aim of building an underground demonstration facility is to confirm the characteristics of the site before construction of the deep geological repository (NWMO, 2010c). The center of expertise will be responsible for including and supporting the construction and operation of the underground demonstration facility. The deep geological repository for nuclear waste in Canada will become a hub for knowledge-sharing in Canada and internationally. The center of expertise design details will be established with the community and the surrounding region with their preferences taken into consideration (NWMO, 2010c).

In step 9, Construction and operation of the facility starts (NWMO, 2010l). The NWMO begins construction of the deep geological repository and related surface facilities. Afterwards, operation will take place after attaining an operating license. The NWMO will continue working in cooperation with the host community to ensure that the needs of the community and the terms of the agreement continue to be met throughout the entire time of construction, operation and closure of the facility (NWMO, 2010l).

Appendix 2: Community Characteristics

Excluded Communities:

Community 1 profile: Community 1 is a township located in Ontario. According to the 2006 Community Profiles; Community 1 had a population of 901 (Statistics Canada, 2007a). 2001 to 2006 population change (%) was -37.8. 2006 to 2011 population change (%) was 25.0 (Statistics Canada, 2012n). In 2006, Community 1 had 900 Canadian citizens (Statistics Canada, 2007a). 190 Canadian citizens aged under 18 and 710 Canadian citizens aged 18 and over. 81.1% of the population aged 15 and over. Median age of the population was 42.9. 10 people indicated being aboriginal. The employment rate for the total population aged 15 years and over by labor force status was 45.6. Unemployment rate was 19.0. All private households' median income in 2005 was 46,680 ($). Persons 15 years and over median income in 2005 was 28,524 ($). Percentage of all Persons in low income after tax was 2.8%. Many residents have been working in the mining, railway and forestry industries and the community has been influenced by the "ups and downs" in these industries (NWMO, 2013d). The main source of employment was Business services and other services, second was manufacturing and third was Retail trade (Statistics Canada, 2007a). Total population aged 15 years and over was 745. Total population aged 15years and over by High school certificate or equivalent was 215. Total population aged 15years and over by Apprenticeship or trades certificate or diploma were 70. Total population aged 15years and over by College, CEGEP or other non-university certificate or diploma was 110. Total population aged 15years and over by University certificate or diploma below the bachelor level was 35. Total population aged 15years and over by University certificate, diploma or degree was 75.

Total population aged 15years with no certificate, diploma or degree was 240 (Statistics Canada, 2007a).

Aboriginal neighbors of community 1: There are some Aboriginal communities and organizations in this area, including Biinjitiwaabik Zaaging Anishinaabek (Rocky Bay First Nation), Fort William First Nation, Gull Bay First Nation, Ojibways of the Pic River First Nation, Pays Plat First Nation, Red Rock First Nation and Sand Point First Nation (NWMO, 2013d). Métis Councils in the area include Greenstone Métis Council, Superior North Shore Métis Council and Thunder Bay Métis Council as represented by Lakehead/Michipicoten/Nipigon Traditional Territory Consultation Committee and the Métis Nation of Ontario. The closest aboriginal community is Pays Plat First Nation (Government of Canada, 2012).

Community 2 profile: Community 2 is a northern village located in Saskatchewan. According to the 2006 Community Profiles; Community 2 had a population of 1,076 (Statistics Canada, 2007b). 2001 to 2006 population change (%) was 3.7. 2006 to 2011 population change (%) was -9.1 (Statistics Canada, 2012m). In 2006, Community 2 had 1,075 Canadian citizens (Statistics Canada, 2007b). 525 Canadian citizens aged under 18 and 550 Canadian citizens aged 18 and over. 58.3% of the population aged 15 and over. Median age of the population was 18.5. 1,045 people indicated being aboriginal. The employment rate for the total population aged 15 years and over by labor force status was 36.5 (Statistics Canada, 2007b). Unemployment rate was 22.4. All private households' median income in 2005 was 41,856 ($). Persons 15 years and over median income in 2005 was 15,344 ($). Percentage of all persons in low income after tax was 14.0%. Many residents of Community 2 are currently working in uranium mining, municipal administration, education, health and social services (NWMO, 2013k). The main source of

