



NUCLEAR WASTE  
MANAGEMENT  
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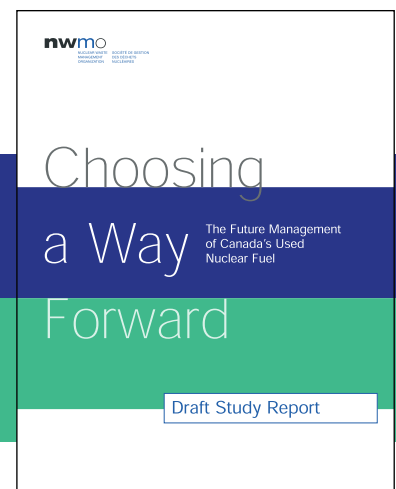
SOCIÉTÉ DE GESTION  
DES DÉCHETS  
NUCLÉAIRES

September 2005

Public Attitude Research Findings

# NWMO National Survey Report

Veraxis Research and Communications



## **Draft Study Report: Choosing a Way Forward**

The NWMO has committed to using a variety of methods to dialogue with Canadians in order to ensure that the study of nuclear waste management approaches reflects the values, concerns and expectations of Canadians at each step along the way.

A number of dialogue activities have been planned to learn from Canadians whether the elements they expect to be addressed in the study have been appropriately reflected and considered in the Draft Study Report. Reports on these activities will be posted on the NWMO website. Your comment is invited and appreciated.

### **Disclaimer**

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# NWMO National Survey Report

Presented to the

Nuclear Waste Management Organization

September 2005

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## Introduction

Veraxis Research and Communications is pleased to present the following report of the results of the national study conducted for the Nuclear Waste Management Organization.

The survey was conducted among 2641 Canadians during the period of July 18 to August 2, 2005. The results are based on a national representative sample of Canadians and nuclear facility site community over samples. Analyses were conducted to examine attitudes of, and the differences among, Canadians living in different regions of Canada, site communities residents and residents in the rest of Canada, residents of northern and southern Ontario, and Involved Canadians and general population Canadians. The reason for examining the attitudes of residents of northern and southern Ontario is because 90% of the used fuel is in Ontario and historically differences have been noted between residents of northern and southern Ontario on this issue.

The survey focused on:

- National and community issues
- Importance of and support for nuclear power for generating electricity
- Familiarity with the nuclear waste management process
- Awareness of and support for the NWMO
- Support for the criteria adopted by the NWMO to guide the process of selecting a long term used nuclear fuel management option
- Perceived reasonable aspects to and concerns regarding elements of the Adaptive Phased Management Approach
- Support for requirements of the used nuclear fuel waste management process, and
- Perceptions about the future possibilities regarding used nuclear fuel waste.

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## Main Findings

### Top of Mind Issues:

Nuclear waste is not a top of mind issue for Canadians, even within nuclear site communities. Healthcare is the most important issue facing Canadians at both the national and community level, followed by the environment and the economy. This has remained unchanged since the last wave of research in June of 2004.

### Nuclear Power

Just over half (53%) of Canadians support the use of nuclear power to generate electricity. This is up slightly from 49% support last year. Support is significantly higher in Ontario and the Atlantic provinces than in any other region of Canada. Support for nuclear energy is lowest in Quebec. Opposition to nuclear energy is also the most extreme in Quebec. Residents of nuclear site communities are significantly more supportive of nuclear energy than are residents in the rest of Canada.

### Nuclear Waste Management

Canadians, generally, are unfamiliar with how used nuclear fuel is currently managed. Less than one in five Canadians (19%) say they are familiar with the current management process, while two-thirds of Canadians say they have low or no familiarity. Nuclear site community residents report greater familiarity than residents in the rest of Canada. In 2004, about the same number (22%) of Canadians said they were familiar with nuclear waste and its management.

As was the case last year, one-quarter of Canadians correctly estimate that nuclear waste remains hazardous at least 1000 years. Twenty-five per cent of Canadians simply responded "Don't Know/No Response" (down from 31% in 2004) and the remaining half of Canadians underestimated the length of time that nuclear waste remains hazardous.

### The Nuclear Waste Management Organization

One in ten Canadians report having heard of the Nuclear Waste Management Organization. This has remained unchanged from last year, when 9% said they had heard about the organization and 90% said they hadn't. Awareness of the Organization is higher among site community residents and among Involved Canadians. Most believe that the Organization is: 1) conducting a study/creating

a plan, 2) seeking a site to locate nuclear waste, 3) burying nuclear waste underground, or 4) placing nuclear waste in the Canadian Shield. In 2004, the top answers to what they had read, seen or heard were quite similar: 1) it's an organization providing solutions or creating a plan, 2) they're looking for a specific site to locate nuclear waste. However, burying waste underground or placing it in the Canadian Shield were not coded separately as answers, which most likely means they were incorporated into other categories.

Respondents were then given the following description of the NWMO's mandate:

"Three years ago, the federal government passed a law to create the Nuclear Waste Management Organization, also known by its initials as the NWMO. I am going to read you a brief statement about the goal of the NWMO.

The NWMO is an organization created in the fall of 2002 to recommend a long-term approach for managing used nuclear fuel produced by Canada's electricity generators. While nuclear waste in Canada is currently being safely managed, no permanent long-term management solution has been adopted.

The first job of the NWMO is to recommend a plan to the government of Canada for the management of this used nuclear fuel by November 2005. In developing this plan, the NWMO is required to consult stakeholders, experts and the general public as it develops a comprehensive, integrated and economically sound approach for Canada."

Based on the preceding explanation of the mandate of the NWMO, a large majority of Canadians support the Organization. Eighty-three per cent of Canadians who do not live in site communities support the organization, 44% of whom strongly support the NWMO, and 85% of site community residents support the organization. Only 11% of site community residents and 15% of residents in the rest of Canada oppose the NWMO. Support is high across the country ranging from a low of 76% of Albertans to a high of 85% of Ontarians. Last year, overall support was at 82% nationally (45% strongly and 37% somewhat), with 3% saying they were neutral on the issue and 13% who opposed the Organization.

The principles adopted by the NWMO to guide the recommended option for the long-term management of used nuclear fuel waste receive overwhelming public support.

Ninety-eight per cent of Canadians agree that the recommended option must be safe and secure to protect people and the environment. Two-thirds of Canadians strongly agree, 97% agree, that the approach must be fair to future generations, use the best scientific and technical knowledge available in Canada and around the world, and ensure that the companies who created the waste have set aside sufficient funds to pay for the cost of properly managing the waste. Ninety-six per cent agree that the approach must be sensitive and responsive to the values and objectives that are important to citizens, and 89% agree that the approach must be fair in how it distributes costs, benefits and responsibilities to different regions and communities.

#### Adaptive Phased Management Approach

Respondents were presented with five elements of the Adaptive Phased Management approach. For each element, respondents were asked what if any aspect of the element sounded reasonable or appropriate. Next, the respondent was asked what concerns if any they have about the element.

#### Element I

**“Used fuel would be moved from nuclear power stations, where it is currently temporarily stored, to a centralized site and placed in a specially constructed repository built deep underground. This repository would be designed to isolate and contain the waste for the very long time period for which it remains hazardous.”**

Perceived benefits to this element of the approach are dominated by the fact that the waste is stored away from large population centers, the waste is deep underground, and the waste is centralized.

When looking at public concerns about this phase of the options, the integrity of the storage containers are the primary concern. One in five Canadians (22%) mentioned that they would be concerned about leakages and/or storage



containers. Other concerns are relatively wide ranging. For instance, 11% of Canadians are worried about transportation, 10% are worried about unknown long-term effects, 10% are worried about safety generally, and 9% of Canadians are worried about the location of the burial, the effect on the environment and soil/water contamination.

## **Element II**

**“We would put this repository in place using a phased decision making process, supported by a program of continuous learning, research and development. By a phased decision-process, we mean breaking the work into a series of steps. At each step, we might decide to revise, halt, or reverse our plan. This would allow us to take advantage of new learning, any new technologies which may emerge, and changes in the needs of society.”**

Public support is strong for the recommendation of a phased decision making process supported by continuous learning. Almost half (47%) of Canadians see the benefit of this element of the option as continuous learning and keeping up to date on the latest technologies. Another 22% see benefit in being able to change the course of action based on new research. There are no sizeable differences between site community residents and the general population.

Expressed concerns centered on management and organizational issues. About 16% believe this type of process may lead to disorganization, the inability to arrive at a final plan, difficulty in implementing changes and the length of the process. Less than 10% simply don't trust the management while another 5% want to ensure that the management is transparent and accountable.

## **Element III**

**“Before we place the used fuel in a deep repository, we might decide to go through an additional step of interim shallow storage. The used fuel would be moved from the reactor sites to the central site, where the deep repository would be located, and put in a shallow underground storage facility. This would allow more time for research and decision making about the deep repository before used fuel is placed in it.”**

Fewer Canadians are able to name benefits of this element of the approach than any other element. Just under one-quarter (23%) said that this element allowed for more research in order to ensure a good long-term solution.

Several concerns with this element are common to storage elements, (i.e. first element) such as risks of leakage and environmental contamination. Particular to this element of the approach are concerns that the site is not deep enough to ensure security. The risks incurred from excessive handling and transportation are also a concern and roughly 17% of Canadians are concerned about the amount of time involved and would rather move directly to permanent holding facility.

#### **Element IV**

**“The used fuel would be monitored to support the collection of new information and to confirm the safety and performance of the repository. For an extended period, the used fuel would also be retrievable, that us until a future society decides to close the repository.”**

The perceived advantages of this element are foremost that it provides the opportunity to ‘discover a future use’. Other strengths of this element of the option are that the waste is easy to monitor and retrieve and that it allows future generations to make different decisions.

Potential concerns regarding this element of the option are relatively varied including safety issues, transportation, potential risk of sabotage due to the accessibility of the waste, environmental pollution, and long-term effects.

#### **Element V**

**“The implementation of this adaptive phased approach might be spread over a period of as much as 300 years.”**

Benefits to this element are predominantly that a long time frame indicates a cautious and considered approach to the management of used nuclear fuel waste. The notion of continual learning and keeping up to date on latest technologies is also a perceived benefit. Once again, we see here that about 1/3

of Canadians (or 20% if we consider those who are not simply opposed to all elements) are concerned about an element that involves a long time frame for implementation (similar to Element III).

Concerns expressed regarding this element of the approach are predominantly based on the long time frame. Almost one in five Canadians said this process is too lengthy, and another 7% said they are concerned that the project may be abandoned at some point. Five per cent expressed concern that there will never be a final solution.

#### Reactions to Phased Management Option By Attitudes to Nuclear Energy

Reactions to the Phased Management elements are not predominantly determined by attitudes to nuclear energy generation. A majority of supporters and of opponents offered concerns and reasonable aspects to the elements.

Opponents of nuclear energy were more likely than supporters of nuclear energy to say that nothing was reasonable about the elements. However, a majority of opponents of nuclear energy did find something reasonable about each element. Similarly, supporters of nuclear energy were more likely than opponents of nuclear energy to say they had no concerns about the elements of the option, but a majority still expressed some concern about each option.

#### Waste Management Requirements

Fourteen requirements for a nuclear used fuel management process were tested. Each received overwhelming support by Canadians.

Those characteristics that involve meeting scientific and technical criteria and using the latest technological advances are priority criteria. For instance, 95% of Canadians said that requiring the site to meet scientific and technical criteria was important and 93% said that it is important to have an approach that is able to adapt to new learnings in science and technology. Similarly, 94% said that it is important the approach include monitoring the used fuel over a long period of time.

Community input and meeting social requirements are also high priorities. Ninety-one per cent of Canadians said that it is important that the approach requires that the site work in collaboration with the community to make major

decisions. Ninety per cent said it is important that the approach requires the site to meet social and ethical requirements. On-going public participation is key as 88% of Canadians said that the process should seek to site the facility only in willing communities and 87% said that ongoing public involvement is important.

While still receiving a majority support, the criteria that ranked lower than others are those that specify a long time frame for disposal (73%) and continued access for retrieval (74%).

There are no significant differences between residents in the site communities and residents in the rest of Canada. Support for these management attributes is high across both populations for all measures. There are no significant differences between Involved and general population site community residents.

#### The Future of Nuclear Waste Management

Eighty per cent of Canadians agree that 'since our generation was the one which caused the nuclear waste, we should be the ones to decide on and implement an approach to manage it'. Almost one-third of Canadians (32%) strongly agree with this statement. Only 4% strongly disagree. Support is universally high across the country. There is no significant difference between site communities and the rest of Canada.

Believing that we should act now to decide on management strategies is not incompatible with the belief that 'since nuclear waste remains hazardous for a long time, we should let future generations decide how they wish to deal with it'. Fifty-seven per cent of Canadians agree with this statement, of whom 20% strongly.

Half of those who believe we should begin implementation now also believe that future generations should have the chance to decide how they wish to deal with it. Roughly speaking, more than 40% of Canadians believe both views. Twenty-five per cent think we should decide and not allow future generations a decision role.

Canadians are relatively optimistic about the ability of science and technology into the future. Just over half of Canadians (55%) believe that 'scientific research

will soon produce a technology that will render nuclear waste safe by eliminating its radioactivity and allowing it to become part of the natural environment again'. Forty per cent disagree and 5% responded DK/NR.

Those who estimate that nuclear waste is hazardous for 1000 or more years are more likely to disagree (55%) than are those who believe it is hazardous for shorter periods of time (35%). Not surprisingly, those who believe that future generation should decide what to do with the waste are also significantly more likely to believe that nuclear waste can be rendered neutral.

Canadians feel relatively confident in the long-term ability of our society to manage nuclear waste. Just over one-third of Canadians (35%) believe 'that future societies will be less able to deal with this waste than we are today'. Involved site community residents (25%) are even less likely to believe this than general population residents (39%).

Conversely, a strong majority of Canadians (62%) have faith in the ability of future societies. Residents of Quebec are especially pessimistic compared to other regions of the country with 51% believing that future societies will be *less* able to deal with the waste compared to averages ranging from 29% to 33% in all other regions.

## Methodology

The survey instrument was constructed in conjunction with the NWMO.

The survey was in field from July 18, 2005 to August 2, 2005.

The total sample size was 2641. The sample provided a national representative sample, a nuclear facility site community sample, a northern Ontario sample, a southern Ontario sample, a site community general population sample of 568, and a site community Involved sample of 194.

### NWMO Regional Quota

Description	Regional Quota	Description	Community Quota
Atlantic	401		
NF	66		
PEI	17		
NS	118		
NB	200	St. John	150
QC	300	Trois-Rivieres	150
ON	669		
Southern Ontario	465	Clarington Pickering Kincardine/Port Elgin	150 150 150
Northern Ontario	204		
MB/SK	202		
SK	94		
MB	108		
West	319		
AB	150		
BC	169		
<b>Total</b>	<b>1,891</b>	<b>Total</b>	<b>750</b>
<b>Grand Total</b>		<b>2,641</b>	

### Involved Canadians Segment

In both the national sample and the site community sample, we note differences between Involved Canadians and general population Canadians. The *Involved Canadians* is a proprietary segment. They represent more than a quarter of the Canadian population and form an audience who is crucial for those Involved in public policy to understand. This portion of the public is responsible for virtually all of the active participation in public policy dialogue by Canadians. These people are responsible for almost all of the letters to editors, calls to phone-in

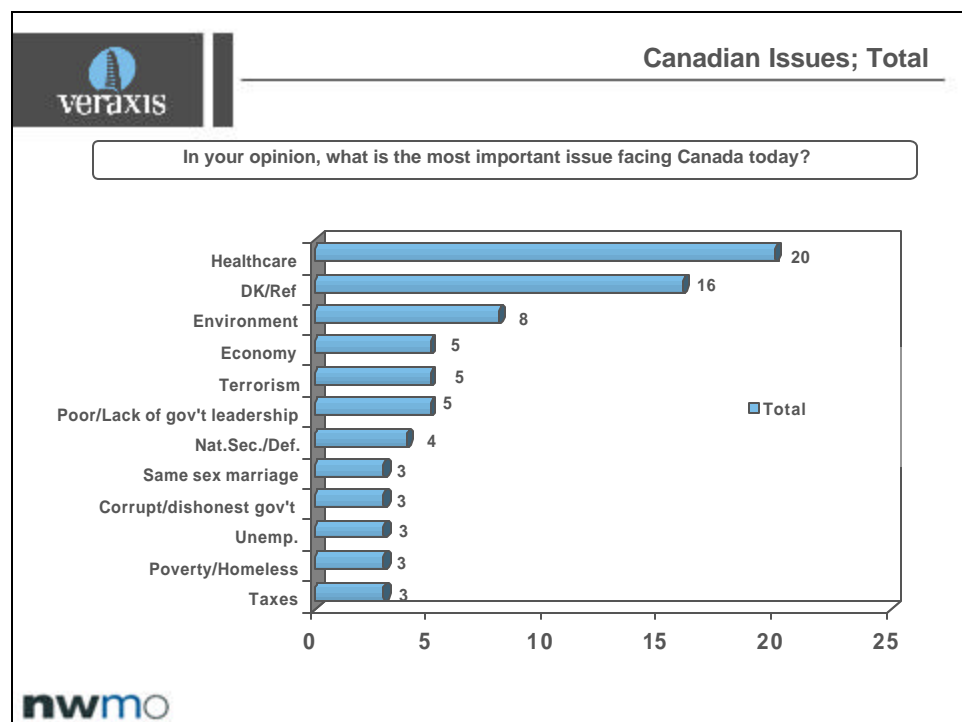
shows, letters to elected representatives, speeches to public audience and published articles.

Our research has demonstrated that Involved Canadians are far more inclined to consume information around public policy and public affairs. They are far more likely to read a daily newspaper or listen to programs such as CBC's *As it Happens*. Involved Canadians represent the audience most likely to have relatively firm opinions, based upon having educated themselves to some degree on a variety of issues. In tracking their views over the past several years, our work has demonstrated that this audience is often distinctly different than the general public in how they feel about public policy issues. Involved Canadians are opinion leaders and provide a key indication of how an issue will be perceived by the public and how debate around it is likely to evolve.

## National and Community Issues

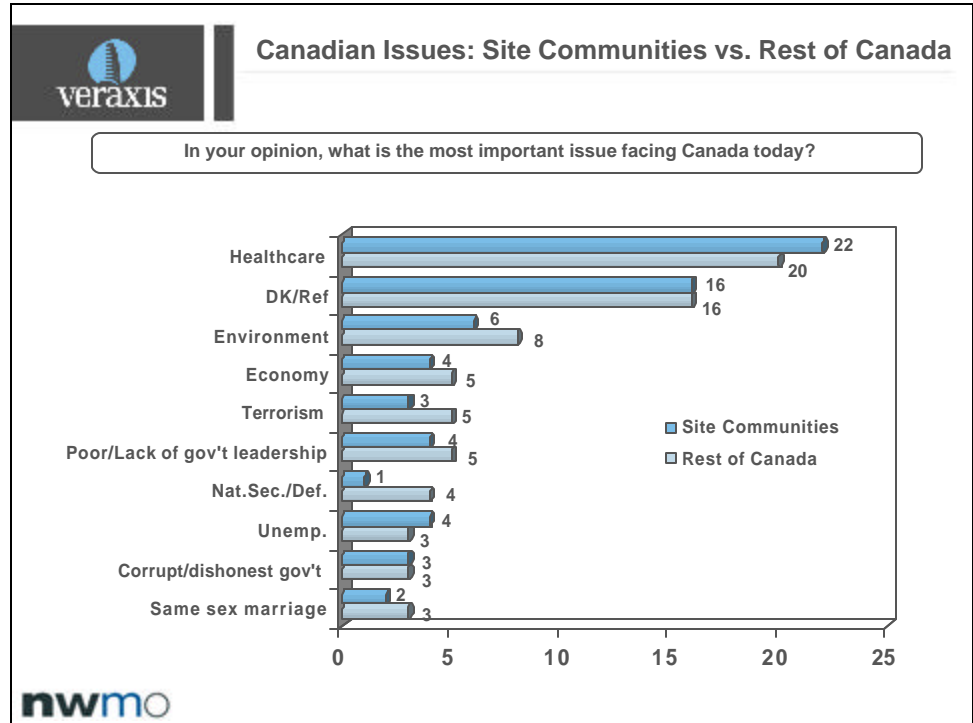
Used nuclear fuel is not a top issue for Canadians. In fact, even among site community residents, used nuclear fuel did not emerge as a pressing community issue.

As expected, the most important issue facing the nation is healthcare. Twenty per cent of Canadians offered it as the top issue. At a distance, 8% of Canadians said the environment was the top issue followed by 5% of Canadians who said it was the economy, a lack of government leadership or terrorism. No energy issues other than gas/fuel prices at less than half a percent were raised as the top issue facing the country. This has not changed since last year's survey.

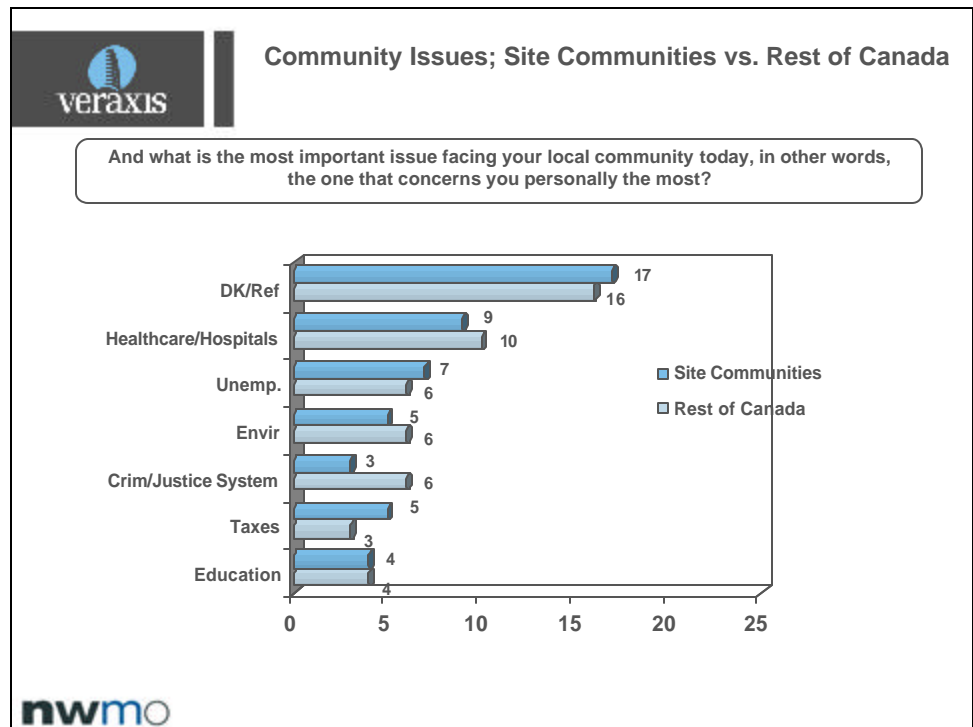
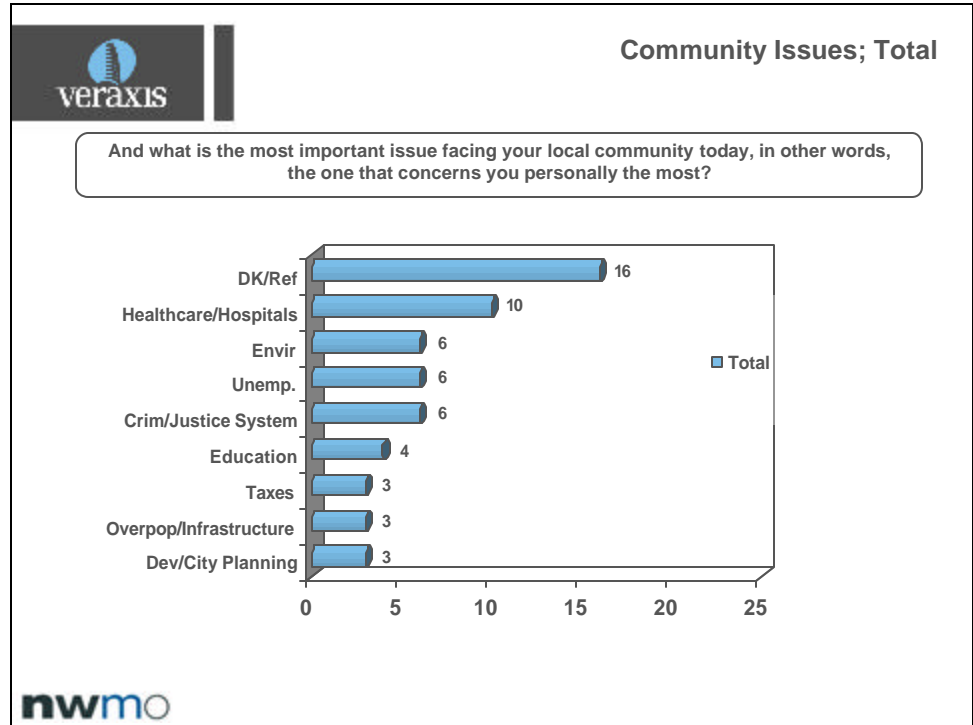


There is no significant difference between site community residents and residents in the rest of Canada. For instance, in site communities, healthcare is also the number one issue facing Canada today at 22% followed by the environment - the top issue for 6% of site community residents while 4% raised the economy as the top issue.

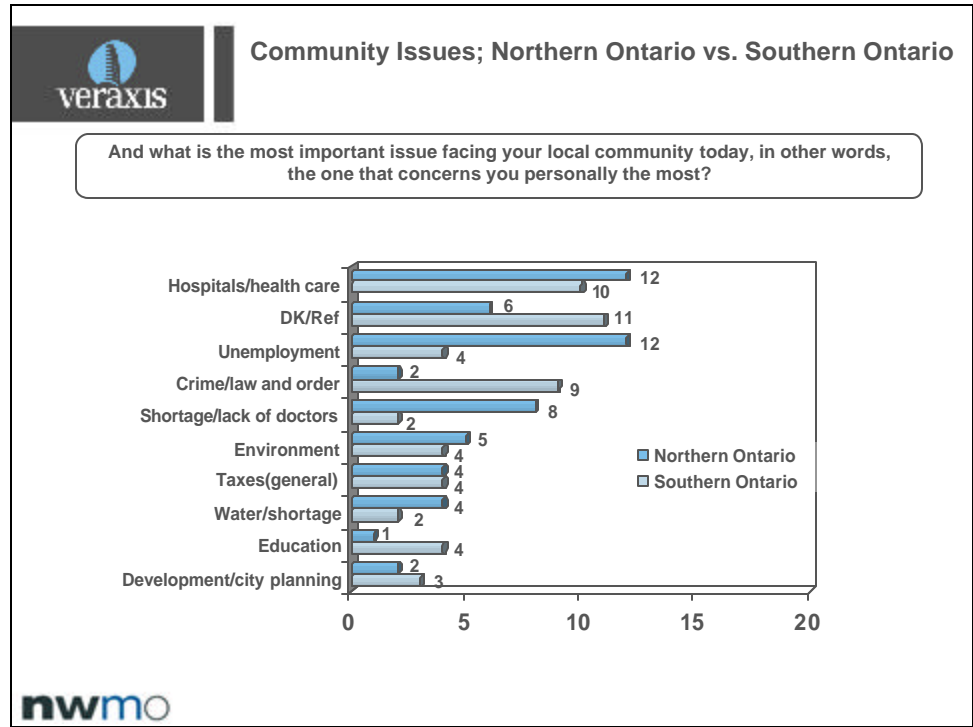




When it comes to community issues, Canadians express more concern about quality of life and service delivery issues such as crime, education and infrastructure. Nonetheless, hospitals and healthcare were still the top issue at 10% and another 6% chose the environment/pollution, unemployment, or crime/justice system. Nuclear waste is not seen as the most important issue by the national representative sample or the site community samples. At the community level, just 2% said that water/water quality is the most important issue, 1% garbage and waste management, and 1% energy/energy supply.



There is a significant difference in the top of mind community issues between northern and southern Ontarians. Northern Ontarians are more likely than Southern Ontarians to say that a shortage of doctors and unemployment are important community issues, while Southern Ontarians are more likely to be worried about crime.

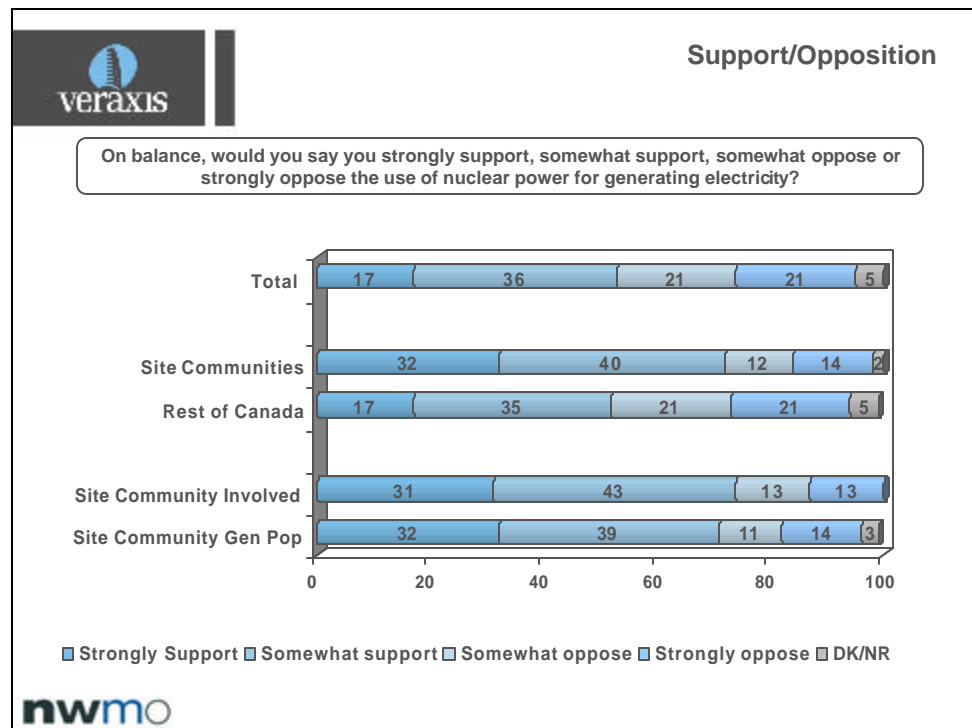


## Nuclear Energy

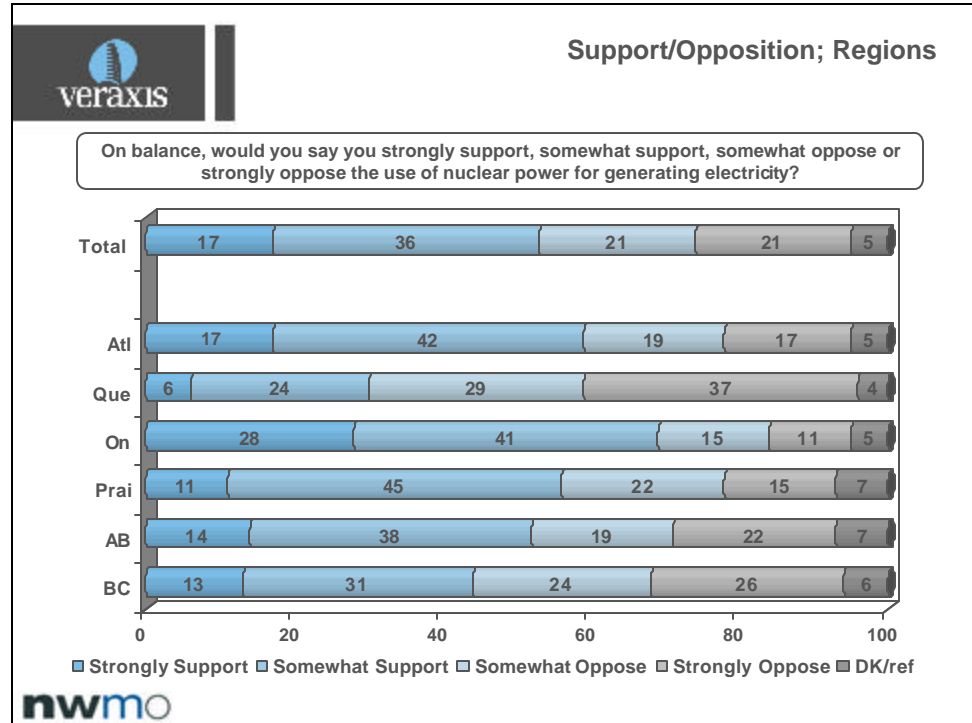
Just over half of Canadians (53%) support the use of nuclear power to generate electricity. Seventeen per cent strongly support the use of nuclear energy and 36% somewhat support it. One in five Canadians (21%) strongly oppose the use of nuclear energy and another 21% somewhat oppose the use of nuclear power to generate electricity. Support is up slightly from last year, when 49% were supportive (15% strongly and 34% somewhat), while 19% somewhat opposed and 24% strongly opposed the use of nuclear power for energy.