employment was educational services, second was Agriculture and other resource-based industries and other services and third was health care and social services. Total population aged 15 years and over was 630. Total population aged 15years and over by High school certificate or equivalent was 75. Total population aged 15years and over by Apprenticeship or trades certificate or diploma were15. Total population aged 15years and over by College, CEGEP or other non-university certificate or diploma was 40. Total population aged 15years and over by University certificate or diploma below the bachelor level was 10. Total population aged 15years and over by University certificate, diploma or degree was 40. Total population aged 15years with no certificate, diploma or degree was 445 (Statistics Canada, 2007b).

Aboriginal neighbors of community 2: There are some Aboriginal communities and organizations in this area, including Lac La Ronge Indian Band, Birch Narrows First Nation, Buffalo River Dene First Nation, Canoe Lake First Nation, Clearwater River Dene Nation, English River First Nation, Flying Dust First Nation, Makwa Sahgaiehcan First Nation, Ministikwan Lake First Nation (formerly known as Island Lake First Nation) and Waterhen Lake First Nation; all are signatories to Treaty 6, 8 or 10 (NWMO, 2013k). Métis Locals in the area include Kineepik – Pinehouse #9, Beauval #37, Canoe River #174, Cole Bay #41, Patuanak #82 and Sakitawak – Île-à-la-Crosse #21; all are located within Métis Nation Saskatchewan Northern Region III (NWMO, 2013k). The closest is English River First Nation (Government of Canada, 2012).

Community 3 profile: Community 3 is a township located in Ontario. According to the 2006 Community Profiles; Community 3 had a population of 1,153 (Statistics Canada, 2007c). 2001 to 2006 population change (%) was 0.3. 2006 to 2011 population change (%) was -11.0 (Statistics Canada, 2012l). In 2006, Community 3 had 1,140 Canadian citizens (Statistics Canada, 2007c).

255 Canadian citizens aged under 18 and 885 Canadian citizens aged 18 and over. 81.3% of the population aged 15 and over. Median age of the population was 39.1. 115 People indicated being aboriginal. The employment rate for the total population aged 15 years and over by labor force status was 73.0. Unemployment rate was 2.8 (Statistics Canada, 2007c). All private households' median income in 2005 was 70,293 ($). Persons 15 years and over median income in 2005 was 39,149 ($). Percentage of all persons in low income after tax was 3.5%. Community 3 had been involved in forestry and mining activities (NWMO, 2013c). The main source of employment was agriculture and other resource-based industries and other services, second was manufacturing and third was business services (Statistics Canada, 2007c). Total population aged 15 years and over was 945. Total population aged 15years and over by High school certificate or equivalent was 310. Total population aged 15years and over by Apprenticeship or trades certificate or diploma were140. Total population aged 15years and over by College, CEGEP or other non-university certificate or diploma was 210. Total population aged 15years and over by University certificate or diploma below the bachelor level was 35. Total population aged 15years and over by University certificate, diploma or degree was 45. Total population aged 15years with no certificate, diploma or degree was 205 (Statistics Canada, 2007c).

Aboriginal neighbors of community 3: There are some Aboriginal communities and organizations in this area, including Asubspeeschoseewagong Netum Anishinabek (Grassy Narrows First Nation), Eagle Lake First Nation, Lac Seul First Nation, Wabaseemoong Independent Nations (Whitedog First Nation) and Wabauskang First Nation (NWMO, 2013c). Métis Councils in the area include Kenora Métis Council, Northwest Métis Council, Sunset Country Métis Council, and Atikokan and Area Métis Council as represented by Lake of Woods/Lac Seul, Rainy Lake/Rainy River and Treaty 3 Traditional Territory Consultation

Committee and the Métis Nation of Ontario (NWMO, 2013c). The closest is Wabauskang First Nation (Government of Canada, 2012).