Residents in nuclear site communities are significantly more likely to support the use of nuclear power to generate electricity. Almost three-quarters (72%) support nuclear power compared to just 26% who oppose it. Within site communities,

there is no significant difference in support for nuclear power between Involved residents and general population.

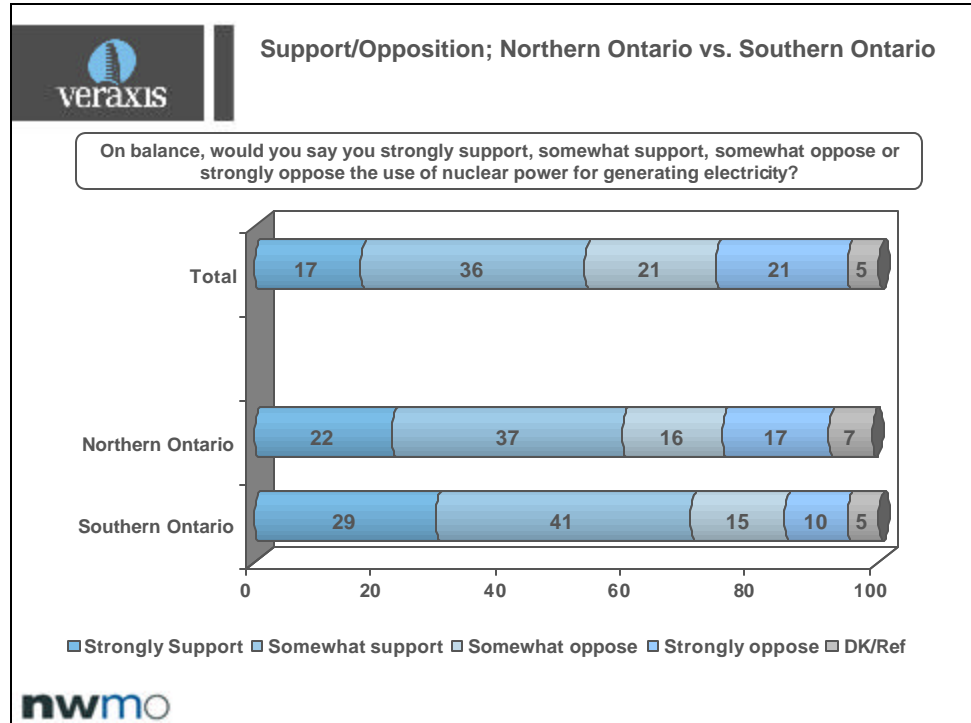


There are noteworthy regional variations in support of nuclear power. Support is highest in Ontario at 69%, followed closely by support in the Atlantic region at 59%. Support is lowest in Quebec at 30% where opposition is also significantly higher and more extreme.



Consistent with previous findings, Analysis of Variance indicates there is a significant difference between men and women in their support for nuclear energy. Men are more likely than women to strongly support the use of nuclear energy while women are more likely to 'somewhat' oppose it.

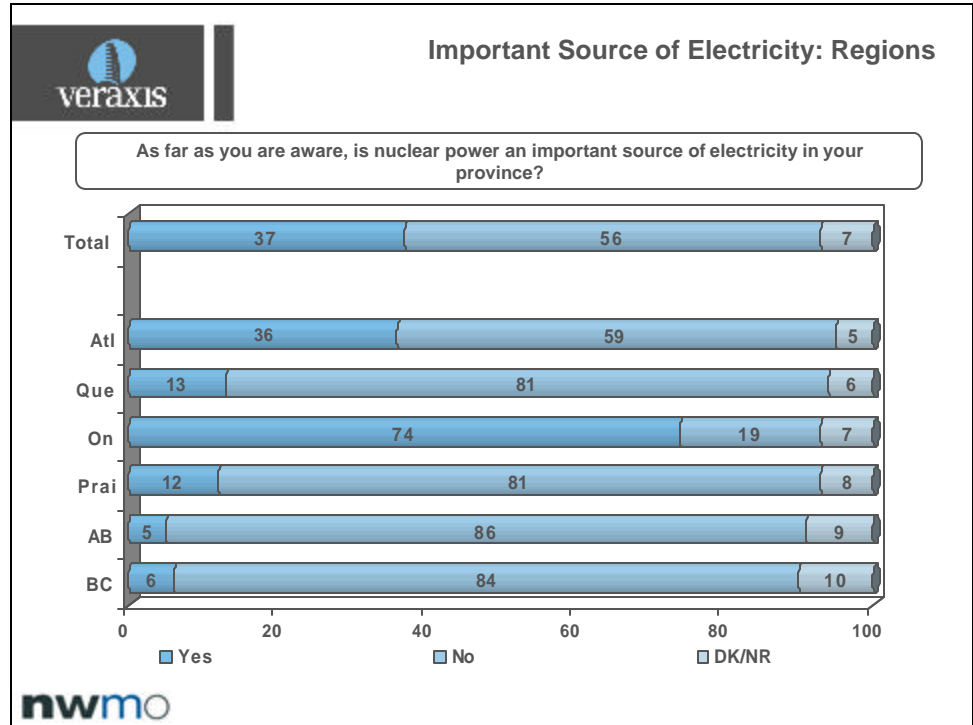
Residents in southern Ontario are significantly more supportive of nuclear energy than residents in northern Ontario. Seventy per cent of southern Ontarians support (29% strongly) nuclear energy compared to 59% of northern Ontarians (22% strongly). Opposition in northern Ontario is also more firm -17% strongly oppose compared to 10% in southern Ontario.



### Importance of Nuclear Energy

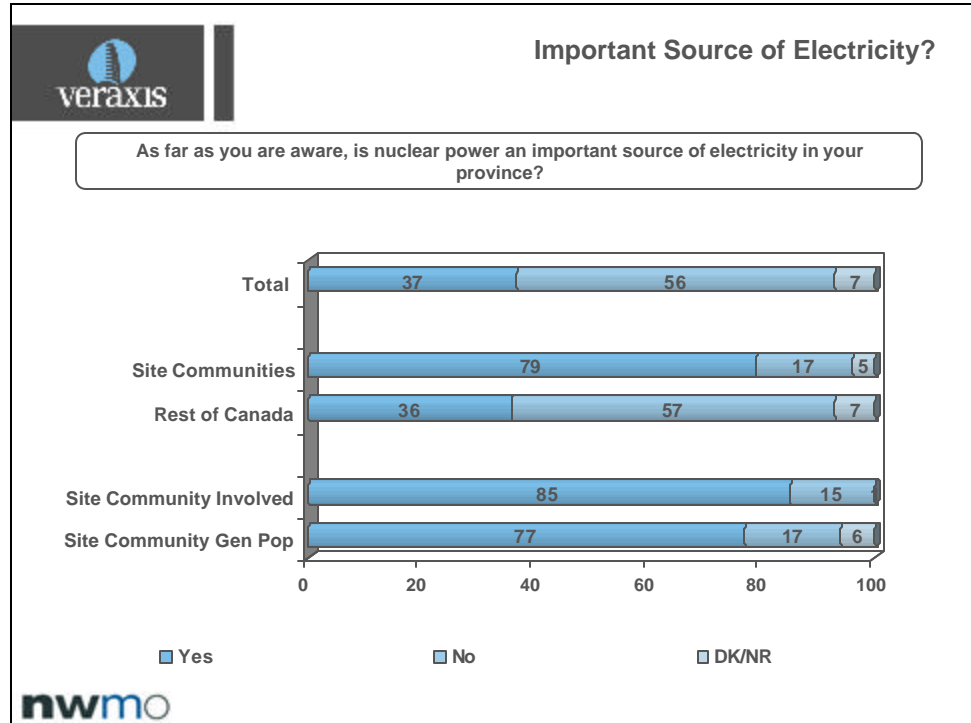
With the highest numbers in the country, residents in Ontario are significantly more likely than residents of any other region in Canada to believe that nuclear power is an important source of electricity in their province. Almost three quarters (74%) of Ontarians believe nuclear power is an important electricity source compared to 36% in the Atlantic region, 13% in Quebec, 12% in the Prairies (Saskatchewan and Manitoba), 5% Alberta and 6% in British Columbia. Northern Ontarians are as likely as southern Ontarians to believe that nuclear energy is an important source of electricity within the province of Ontario.

In total, 37% of Canadians believe it is an important source of electricity in their province. This number was similar (35%) a year ago.



Not surprisingly, 79% of site community residents report that nuclear power is an important source of electricity in their province compared to 36% of residents in the rest of Canada.

Involved site community residents are even more likely than general population site community residents to say that nuclear energy is an important source of electricity.

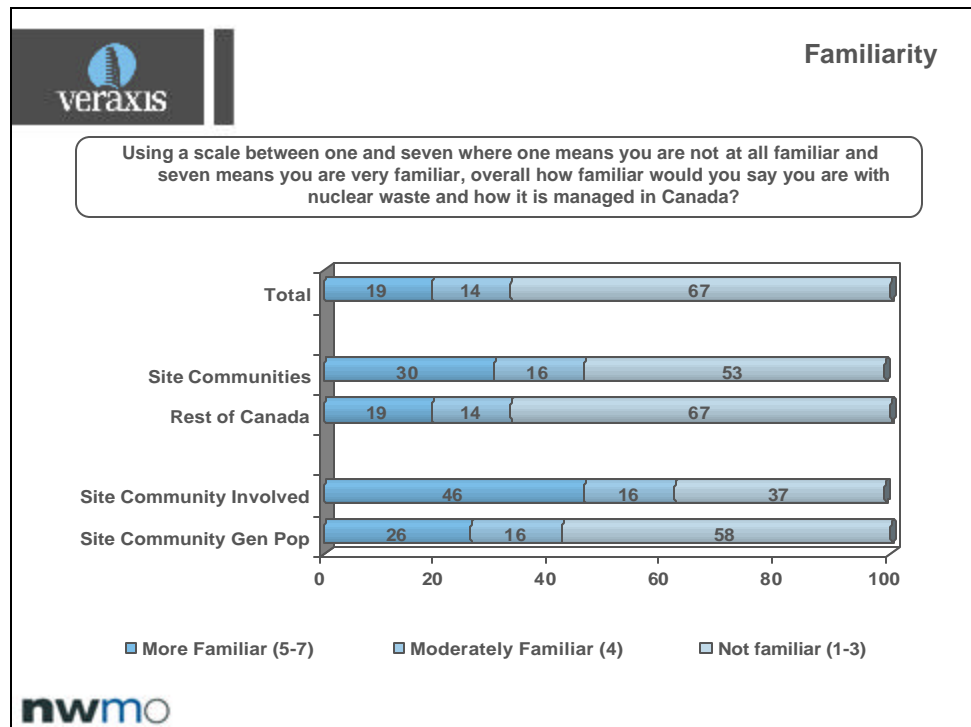


## Nuclear Waste

Canadians are, by in large, unfamiliar with how nuclear waste is currently managed in Canada. When Canadians were asked how familiar they are with how nuclear waste is currently managed in Canada, on a scale of one to seven where one is not at all familiar and seven is very familiar, less than one in five Canadians (19%) chose the upper part of the scale. One-third of Canadians (32%) chose a 1 saying they are not at all familiar, and fully two-thirds chose the lower half of the scale.

In 2004, about the same number (22%) expressed familiarity with nuclear waste management, with 35% saying they were not at all familiar and another three in ten expressing low levels of familiarity as well.

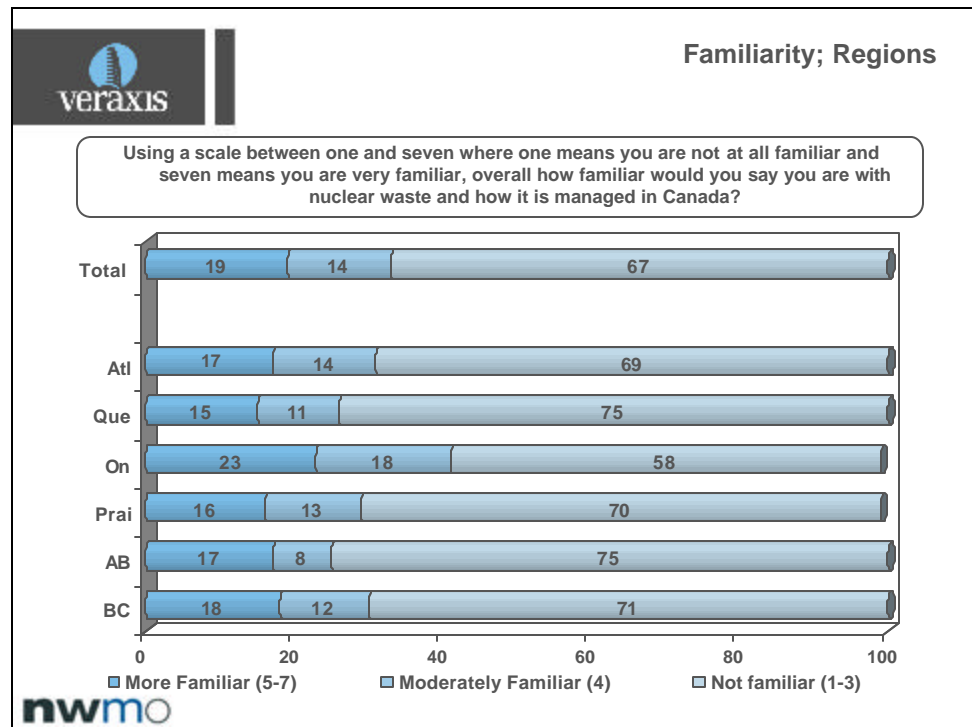




Residents in site communities appear to be more knowledgeable than residents in the rest of Canada. Thirty per cent rated their knowledge at the high end of the scale compared to 19% of residents in the rest of the country. While one-third of residents in the rest of Canada said they were not at all familiar (point one on a seven point scale) just 22% of site community residents said this.

Within site communities, Involved residents are more likely to report being familiar with the nuclear waste management process. Forty-six per cent of Involved site community residents report being familiar compared to 24% of general population site community residents. Conversely, more than one-quarter (26%) of general population site community residents report being not at all familiar compared to just 9% of Involved site community residents.

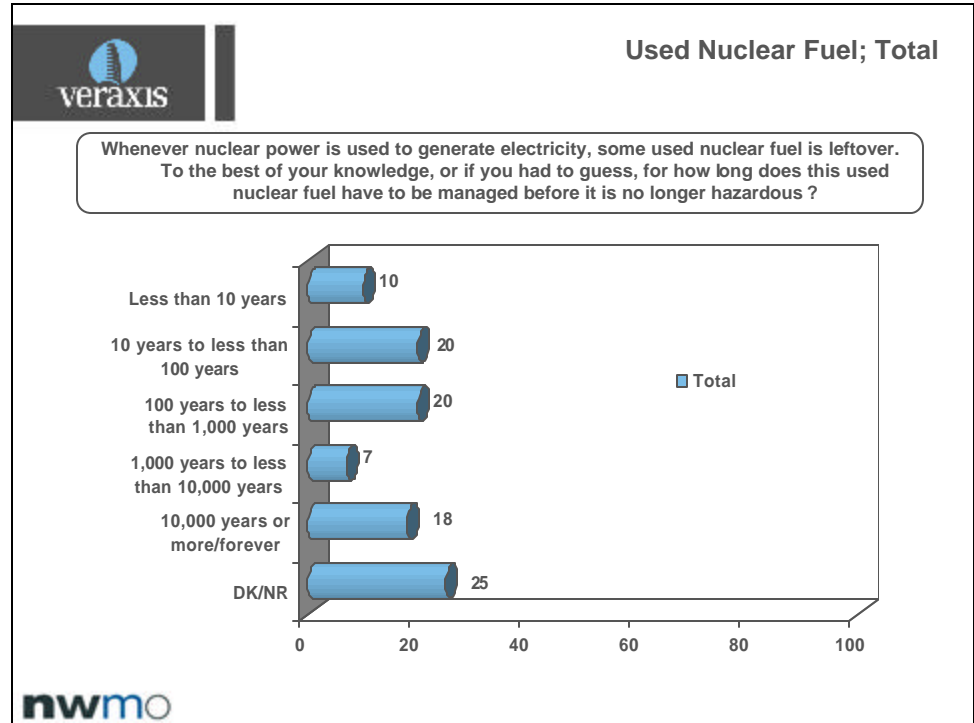
Ontario residents are significantly more likely to say they are familiar with how nuclear waste is managed than are residents in other regions with 23% reporting relatively great familiarity. Still, one-quarter chose a one and 58% of Ontarians chose the lower half of the scale.



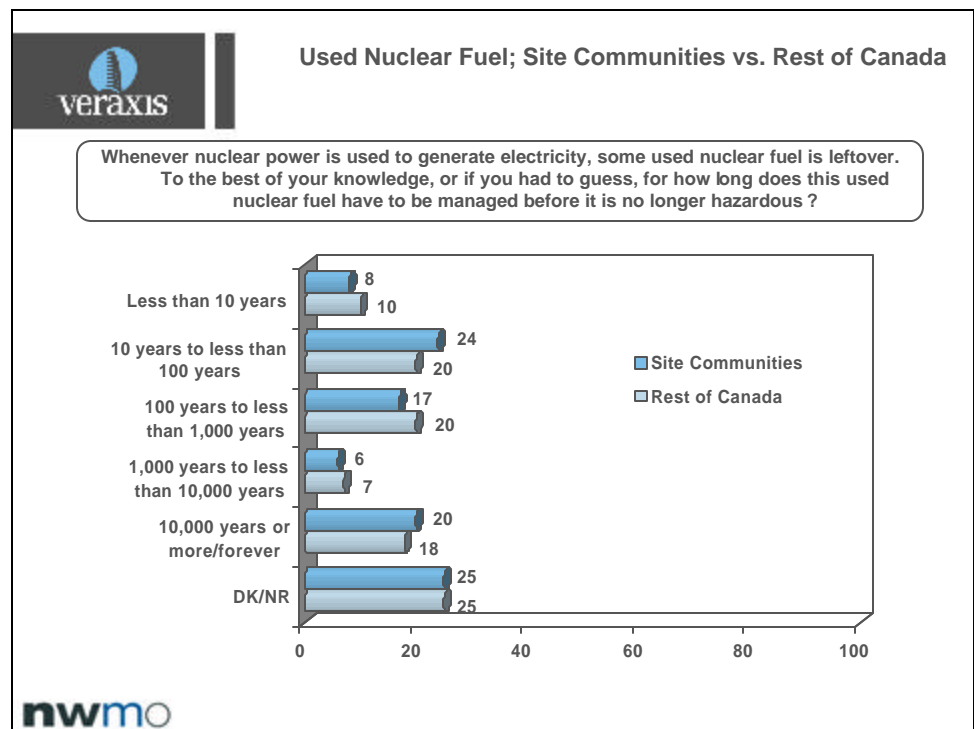
Women (74%) are much more likely than men (60%) to say that they have low or no familiarity with nuclear waste management. Conversely, one-quarter of men report relatively high familiarity compared to 13% of women.

### Length of Time that Nuclear Waste is Hazardous

As was the case last year, one-quarter of Canadians correctly estimate that nuclear waste stays hazardous for thousands of years. Another one-quarter of Canadians simply said “Don’t Know/No response”, (down from 31% last year) the remaining 50% underestimated the length of time during which nuclear waste remains hazardous. In fact, one-third of Canadians (30%) believe that nuclear waste is hazardous for 100 years or less and 20% think it is hazardous for 100 to 1000 years.

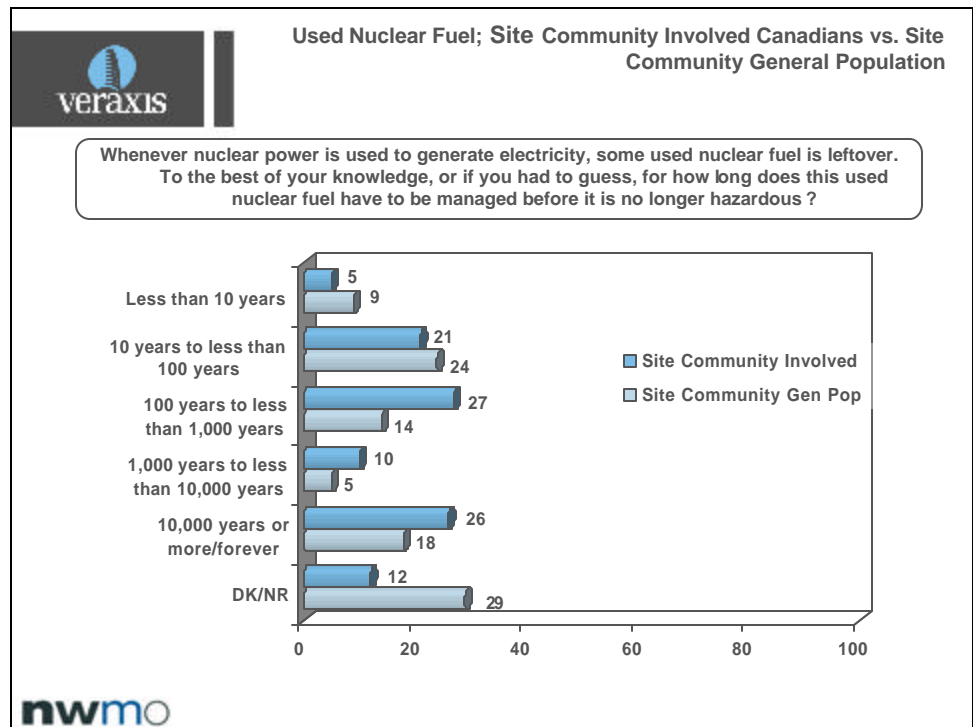


Site community residents are no more or less aware of the length of time during which used nuclear fuel remains hazardous than other Canadians.



Involved Canadians, whether in site communities or in the rest of Canada, are significantly more likely to correctly estimate the length of time during which used nuclear fuel remains hazardous. For instance, 36% of Involved site community residents and 34% of Involved residents in the rest of Canada estimate that waste stays hazardous for 1000 years or more compared to 23% of general pop site community residents and 21% of the general population in the rest of Canada. Conversely, general population site community residents are significantly more likely to respond DK/NR than are Involved site community residents.

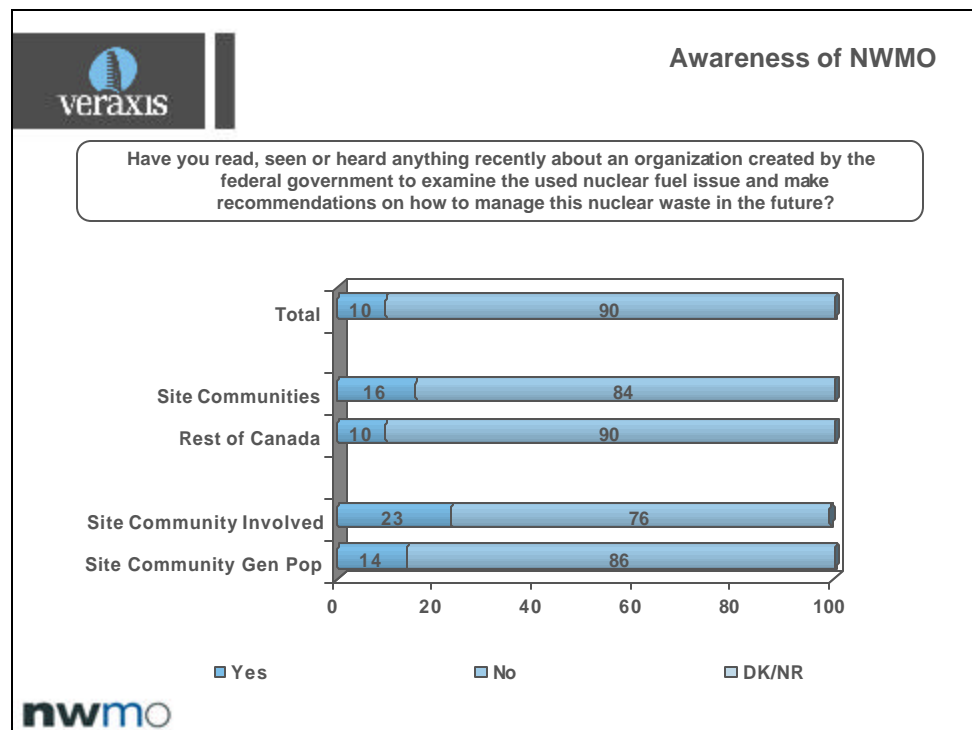
At the national level, women are significantly more likely than men to simply respond “DK/NR”. Men are more likely than women to provide an answer – both correctly and incorrectly. Men are significantly more likely than women to provide an underestimate of the length of time for which nuclear waste remains hazardous and one-third of men correctly estimate that nuclear waste stays hazardous for at least 1000 years compared to 19% of women.



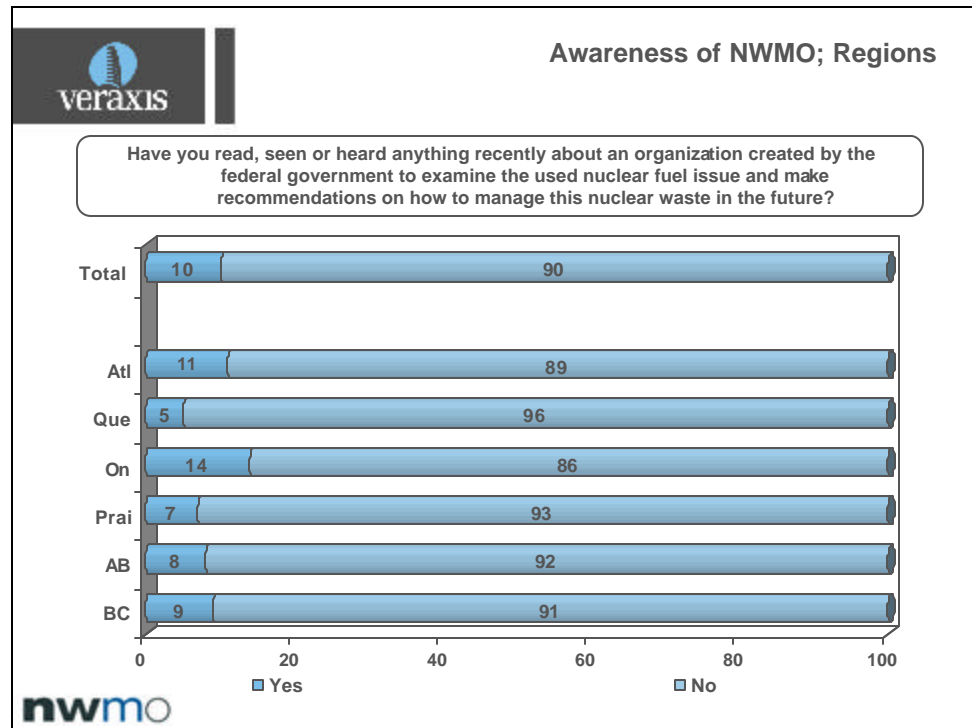
## Awareness of NWMO

Ten per cent of Canadians report that they have heard about the Nuclear Waste Management Organization, virtually unchanged from last year's 9%.

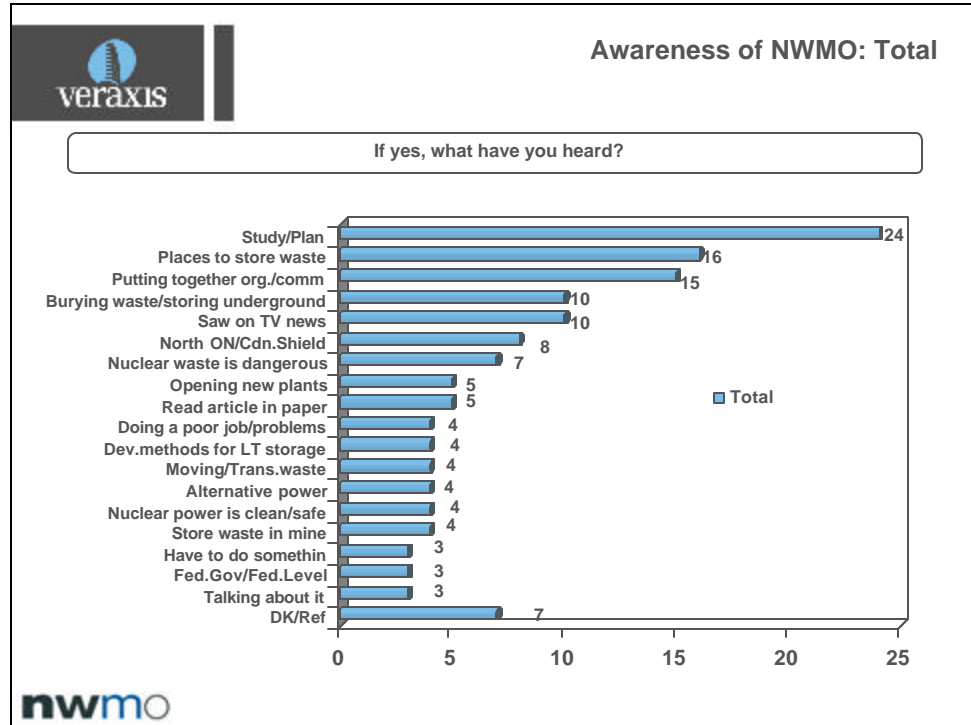
Site community residents are more likely to have heard of NWMO, and within site communities, Involved residents are significantly more likely than general population residents to report having heard of this organization. This is also true at the national level, where Involved Canadians (15%) are twice as likely as the general population (7%) to say they have heard of the NWMO.



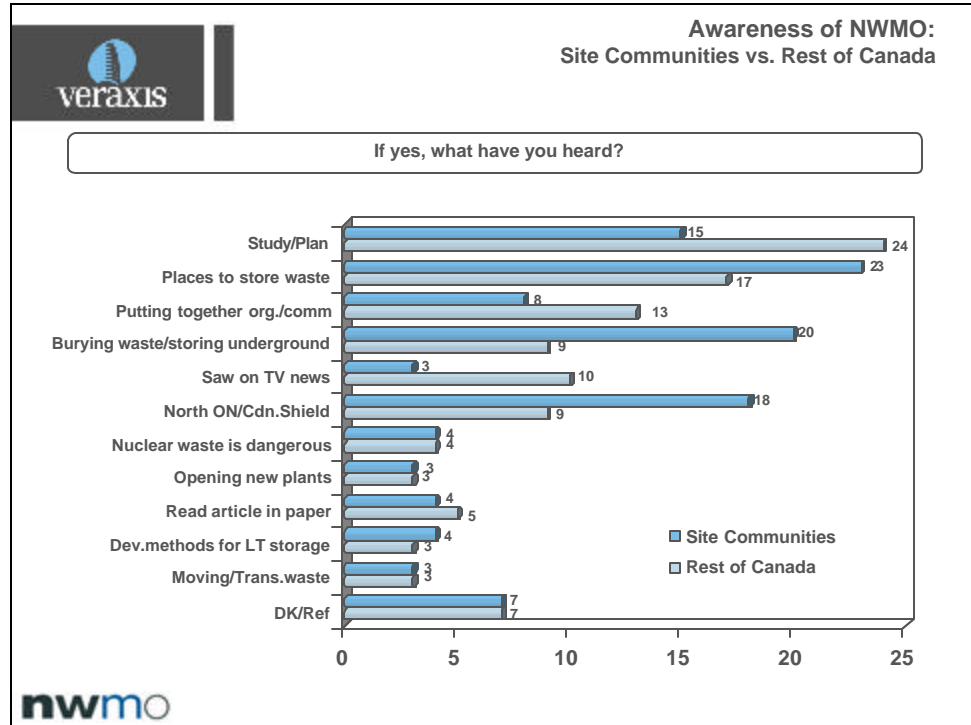
Nationally, awareness is highest in Ontario (14%) and the Atlantic region (11%).