Community 4 profile: Community 4 is a community located in northern Saskatchewan. According to First Nation Detail; In 2006 Community 4 had a population of 665 (Aboriginal Affairs and Northern Development Canada, 2014). 2006 to 2011 population change (%) was -9.8. Median age of the population was 26.1. 625 People were registered Indian. The employment rate for the total population aged 15 years and over by labor force status was 24.7. Unemployment rate was 36.1. Average total income of all persons with income in 2006 was 16,942 ($). All private households' median income in 2006 was 27,584 ($). Community members are employed in education, housing, health and social services, outfitters and at regional uranium mines (NWMO, 2013f). The main source of employment was other services, second was health, education and third was agriculture, resource based. (Aboriginal Affairs and Northern Development Canada, 2014) Total population aged 15 years and over was 465. Total population aged 15years and over by High school certificate or equivalent was 65. Total population aged 15years and over by Apprenticeship or trades certificate or diploma were 75. Total population aged 15years and over by College, CEGEP or other non-university certificate or diploma was. Total population aged 15years and over by University certificate or diploma below the bachelor level was zero. Total population aged 15years and over by University certificate, diploma or degree was 20. Total population aged 15years with no certificate, diploma or degree was 295 (Aboriginal Affairs and Northern Development Canada, 2014).

Aboriginal neighbors of community 4: There are some First Nation communities and organizations in this area, including Birch Narrows First Nation, Buffalo River Dene First Nation, Canoe Lake First Nation, Clearwater River Dene Nation, Flying Dust First Nation,

Makwa Sahgaiehcan First Nation, Ministikwan Lake First Nation (formerly known as Island Lake First Nation) and Waterhen Lake First Nation; all are signatories to Treaty 6, 8 or 10 (NWMO, 2013f). Métis Locals in the area include Patuanak #82, Beauval #37, Canoe River #174, Cole Bay #41, Kineepik – Pinehouse #9 and Sakitawak – Île-à-la-Crosse #21; all are located within Métis Nation-Saskatchewan Northern Region III (NWMO, 2013f). The closest is Buffalo River Dene First Nation (Government of Canada, 2012).

Community 6 profile: Community 6 is a municipality in Ontario. According to the 2006 Community Profiles; Community 6 had a population of 3,204 (Statistics Canada, 2007e). 2001 to 2006 population change (%) was -12.6. 2006 to 2011 population change (%) was -7.1 (Statistics Canada, 2012j). In 2006, Community 6 had 3,155 Canadian citizens (Statistics Canada, 2007e). 735 Canadian citizens aged under 18 and 2,420 Canadian citizens aged 18 and over. 81.7% of the population aged 15 and over. Median age of the population was 40.6. 275 People indicated being aboriginal (Statistics Canada, 2007e). The employment rate for the total population aged 15 years and over by labor force status was 60.2. Unemployment rate was 6.6. All private households' median income in 2005 was 58,771($). Persons 15 years and over median income in 2005 was 28,715 ($). Percentage of all persons in low income after tax was 8.9 (Statistics Canada, 2007e). Residents of Community 6 have been employed in the mining and forestry industries and health and social services (NWMO, 2013g). The natural resource-based industries in Community 6 have been through many "boom and bust" cycles (NWMO, 2013g). The main source of employment was other services, second was manufacturing and third was health care and social services. Total population aged 15 years and over was 2,600. Total population aged 15years and over by High school certificate or equivalent was 570. Total population aged 15years and over by Apprenticeship or trades certificate or diploma were 310 (Statistics Canada,

2007e).Total population aged 15years and over by College, CEGEP or other non-university certificate or diploma was 585. Total population aged 15years and over by University certificate or diploma below the bachelor level was 45. Total population aged 15years and over by University certificate, diploma or degree was 390. Total population aged 15years with no certificate, diploma or degree was 700 (Statistics Canada, 2007e).

Aboriginal neighbors of community 6: There are some Aboriginal communities and organizations in this area, including the Brunswick House First Nation, Chapleau Cree First Nation, Chapleau Ojibway First Nation, Michipicoten First Nation and Missanabie Cree First Nation (NWMO, 2013g). Métis Councils in the area include Greenstone Métis Council, Superior North Shore Métis Council and Thunder Bay Métis Council and Chapleau Métis Council, Métis Nation of Ontario Timmins Council, Northern Lights Métis Council and Temiskaming Métis Council as represented by Abitibi/Temiskamingue and James Bay Traditional Territory Consultation Committee and the Métis Nation of Ontario (NWMO, 2013g). The closest is Michipicoten First Nation community (Government of Canada, 2012).

Community 7 profile: Community 7 is a township in Ontario. According to the 2006 Community Profiles; Community 7 had a population of 549 (Statistics Canada, 2007f). 2001 to 2006 population change (%) was 0.9. 2006 to 2011 population change (%) was -7.3 (Statistics Canada, 2012i). In 2006, Community 7 had 545 Canadian citizens (Statistics Canada, 2007f). 70 Canadian citizens aged under 18 and 480 Canadian citizens aged 18 and over. 91.8% of the population aged 15 and over. Median age of the population was 53.5. 60 People indicated being aboriginal. The employment rate for the total population aged 15 years and over by labor force status was 48.0. Unemployment rate was 9.3. All private households' median income in 2005 was 45,809($). Persons 15 years and over median income in 2005 was 23,985($) (Statistics

Canada, 2007f). Percentage of all persons in low income after tax was 7.3. Community 7 industries are based on logging, sawmills, and some commercial fishing (NWMO, 2014i). The main source of employment was other services, second was agriculture and other resource-based industries and third was business services and retail trade (Statistics Canada, 2007f). Total population aged 15 years and over was 500. Total population aged 15years and over by High school certificate or equivalent was 145 (Statistics Canada, 2007f). Total population aged 15years and over by Apprenticeship or trades certificate or diploma were 60. Total population aged 15years and over by College, CEGEP or other non-university certificate or diploma was 120. Total population aged 15years and over by University certificate or diploma below the bachelor level was zero. Total population aged 15years and over by University certificate, diploma or degree was 20. Total population aged 15years with no certificate, diploma or degree was160 (Statistics Canada, 2007f).

Aboriginal neighbors of community 7: There are some Aboriginal communities and organizations around the area including Whitefish Lake First Nation, Wikwemikong Unceded First Nation, Serpent River First Nation, Mississauga #8 First Nation, Sagamok Anishnawbek First Nation, and Whitefish River First Nation (NWMO, 2014c). Métis Councils in the area include Historic Sault Ste. Marie Métis, North Channel Métis, Sudbury Métis, and the North Bay Métis (NWMO, 2014c). The closest is Serpent River First Nation community in the Serpent River No.7 Indian Reserve (Government of Canada, 2012).

Community 8 profile: Community 8 is a town in Ontario. According to the 2006 Community Profiles; Community 8 had a population of 728 (Statistics Canada, 2007g). 2001 to 2006 population change (%) was -10.8. 2006 to 2011 population change (%) was -4.4 (Statistics Canada, 2012h). In 2006, Community 8 had 725 Canadian citizens (Statistics Canada, 2007g).

160 Canadian citizens aged under 18 and 565 Canadian citizens aged 18 and over. 80.1% of the population aged 15 and over. Median age of the population was 45.2. 200 People indicated being aboriginal (Statistics Canada, 2007g). The employment rate for the total population aged 15 years and over by labor force status was 29.4. Unemployment rate was 21.7. All private households' median income in 2005 was 34,417($). Persons 15 years and over median income in 2005 was 17,650($). Percentage of all persons in low income after tax was 10.3. Historically, community 8 industry base was associated to the area's natural resources, including agriculture, mining, logging, and commercial fishing (NWMO, 2014j). Currently, main employers in the town are working in fishing and forest products, construction, financial services and public sector employers. The main source of employment was business services and other services, second was agriculture and other resource-based industries and third was construction, manufacturing, retail trade, finance and real estate (Statistics Canada, 2007g). Total population aged 15 years and over was 600 (Statistics Canada, 2007g). Total population aged 15years and over by High school certificate or equivalent was 135. Total population aged 15years and over by Apprenticeship or trades certificate or diploma were 35. Total population aged 15years and over by College, CEGEP or other non-university certificate or diploma was 95. Total population aged 15years and over by University certificate or diploma below the bachelor level was zero. Total population aged 15years and over by University certificate, diploma or degree was 20. Total population aged 15years with no certificate, diploma or degree was 300 (Statistics Canada, 2007g).