Of those who have heard something about an organization created by the federal government to examine the used nuclear fuel issue (10% of national), 24% say the organization is going to do a study/examine situation, 16% say they are looking for a place to store/dump/manage nuclear waste, and 15% say they are putting together a committee or organization.



Because of small sample size, differences between site community residents and residents in the rest of Canada in what they have heard of NWMO should be taken only as indicative but certainly not as representative. Having said this, what people have heard about the NWMO depends on where they live. Site community residents are more likely than residents in the rest of Canada to say that the NWMO is looking for a place to store the waste, is storing or burying the waste underground or is putting it in the Canadian Shield. At the same time, residents in the rest of Canada are more likely than site community residents to say they have heard the NWMO is conducting a study/devising a plan.



### Support for the Mandate of the NWMO

Three years ago, the federal government passed a law to create the Nuclear Waste Management Organization, also known by its initials as the NWMO. Respondents were read a brief statement about the goal of the NWMO:

“Three years ago, the federal government passed a law to create the Nuclear Waste Management Organization, also known by its initials as the NWMO. I am going to read you a brief statement about the goal of the NWMO.

The NWMO is an organization created in the fall of 2002 to recommend a long-term approach for managing used nuclear fuel produced by Canada’s electricity generators. While nuclear waste in Canada is currently being safely managed, no permanent long-term management solution has been adopted.

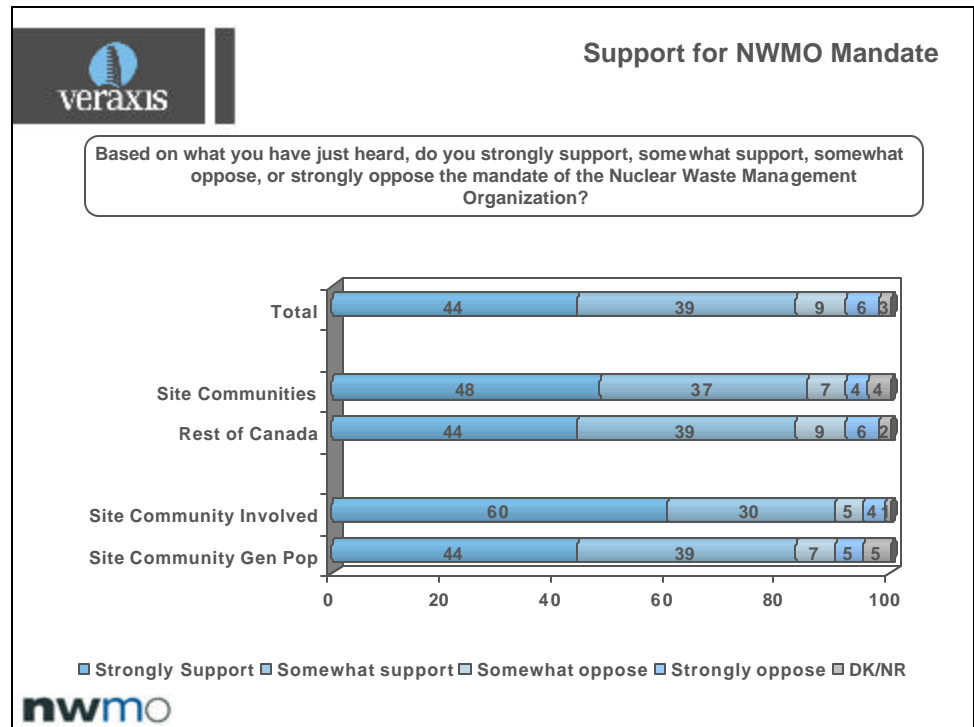
The first job of the NWMO is to recommend a plan to the government of Canada for the management of this used nuclear fuel by November



2005. In developing this plan, the NWMO is required to consult stakeholders, experts and the general public as it develops a comprehensive, integrated and economically sound approach for Canada.”

Based on the preceding explanation of the mandate of the NWMO, a large majority of Canadians support the Organization. Eighty-three per cent of Canadians who do not live in site communities support the organization and 85% of site community residents support the organization. Only 11% of site community residents oppose the NWMO and 15% of residents in the rest of Canada.

Support is high across the country ranging from a low of 76% of Albertans to a high of 85% of Ontarians.



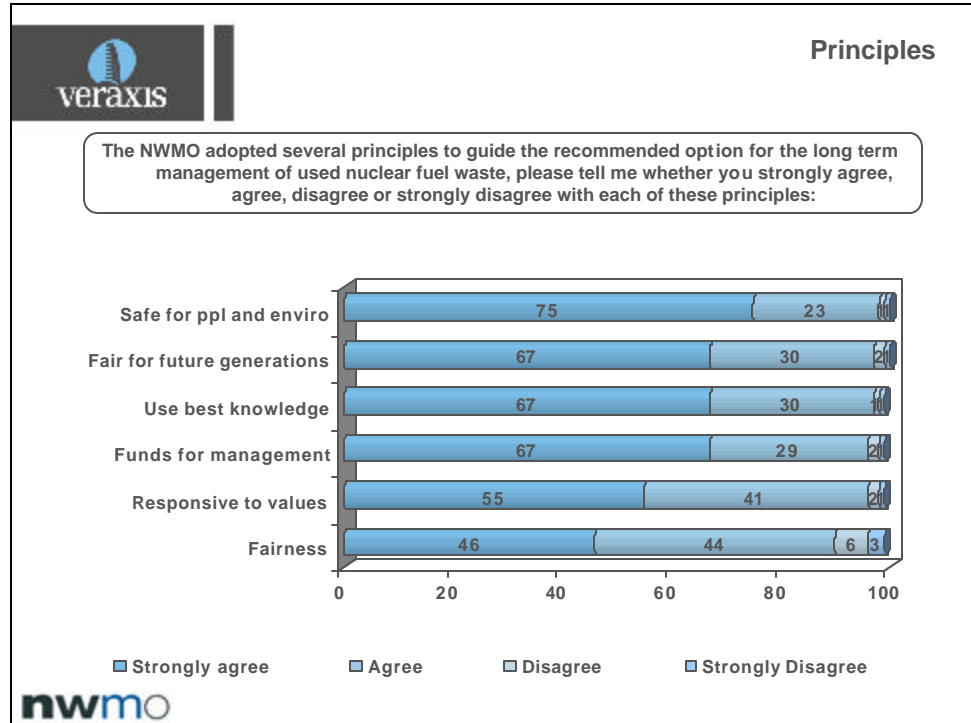
## NWMO Principles

The principles adopted by the NWMO to guide the recommended option for the long-term management of used nuclear fuel waste receive overwhelming public support.

Ninety-eight per cent of Canadians agree, 75% cent strongly, that the recommended option must be safe and secure to protect people and the environment. Two-thirds of Canadians strongly agree, 79% cent agree, that the approach must be fair to future generations, use the best scientific and technical knowledge available in Canada and around the world, and ensure that the companies who created the waste have set aside sufficient funds to pay for the cost of properly managing the waste. Ninety-six per cent agree, 55% strongly, that the approach must be sensitive and responsive to the values and objectives that are important to citizens, and 89% agree, 46% strongly, that the approach must be fair in how it distribute costs, benefits and responsibilities to different regions and communities.

There are no significant differences between site community residents and residents in the rest of Canada in support for the criteria the NWMO has adopted to guide the process of selecting a waste management option. The one exception to this is slightly weaker support among site community residents for the requirement that “the approach must ensure that the companies who created the waste have set aside enough funds to pay the costs of managing the waste’. While noting the difference, it is important to state that support for this requirement stands at 93% among site community residents. Additionally, within site communities, Involved residents are as supportive as are general population residents of the criteria. Similarly, there is no significant different between residents of southern and northern Ontario in support for the criteria.

It is important to state that support is universally high. Nonetheless, women are more supportive than men of the requirements to ensure that the approach fairly distributes the costs, benefits and responsibilities to different regions and communities and that the companies that produced the waste must put aside funds for the management of the waste.



### Adaptive Phased Management Approach

Respondents were presented with five elements of the Adaptive Phased Management Approach. For each element, respondents were asked if any aspect of the element sounded reasonable or appropriate. Next, the respondents were asked what concerns if any they have about the element.

Generally speaking, respondents were most comfortable with a phased decision making process supported by a process of continual learning. Elements that included the ability to adjust the plan based on new scientific learnings or technical development was also appreciated as was ensuring that future generations retained some choice. Regarding the technical aspects of deep burial, respondents were most supportive of having the waste removed from large population centers, isolation and centralization. It appears that Canadians are more supportive of deep burial than of shallow burial.

Concerns tended to centre on containment of the waste and protection of the environment from leakage. Transportation was also a concern raised by about 10% of Canadians. There is some evident concern that shallow storage poses risks due to excess handling and is not as secure as deep burial. The long time

frame for implementation raises concerns that the process will be stalled due to disorganization, lack of ability to agree on a final solution or simply losing interest. There is evidence to suggest that the public is more comfortable with moving to a solution that has been scientifically, technically and socially proven viable.

Whatever the specifics of the particular technical recommendation, management effectiveness and responsiveness is clearly a consistent requirement from the public. Safety rests on proper management.

In looking at responses to all five Elements, Involved Canadians tend to be more critical of the elements than are general population Canadians – in site communities as well as nationally. Northern Ontario residents tend to be less supportive of things-nuclear generally and more concerned about elements than are southern Ontarians.

In order to put the results in context, it is important to note there is a segment of the population that finds nothing reasonable about the elements and conversely a correlating segment that has no concerns about the elements. For instance, of the 19% who did not find anything reasonable about the first element:

- 25% found nothing reasonable about Element II
- 54% also found nothing reasonable about Element III
- 36% found nothing reasonable about Element IV
- 51% found nothing reasonable about Element V

The obverse is also true. Of the 12% of Canadians who said they have 'no concerns' about Element 1:

- 75% also had no concerns about Element II
- 53% had no concerns about Element III
- 65% had no concerns about Element IV
- 57% had no concerns about Element V

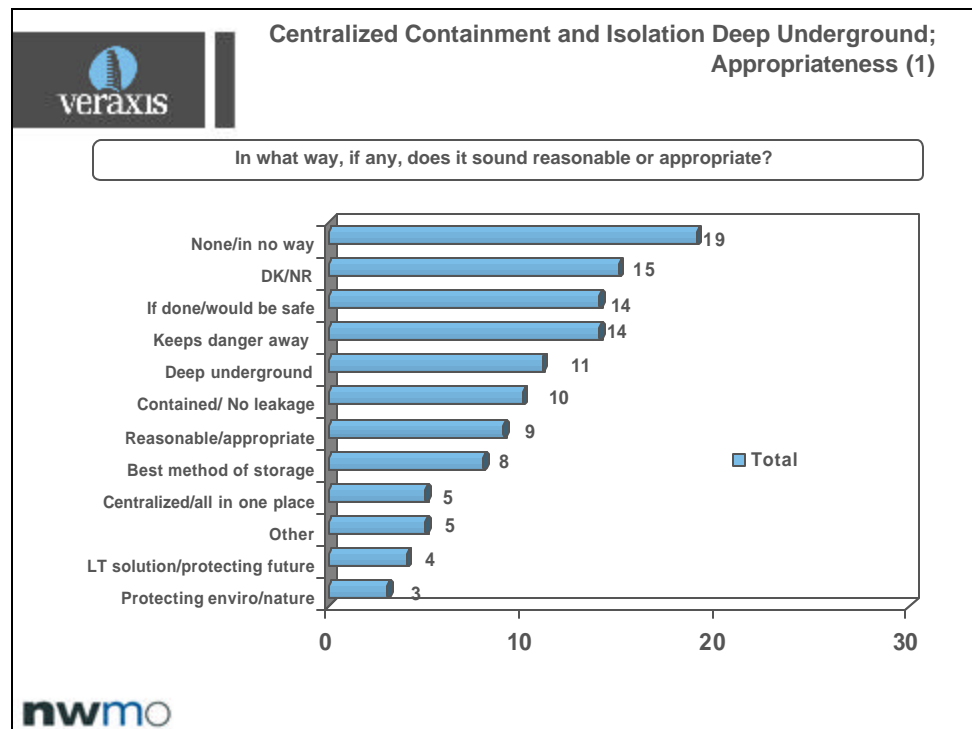
### Element I

“Used fuel would be moved from nuclear power stations, where it is currently temporarily stored, to a centralized site and placed in a specially constructed repository built deep underground. This repository would be designed to isolate and contain the waste for the very long time period for which it remains hazardous.”

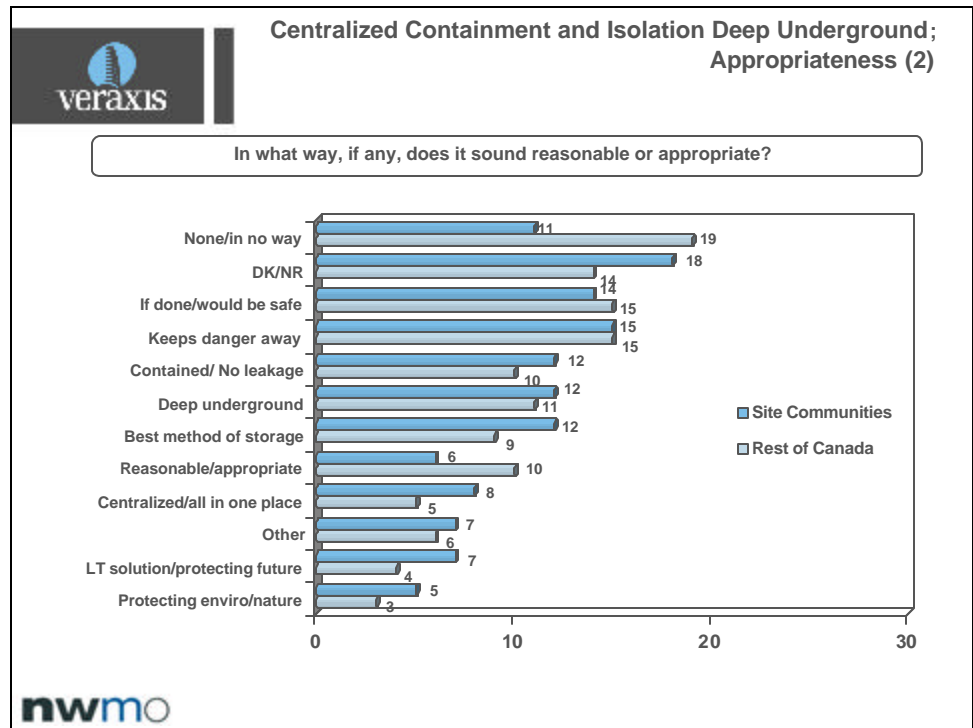
Perceived benefits to this element of the approach are dominated by the fact that the waste is stored away from large population centers, the waste is deep underground, and the waste is centralized. Concerns regarding this element are primarily focused on the potential for leakage, contamination of the environment and groundwater, transportation, safety generally and unknown long term effects.