Aboriginal neighbors of community 8: There are some Aboriginal communities and organizations around the area including Whitefish Lake First Nation, Wikwemikong Unceded First Nation, Serpent River First Nation, Mississauga #8 First Nation, Sagamok Anishnawbek

First Nation, and Whitefish River First Nation. Métis Councils in the area include Historic Sault Ste (NWMO, 2014d). Marie Métis, North Channel Métis, Sudbury Métis, and the North Bay Métis. The closest is the Sagamok Anishnawbek First Nation Community in the Sagamok Indian Reserve (Government of Canada, 2012).

Community 9 profile: Community 9 is a town in Saskatchewan. According to the 2006 Community Profiles; Community 9 had a population of 1,502 (Statistics Canada, 2007h). 2001 to 2006 population change (%) was -3.5. 2006 to 2011 population change (%) is -0.3 (Statistics Canada, 2012g). In 2006, Community 9 had 1,495 Canadian citizens (Statistics Canada, 2007h). 400 Canadian citizens aged under 18 and 1,090 Canadian citizens aged 18 and over. 78.7% of the population aged 15 and over. Median age of the population was 37.5. 245 People indicated being aboriginal. The employment rate for the total population aged 15 years and over by labor force status was 65.3 (Statistics Canada, 2007h). Unemployment rate was 6.6. All private households' median income in 2005 was 62,179 ($). Persons 15 years and over median income in 2005 was 27,389($). Percentage of all persons in low income after tax was 6.0. Many citizens of community 9 work in mining and exploration companies (NWMO, 2013h). The main source of employment was manufacturing and other services, second was retail trade and third was agriculture and other resource-based industries (Statistics Canada, 2007h). Total population aged 15 years and over was 1,180. Total population aged 15years and over by High school certificate or equivalent was 300 (Statistics Canada, 2007h). Total population aged 15years and over by Apprenticeship or trades certificate or diploma were 130. Total population aged 15years and over by College, CEGEP or other non-university certificate or diploma was 240. Total population aged 15years and over by University certificate or diploma below the bachelor level was 25. Total population aged 15years and over by University certificate, diploma or degree was 70.

Total population aged 15years with no certificate, diploma or degree was 410 (Statistics Canada, 2007h).

Aboriginal neighbors of community 9: There are a number of Aboriginal communities and organizations in this area, including Cumberland House Cree Nation (Treaty 5) and Peter Ballantyne Cree Nation (Treaty 6). Métis Locals in the area include Creighton #89, Cumberland House #42, and Sandy Bay #90; all are located within Métis Nation Saskatchewan Eastern Region 1 (NWMO, 2013h).The closest is Peter Ballantyne Cree Nation (Government of Canada, 2012).

Communities that are still participating

Community 10 profile: According to the 2006 Community Profiles; Community 10 had a population of 6,515 (Statistics Canada, 2007i). 2001 to 2006 population change (%) was 4.7. 2006 to 2011 population change (%) was 4.2 (Statistics Canada, 2012f). In 2006, Community 10 had 6,375 Canadian citizens (Statistics Canada, 2007i). 1,425 Canadian citizens aged under 18 and 4,945 Canadian citizens aged 18 and over. 82.7% of the population aged 15 and over. Median age of the population was 44.5. 35 People indicated being aboriginal. The employment rate for the total population aged 15 years and over by labor force status was 61.9. Unemployment rate was 3.4 (Statistics Canada, 2007i). All private households' median income in 2005 was 58,504 ($). Persons 15 years and over median income in 2005 was 24,080 ($). Percentage of all persons in low income after tax was 6.6. The industry of Community 10 is mainly based on agriculture and agricultural services (NWMO, 2014e). The main source of employment was agriculture and other resource-based industries, second was other services and

third was retail trade. Total population aged 15 years and over was 5,310. Total population aged 15years and over by High school certificate or equivalent was 1,165 (Statistics Canada, 2007i). Total population aged 15years and over by Apprenticeship or trades certificate or diploma were 610. Total population aged 15years and over by College, CEGEP or other non-university certificate or diploma was 1,080. Total population aged 15years and over by University certificate or diploma below the bachelor level was 155. Total population aged 15years and over by University certificate, diploma or degree was 615. Total population aged 15years with no certificate, diploma or degree was1, 675 (Statistics Canada, 2007i).