#### *Reasonable Aspects of Element 1*

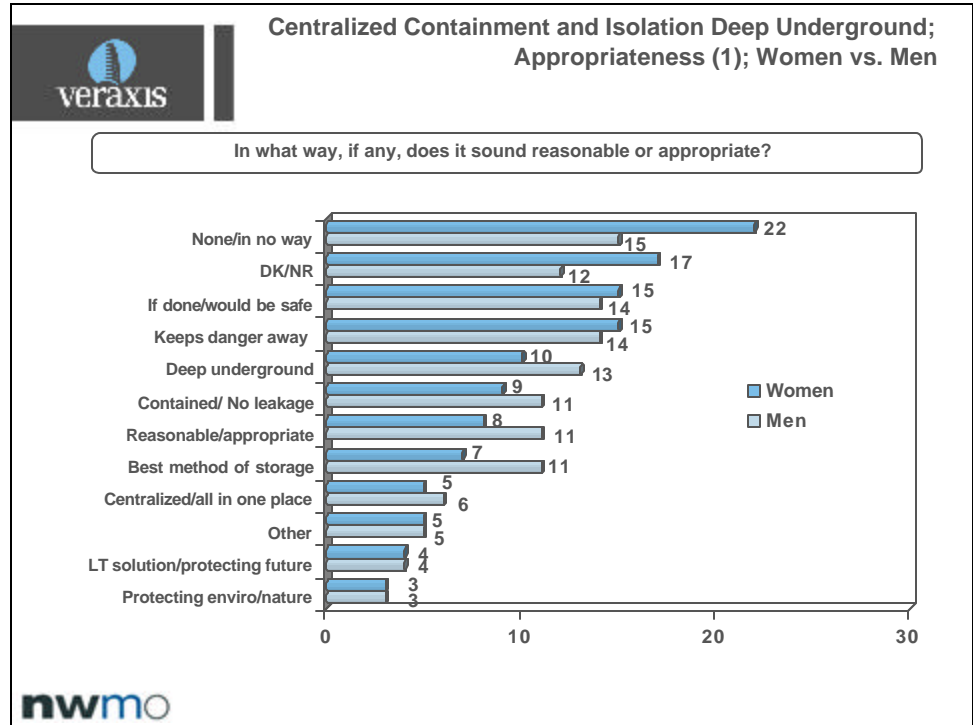
Benefits seen as particular to Element 1 are that it stores the waste away from large population centers/is isolated and that the waste is stored deep underground. Centralization is also seen as an advantage. Nineteen per cent of Canadians do not find any part of this element reasonable.



Response patterns regarding benefits of this element do not differ substantially between site community residents and residents in the rest of Canada. One exception is that site community residents are less likely than residents in the rest of Canada to say there is 'nothing' reasonable about this element. For instance, while 19% of residents in the rest of the country found nothing reasonable just 11% of site community residents found nothing reasonable.

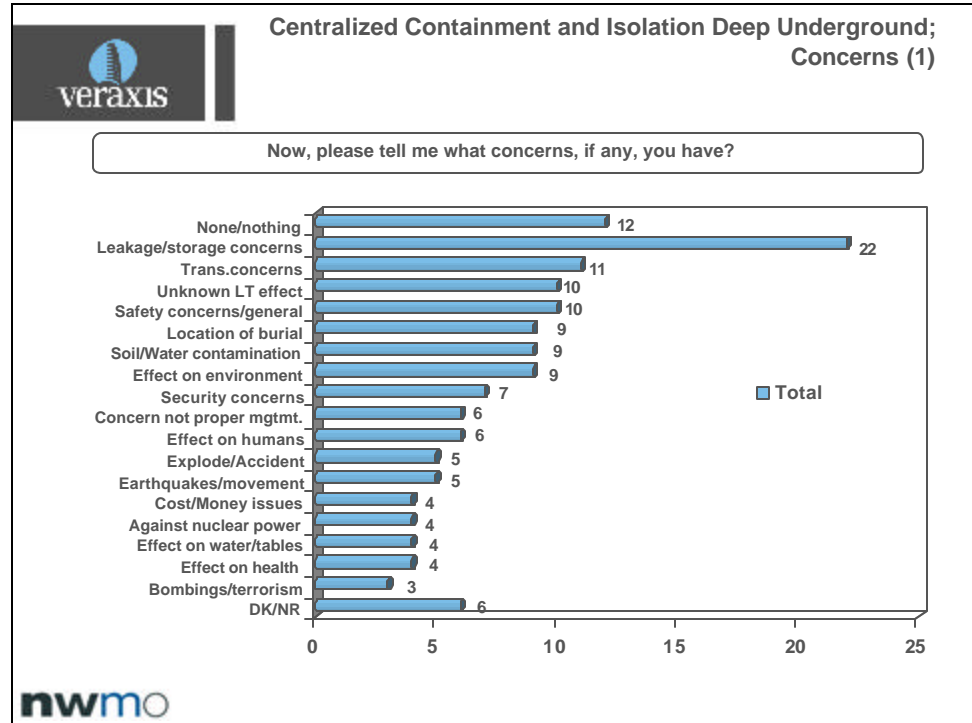


Nationally, women (22%) are more likely than men (15%) to say that there is no reasonable/appropriate aspect to this element. There is no one reason that men are more comfortable with this element.



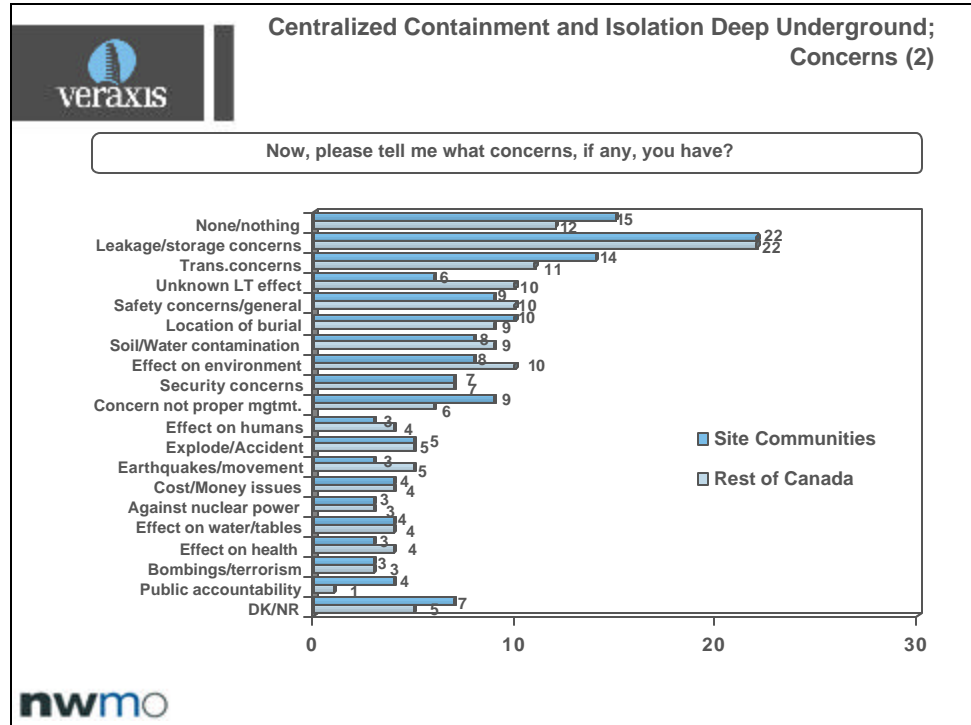
*Concerns regarding Element 1*

When looking at public concerns about this phase of the options, the integrity of the storage containers are the primary concern. One in five Canadians (22%) mentioned that they would be concerned about leakages and/or storage containers. Other concerns are relatively wide ranging. For instance, 11% of Canadians are worried about transportation, 10% are worried about unknown long-term effects, 10% are worried about safety generally, and 9% of Canadians are worried about the location of the burial, the effect on the environment and soil/water contamination. Twelve per cent of Canadians have no concerns about this element at all.



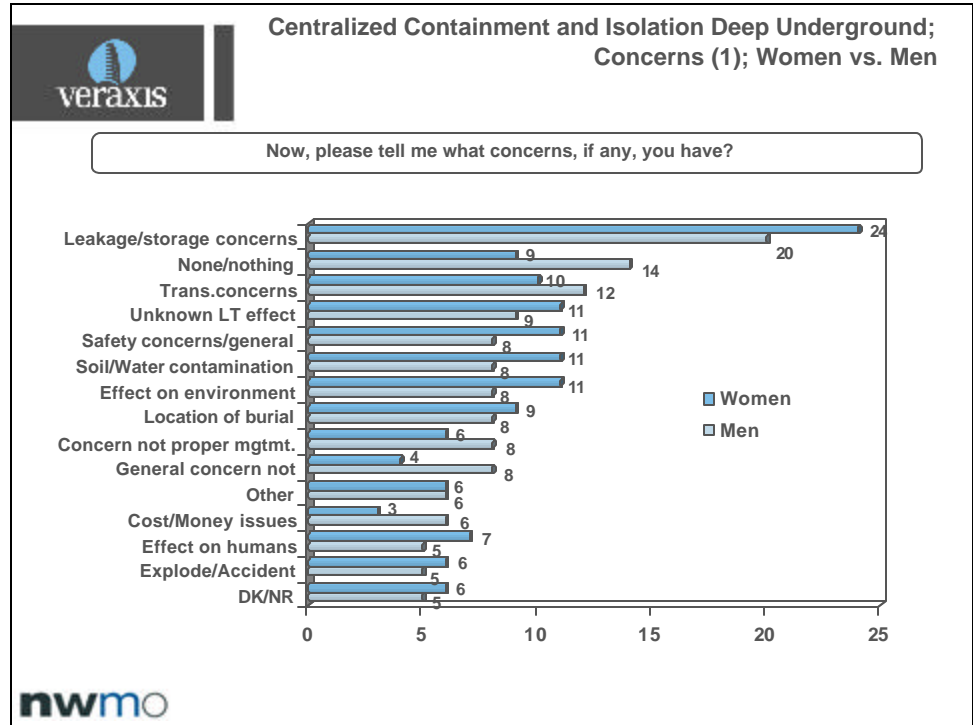
There are few differences in concerns between site community residents and residents in the rest of Canada. The top concern among both populations is leakage/storage followed by transportation, unknown long term effects, and safety concerns generally, location of the burial, soil and water contamination and the effect on the environment. Residents in the rest of Canada are *slightly* more worried than site community residents about any unknown long terms effects and the effect on the environment.





Within site communities, Involved residents (6%) are significantly less likely than the general population (18%) to say they have no concerns. Involved site community residents are more concerned than general population site community residents about transportation, bombing/terrorist attacks, and affects on the environment. General population site community residents are more concerned than Involveds with possible affects on human health.

Women are less likely than men (9% of women vs. 14% for men) to say they have no concerns about this element of the approach. Women are more likely to be concerned about leakage from the storage containers but no other concerns stand out disproportionately. Instead, more women tend to express each concern more than men.

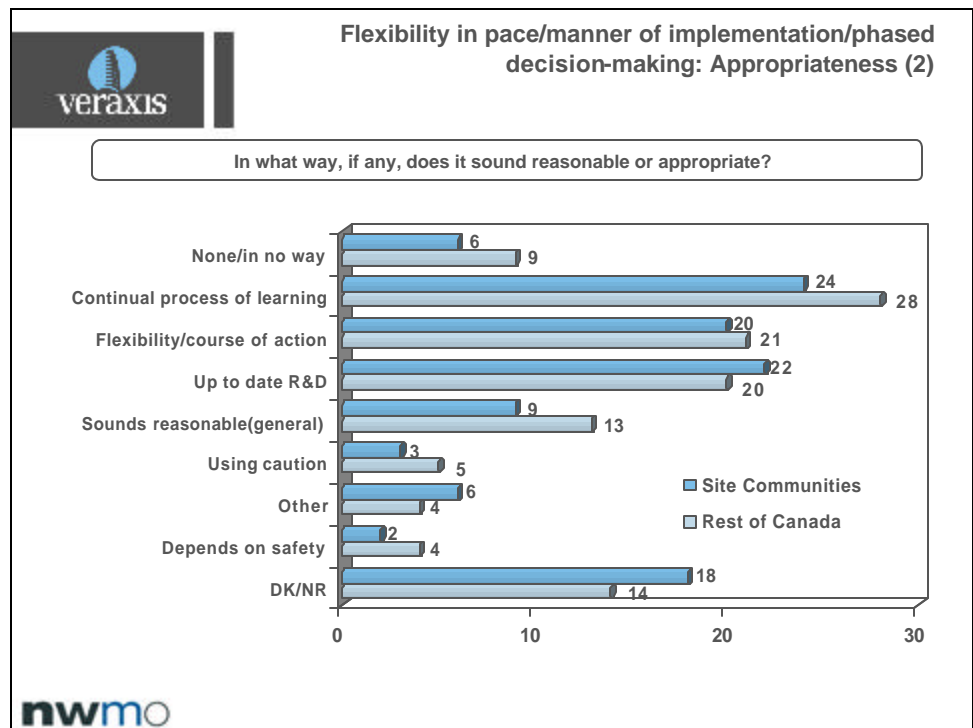
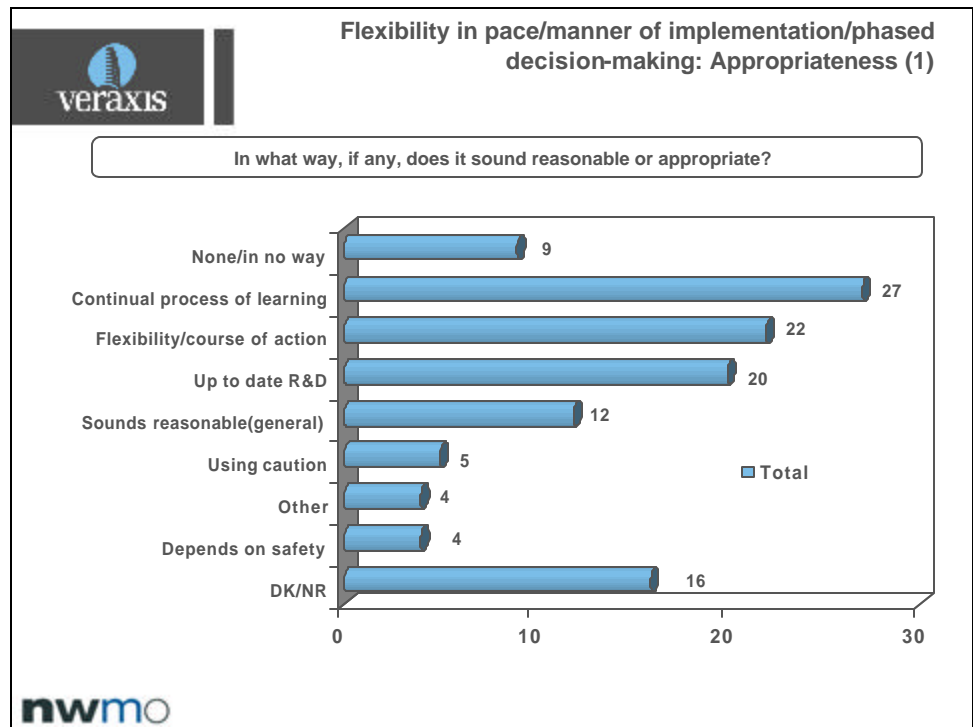


## Element II

“We would put this repository in place using a phased decision making process, supported by a program of continuous learning, research and development. By a phased decision process, we mean breaking the work into a series of steps. At each step, we might decide to revise, halt, or reverse our plan. This would allow us to take advantage of new learning, any new technologies which may emerge, and changes in the needs of society.”