Aboriginal neighbors of community 10: There are some First Nation and Métis communities and organizations in this area, including The Saugeen Ojibway Nations (Saugeen First Nation and Chippewas of Nawash Unceded First Nation). Métis Nation of Ontario community councils in the area includes Moon River Métis, Georgian Bay Métis, and Great Lakes Métis. The Historic Saugeen Métis are also located in the neighborhood (NWMO, 2014e). The closest is Saugeen First Nation Community (Government of Canada, 2012). Community 10 is a neighboring community to community 15 (Google, 2015).

Community 11 profile: According to the 2006 Community Profiles; Community 11 had a population of 11,549 (Statistics Canada, 2007j). 2001 to 2006 population change (%) was -3.4. 2006 to 2011 population change (%) was -1.7 (Statistics Canada, 2012e). In 2006, Community 11 had 11,170 Canadian citizens (Statistics Canada, 2007j). 1,660 Canadian citizens aged under 18 and 9,515 Canadian citizens aged 18 and over. 89.3% of the population aged 15 and over. Median age of the population was 54.8. 815 People indicated being aboriginal. The employment rate for the total population aged 15 years and over by labor force status was 33.2 (Statistics Canada, 2007j). Unemployment rate was 13.2. All private households' median income in 2005

was 36,366($). Persons 15 years and over median income in 2005 was 20,111($). Percentage of all persons in low income after tax was 10.3. Citizens of community 11 are involved in mining activities (NWMO, 2014f). The main source of employment was other services, second was health care and social services and third was retail trade. Total population aged 15 years and over was 10,205 (Statistics Canada, 2007j). Total population aged 15years and over by High school certificate or equivalent was 2,485. Total population aged 15years and over by Apprenticeship or trades certificate or diploma were 1,495. Total population aged 15years and over by College, CEGEP or other non-university certificate or diploma was 1,925. Total population aged 15years and over by University certificate or diploma below the bachelor level was 200. Total population aged 15years and over by University certificate, diploma or degree was 830. Total population aged 15years with no certificate, diploma or degree was 3,265 (Statistics Canada, 2007j).

Aboriginal neighbors of community 11: There are some Aboriginal communities and organizations around the area including Whitefish Lake First Nation, Wikwemikong Unceded First Nation, Serpent River First Nation, Mississauga #8 First Nation, Sagamok Anishnawbek First Nation, and Whitefish River First Nation (NWMO, 2014f). Métis Councils in the area include Historic Sault Ste. Marie Métis, North Channel Métis, Sudbury Métis, and the North Bay Métis. The closest is Serpent River First Nation community in the Serpent River No. 7 Indian Reserve (Government of Canada, 2012).

Community 12 profile: According to the 2006 Community Profiles; Community 12 had a population of 2,300 (Statistics Canada, 2007k). 2001 to 2006 population change (%) was -22.0. 2006 to 2011 population change (%) was -8.5 (Statistics Canada, 2012d). In 2006, Community 12 had 2,250 Canadian citizens (Statistics Canada, 2007k). 520 Canadian citizens aged under 18 and 1,730 Canadian citizens aged 18 and over. 83.0% of the population aged 15 and over.

Median age of the population was 42.8. 130 People indicated being aboriginal. The employment rate for the total population aged 15 years and over by labor force status was 62.4 (Statistics Canada, 2007k). Unemployment rate was 6.5. All private households' median income in 2005 was 78,894 ($). Persons 15 years and over median income in 2005 was 31,372 ($). Percentage of all persons in low income after tax was 4.4%. The industry of Community 12 is mainly based on mining and forestry and has a small tourism sector (NWMO, 2014g). The main source of employment was agriculture and other resource-based industries, second was other services and third was educational services. Total population aged 15 years and over was 1,855 (Statistics Canada, 2007k). Total population aged 15years and over by High school certificate or equivalent was 575. Total population aged 15years and over by Apprenticeship or trades certificate or diploma were 305. Total population aged 15years and over by College, CEGEP or other non-university certificate or diploma was 345 (Statistics Canada, 2007k). Total population aged 15years and over by University certificate or diploma below the bachelor level was 45. Total population aged 15years and over by University certificate, diploma or degree was 135. Total population aged 15years with no certificate, diploma or degree was 440 (Statistics Canada, 2007k).

Aboriginal neighbors of community 12: There are some Aboriginal communities and organizations in this area including the Ojibways of Pic River (Heron Bay), Ojibways of Pic Mobert, Ginoogaming First Nation, and Long Lake #58 First Nation. Métis Councils in this area include the Thunder Bay Métis Council, Greenstone Métis Council, and Superior North Shore Métis Council (NWMO, 2014g). The closest is Pic Mobert First Nation Community (Government of Canada, 2012).

Community 13 profile: According to the 2006 Community Profiles; Community 13 had a population of 1,431 (Statistics Canada, 2007l). 2001 to 2006 population change (%) was -16.3. 2006 to 2011 population change (%) was -16.0 (Statistics Canada, 2012c). In 2006, Community 13 had 1,410 Canadian citizens (Statistics Canada, 2007l). 300 Canadian citizens aged under 18 and 1,110 Canadian citizens aged 18 and over. 82.2% of the population aged 15 and over. Median age of the population was 42.5. 200 People indicated being aboriginal. The employment rate for the total population aged 15 years and over by labor force status was 60.3% (Statistics Canada, 2007l). Unemployment rate was 10.6%. All private households' median income in 2005 was 57,250($). Persons 15 years and over median income in 2005 was 20,602($). Percentage of all persons in low income after tax was 4.2. Many residents of Community 13 are working in the forestry and mining industry and there are current plans to develop new mining and forestry activities in the area (NWMO, 2013i). The main source of employment was agriculture and other resource-based industries, second was other services and third was business services (Statistics Canada, 2007l). Total population aged 15 years and over was 1,195. Total population aged 15years and over by High school certificate or equivalent was 335. Total population aged 15years and over by Apprenticeship or trades certificate or diploma were135. Total population aged 15years and over by College, CEGEP or other non-university certificate or diploma was160 (Statistics Canada, 2007l). Total population aged 15years and over by University certificate or diploma below the bachelor level was 30. Total population aged 15years and over by University certificate, diploma or degree was 55. Total population aged 15years with no certificate, diploma or degree was 475 (Statistics Canada, 2007l).

Aboriginal neighbors of Community 13: There are some Aboriginal communities and organizations in this area, including Lac Seul First Nation, Seine River First Nation and

Wabigoon Lake First Nation (NWMO, 2013i). Métis Councils in the area include Atikokan and Area Métis Council, Kenora Métis Council, Northwest Métis Council and Sunset Country Métis Council as represented by the Lake of Woods/Lac Seul, Rainy Lake/Rainy River and Treaty 3 Traditional Territory Consultation Committee and Greenstone Métis Council, Superior North Shore Métis Council and Thunder Bay Métis Council as represented by Lakehead/Michipicoten/Nipigon Traditional Territory Consultation Committee and the Métis Nation of Ontario (NWMO, 2013i). The closest is Wabigoon Lake Ojibway First Nation community in the Wabigoon Lake No. 27 (Government of Canada, 2012).