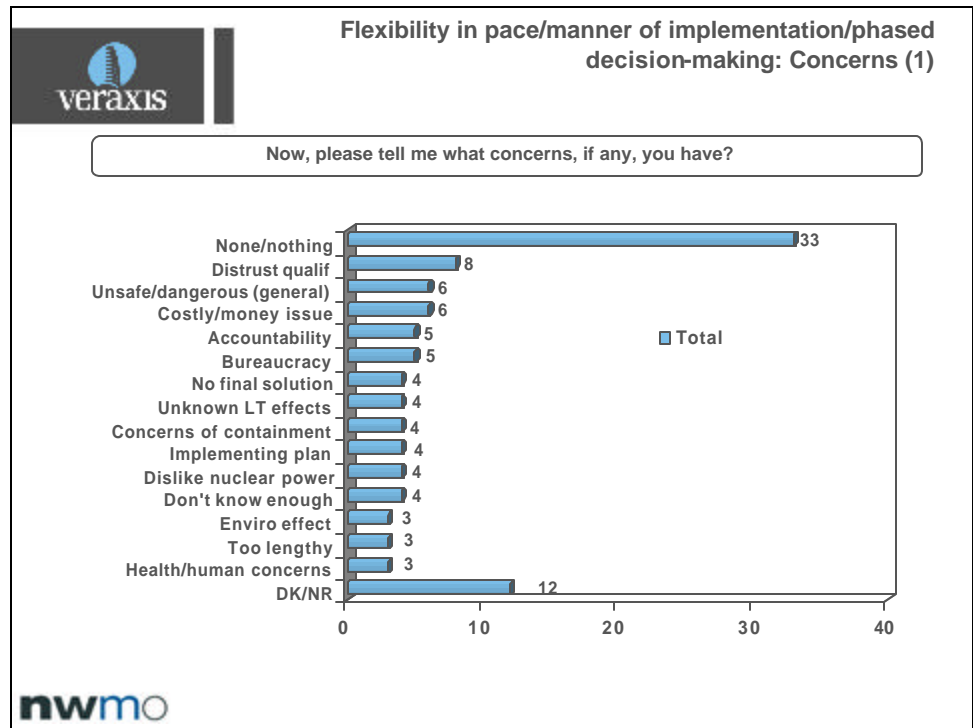
### *Reasonable Aspects of Element II*

Public support is strong for the recommendation of a phased decision making process supported by continuous learning. Almost half (47%) of Canadians see the benefit of this element of the option as continuous learning and keeping up to date on the latest technologies. Another 22% see benefit in being able to change the course of action based on new research. Just 9% of Canadians do not see any benefit to this element. There are no sizeable differences between site community residents and general population.

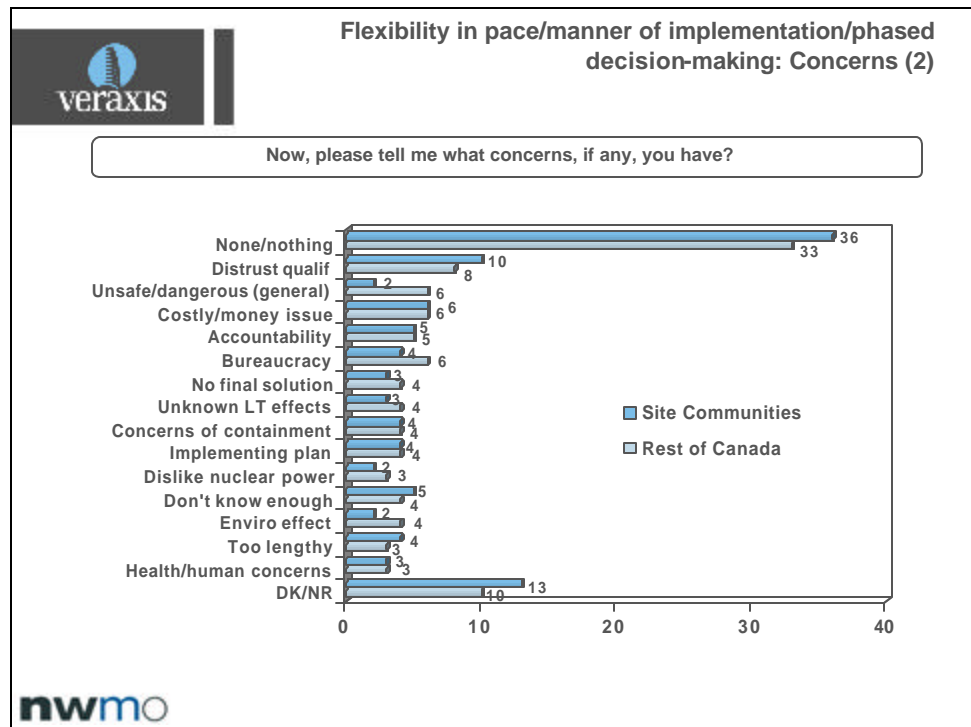


*Concerns regarding Element II*

One-third of Canadians have no concerns with this element of the approach. Expressed concerns centered on management and organizational issues. About 16% believe this type of process may lead to disorganization, the inability to arrive at a final plan, difficulty in implementing changes and the length of the process. Less than 10% simply don't trust the management while another 5% want to ensure that the management is transparent and accountable.



Involved site community residents are more likely than general population site community residents to say there is nothing beneficial to this element of the approach (11% to 6%), but they are also more likely to say they have no concerns. For instance, 24% of Involved site community residents say have no concerns compared to 18% of the general population in site communities.

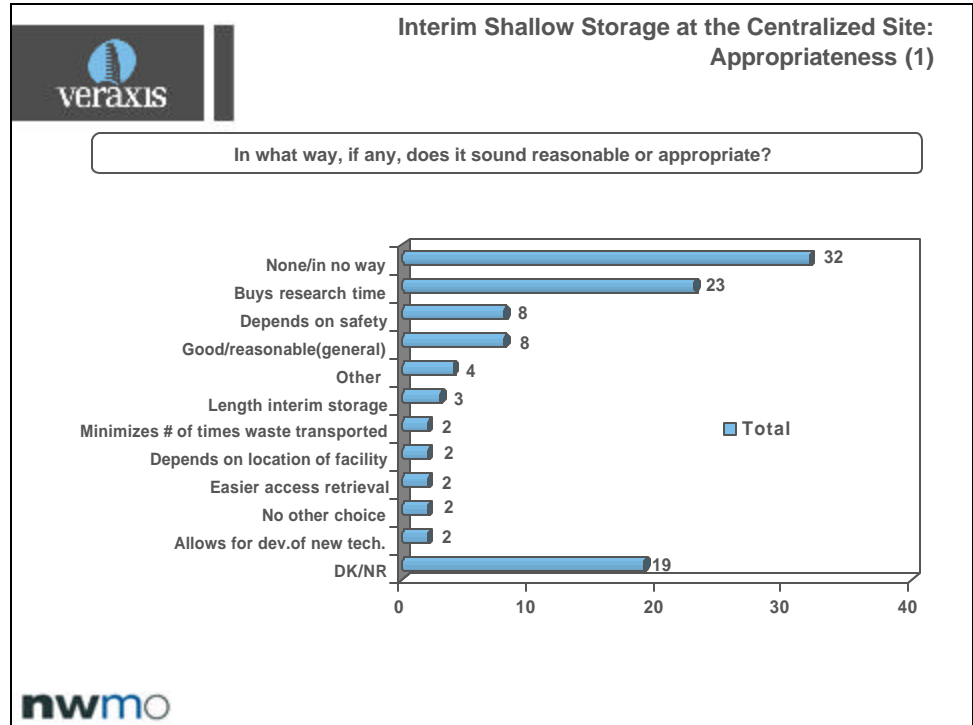


### Element III

“Before we place the used fuel in deep repository, we might decide to go through an additional step of interim shallow storage. The used fuel would be moved from the reactor sites to the central site, where the deep repository would be located, and put in a shallow underground storage facility. This would allow more time for research and decision making about the deep repository before used fuel is placed in it.”

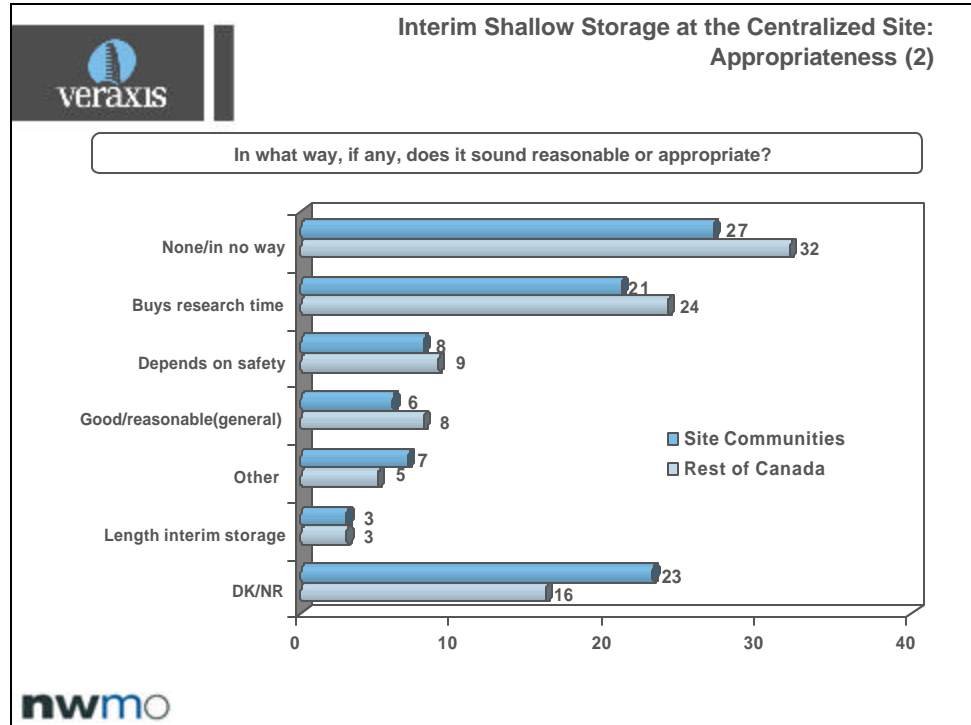
#### *Reasonable Aspects of Element III*

Just under one-quarter (23%) said that this element allowed for more research in order to ensure a good long-term solution. Eight percent of Canadians said that it ‘depended on the safety’ of the element and another eight percent expressed ‘general’ sounded reasonable. One-third of Canadians could not offer any reasonable or appropriate aspect to this element.



Compared to the one-third of residents in the rest of Canada, 27% of residents in site communities say there is nothing reasonable about this element of the option. Similar to residents in the rest of Canada, the most reasonable aspect of this element to site community residents is that it allows more time for research.

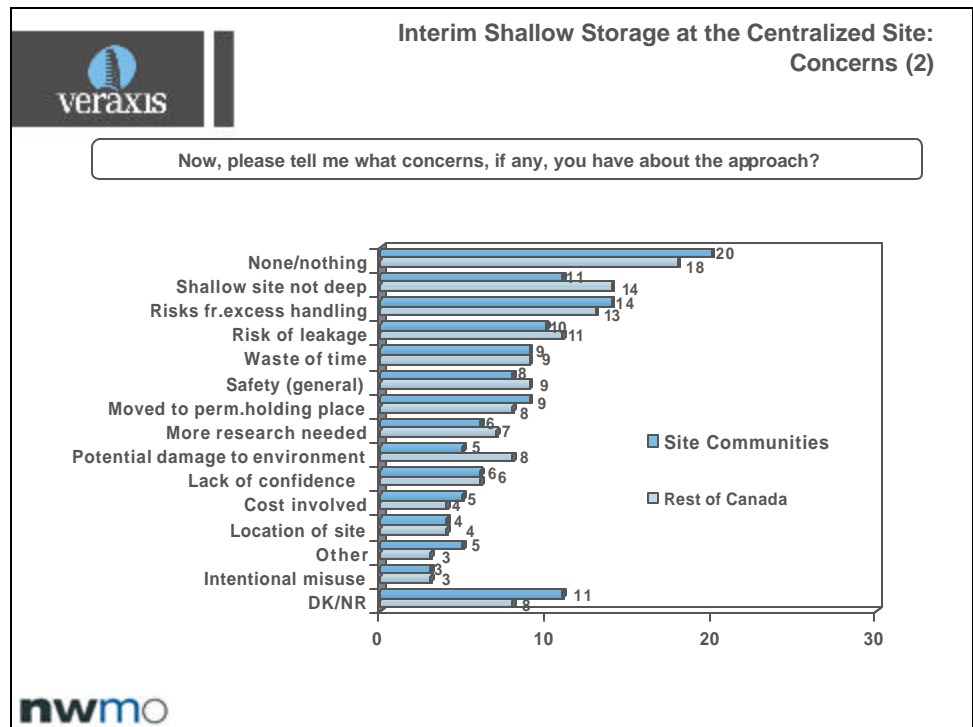
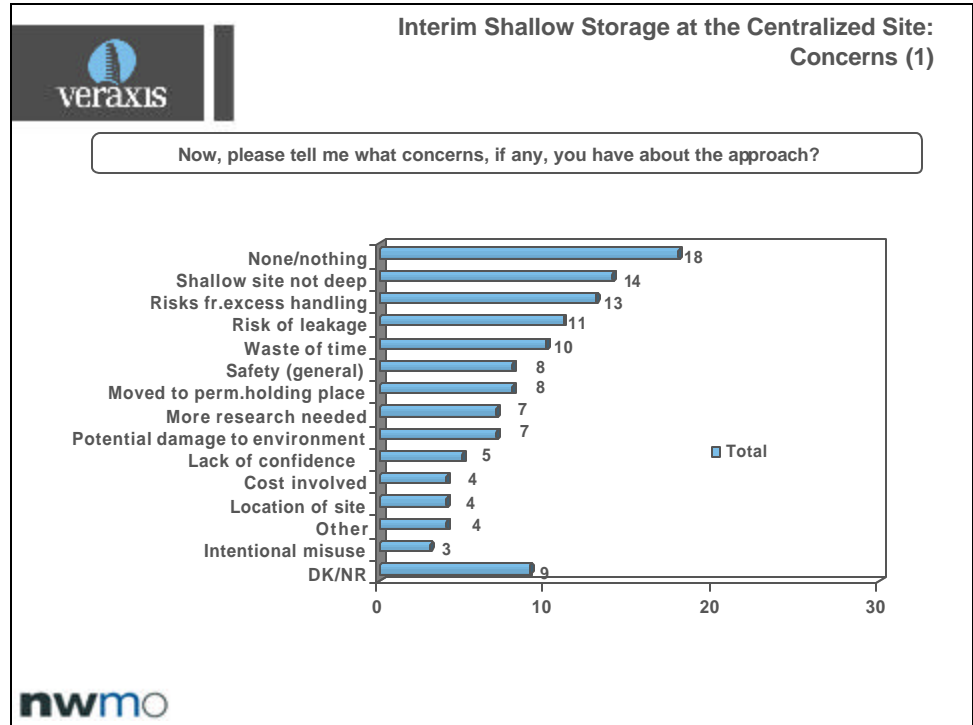
Involved site community residents are significantly more likely than general population site community residents to say that there is nothing reasonable about this aspect. Thirty-six per cent of Involveds say there are no reasonable aspects compared to 28% of general population.



*Concerns regarding Element III*

Several concerns with this element are common to storage elements (i.e. first element) such as risks of leakage and environmental contamination. Particular to this element of the approach are concerns that the site is not deep enough to ensure security. The risks incurred from excessive handling and transportation are also a concern and roughly 17% of Canadians are concerned about the amount of time involved and would rather move directly to permanent holding facility. Eighteen per cent of Canadians say they have no concerns regarding this element.

There are no significant differences between residents in site communities and residents in the rest of Canada. Within site communities, Involved site community residents are again less likely to say they have no concerns (12%) than are general population site community residents (19%). Specifically, Involved site community residents are more concerned than general population that the shallow site is not deep / secure enough and in safety generally.





Women (34%, compared to 30% for men) are also a bit more likely to not find anything reasonable/appropriate about the provision for interim shallow storage at the centralized site, and at the same time are a bit less likely (16%, vs., 20% of men) to say that they have no concerns.

#### **Element IV**

**“The used fuel would be monitored to support the collection of new information and to confirm the safety and performance of the repository. For an extended period, the used fuel would also be retrievable, that is until a future society decides to close the repository.”**

#### **Reasonable Aspects to Element IV**

The perceived advantages of this element are foremost that it provides the opportunity to ‘discover a future use’. Other strengths of this element of the option are that the waste is easy to monitor and retrieve and that it allows future generations to make different decisions. Just 16% could think of no benefit.<sup>1</sup>

Men are more likely than women to say that a reasonable aspect to this element is that it allows for future use of used nuclear fuel waste.