Community 14 profile: According to the 2006 Community Profiles; Community 14 had a population of 1,209 (Statistics Canada, 2007m). 2001 to 2006 population change (%) was -11.2. 2006 to 2011 population change (%) was -13.2 (Statistics Canada, 2012b). In 2006, Community 14 had 1,190 Canadian citizens (Statistics Canada, 2007m). 330 Canadian citizens aged under 18 and 860 Canadian citizens aged 18 and over. 79.8% of the population aged 15 and over. Median age of the population was 38.6. 140 People indicated being aboriginal. The employment rate for the total population aged 15 years and over by labor force status was 68.9 (Statistics Canada, 2007m). Unemployment rate was 5.1. All private households' median income in 2005 was 68,217 ($). Persons 15 years and over median income in 2005 was 34,872 ($). Percentage of all persons in low income after tax was 1.3. In community 14 residents are employed mainly in the forestry and railroad industries (NWMO, 2013l). The main source of employment was business services, second was other services and third was manufacturing (Statistics Canada, 2007m). Total population aged 15 years and over was 950. Total population aged 15years and over by High school certificate or equivalent was 315. Total population aged 15years and over by Apprenticeship or trades certificate or diploma were 75 (Statistics Canada, 2007m). Total

population aged 15years and over by College, CEGEP or other non-university certificate or diploma was150. Total population aged 15years and over by University certificate or diploma below the bachelor level was 25. Total population aged 15years and over by University certificate, diploma or degree was 75. Total population aged 15years with no certificate, diploma or degree was 310 (Statistics Canada, 2007m).

Aboriginal neighbors of community 14: There are some Aboriginal communities and organizations in this area, including Brunswick House First Nation, Chapleau Cree First Nation, Constance Lake First Nation, Michipicoten First Nation, Missanabie Cree First Nation, Ojibways of the Pic River (Heron Bay) and Pic Mobert First Nation (NWMO, 2013j). Métis Councils in this area include Greenstone Métis Council, Superior North Shore Métis Council and Thunder Bay Métis Council that are represented by Lakehead/Michipicoten/Nipigon Traditional Territory Consultation Committee and Chapleau Métis Council, Métis Nation of Ontario Timmins Council, Northern Lights Métis Council and Temiskaming Métis Council as represented by Abitibi/Temiskamingue and James Bay Traditional Territory Consultation Committee and the Métis Nation of Ontario (NWMO, 2013j). The closest First Nation Communities are both Constance Lake and Pic Mobert First Nation Communities (Government of Canada, 2012).

Opted out Community

Community 15 profile: According to the 2006 Community Profiles; Community 15 had a population of 5,939 (Statistics Canada, 2007n). 2001 to 2006 population change (%) was -2.0. 2006 to 2011 population change (%) was -4.3 (Statistics Canada, 2012a). In 2006, Community 15 had 5,845 Canadian citizens (Statistics Canada, 2007n). 1,520 Canadian citizens aged under

18 and 4,330 Canadian citizens aged 18 and over. 79.4% of the population aged 15 and over. Median age of the population was 38.2. 35 People indicated being aboriginal. The employment rate for the total population aged 15 years and over by labor force status was 73.9 (Statistics Canada, 2007n). Unemployment rate was 2.9. All private households' median income in 2005 was 50,952 ($). Persons 15 years and over median income in 2005 was 23,856 ($). Percentage of all persons in low income after tax was 4.8 (Statistics Canada, 2007n). Community 15 is mainly an agriculture community (NWMO, 2014h). The main source of employment was agriculture and other resource-based industries, second was manufacturing and third was other services. Total population aged 15 years and over was 4,705. Total population aged 15years and over by High school certificate or equivalent was 1,345 (Statistics Canada, 2007n). Total population aged 15years and over by Apprenticeship or trades certificate or diploma were 535. Total population aged 15years and over by College, CEGEP or other non-university certificate or diploma was 800 (Statistics Canada, 2007n). Total population aged 15years and over by University certificate or diploma below the bachelor level was 75. Total population aged 15years and over by University certificate, diploma or degree was 285. Total population aged 15years with no certificate, diploma or degree was 1,665 (Statistics Canada, 2007n).

Aboriginal neighbors of Community 15: There are a number of First Nation and Métis communities and organizations in this area, including The Saugeen Ojibway Nations (Saugeen First Nation and Chippewas of Nawash Unceded First Nation) (NWMO, 2014h). Métis Nation of Ontario community councils in this area includes Moon River Métis, Georgian Bay Métis, and Great Lakes Métis. The Historic Saugeen Métis are also located in the neighborhood. The closest is Saugeen First Nation Community (Government of Canada, 2012).

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