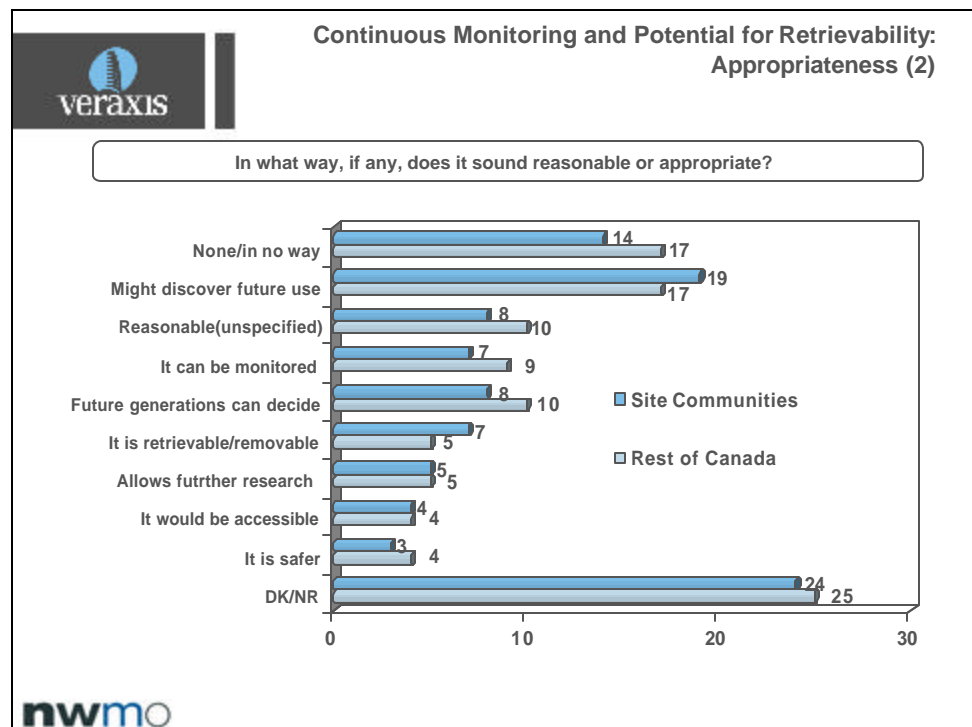
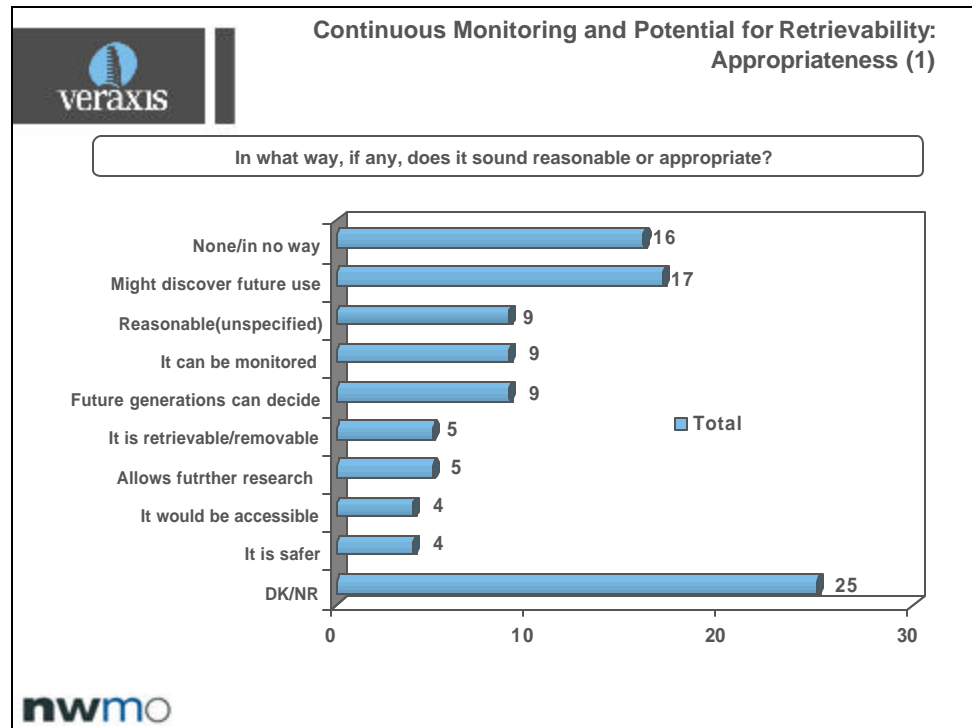
There are no significant differences between site community residents and residents in the rest of Canada in pattern of responses. Similarly, there are no significant differences between residents of southern and northern Ontario.

Within site communities, Involveds are particularly impressed by the fact that this element of the option allows future generations to decide what to do with it – 14% Involved v. 6% general population. Involveds are also significantly more likely to

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<sup>1</sup> There is a disproportionately high number of DK/NR among both site community residents and residents in the rest of Canada regarding what they think is reasonable about this element. There were no apparent problems during pre-testing or during administration of the survey regarding the question, so this could signify a relatively neutral or unsure response among one-quarter of the population. The DK/NR rate is significantly lower in Ontario (16%) demonstrating stronger feelings about this element. Additionally, the DK/NR rate is significantly lower among Involved site community residents (17%) than general population site community residents (28%).

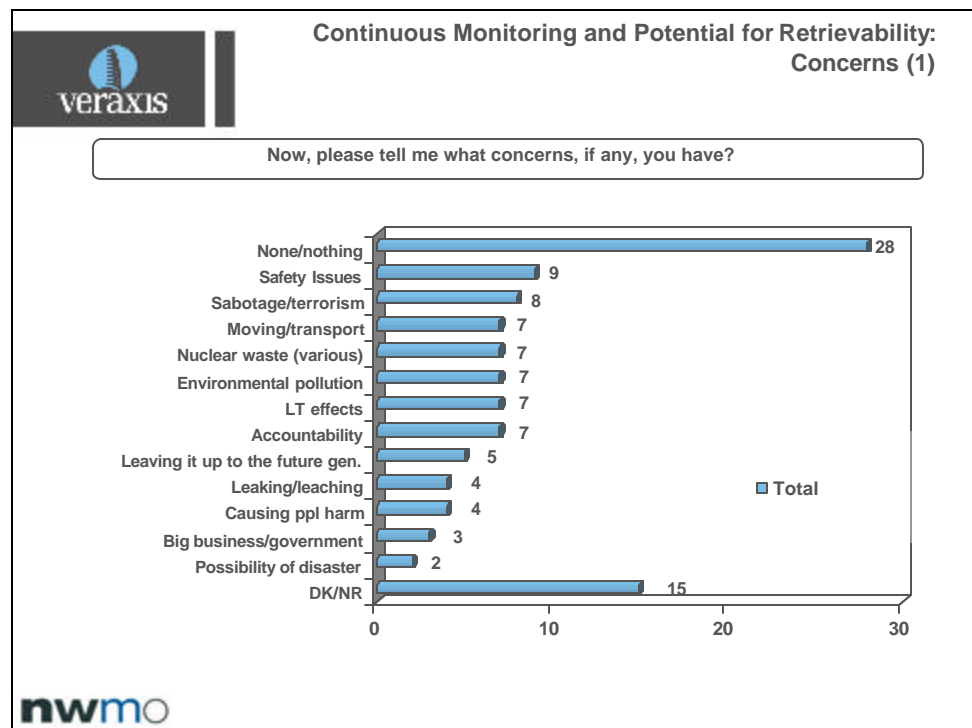
say (20%) there is no aspect of this element that is reasonable compared to general population (14%).



*Concerns regarding Element IV*

Potential concerns regarding this element of the option are relatively varied including safety issues, transportation, potential risk of sabotage due to the accessibility of the waste, environmental pollution, and long-term effects. More than one-quarter of Canadians (28%) said they have no concerns with this element.

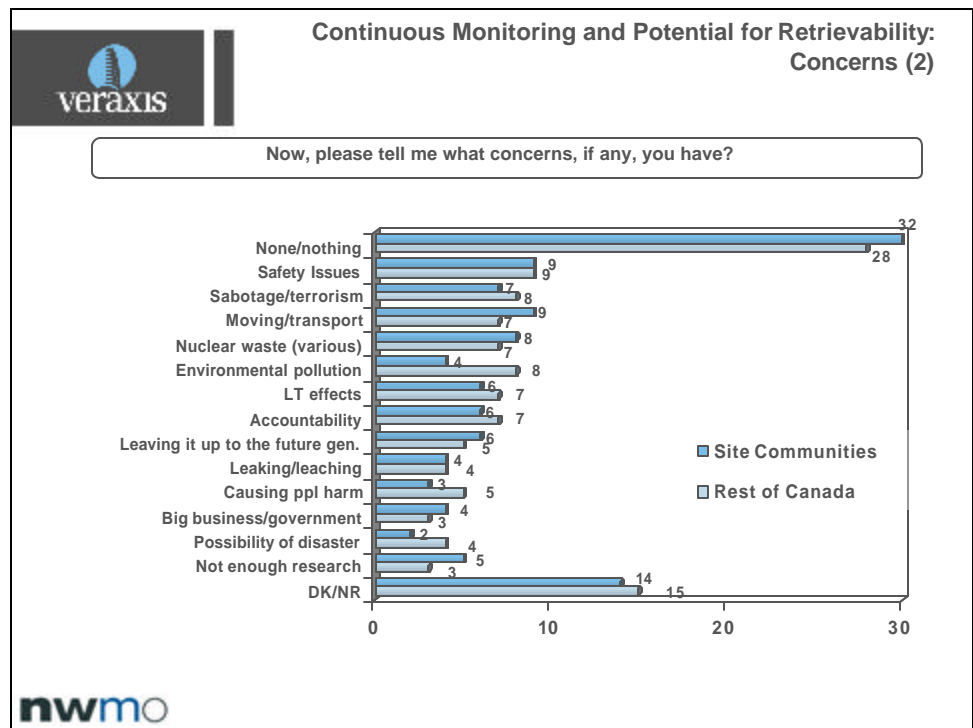
As we've seen thus far, differences between site communities and the rest of Canada tend to be in degree but not substantial. Regarding Element IV, the only slight difference is that residents in the ROC are more likely to offer "environmental pollution/contamination" as a concern (8%) than are SCR (4%) and site community residents (35%) are more likely to say they have no concerns about this element of the option than are of residents in the rest of Canada (28%).



Within site communities, Involved site community residents (9%) are more likely to be concerned that we haven't done enough research yet/don't know enough about it than are general population site community residents (3%). General population site community residents are more likely to say they have no concerns with this element (34%) than are Involved site community residents (20%).

Residents in northern Ontario are significantly more likely than residents in southern Ontario to have concerns. For instance, one-third of residents in southern Ontario have no concerns compared to 23% of residents in northern Ontario. Other than a higher degree of concern generally about nuclear waste (13% in northern Ontario v. 5% in southern), there is no one concern that is disproportionately higher among northern Ontarians than southern Ontarians. Instead, each concern is expressed among a slightly greater proportion of the population than in southern Ontario.

Women (26%) are less likely than men (31%) to have no concerns about this.

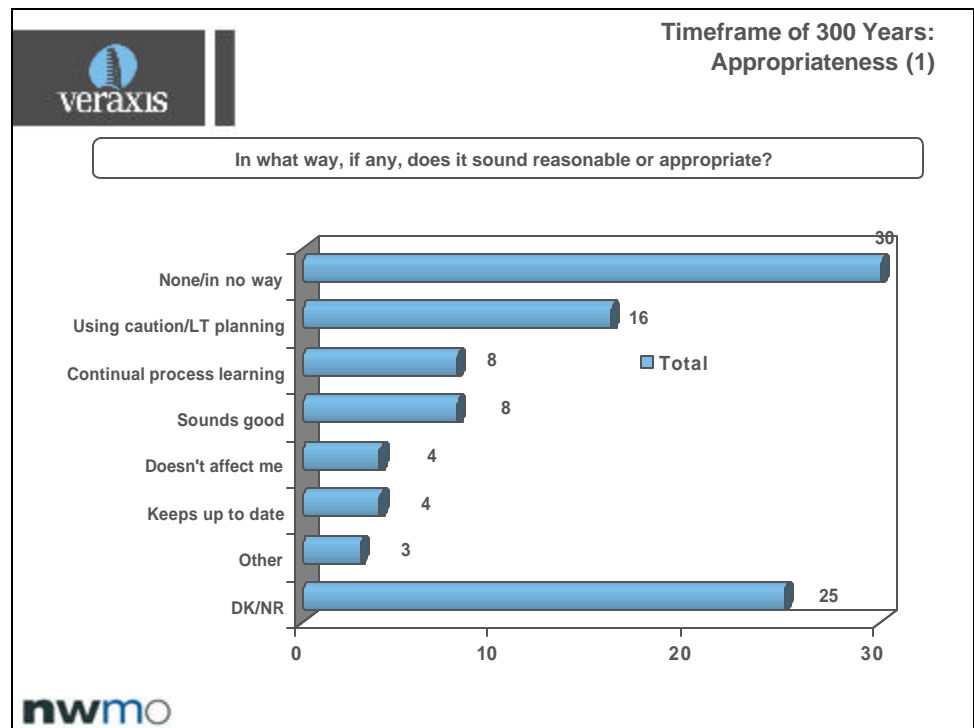


### Element V

“The implementation of this adaptive phased approach might be spread over a period of as much as 300 years.”

*Reasonable Aspects of Element V*

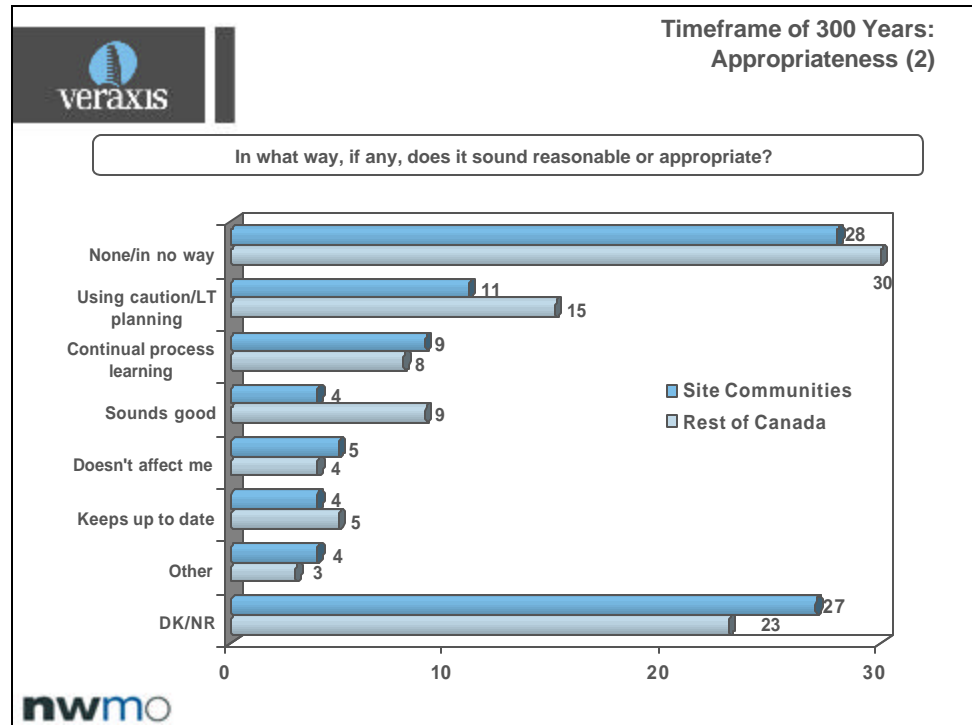
Benefits to this element are predominantly that a long time frame indicates a cautious and considered approach to the management of used nuclear fuel waste. The notion of continual learning and keeping up to date on latest technologies is also a perceived benefit. Once again, we see here that about 1/3 of Canadians are concerned about an element that involves a long time frame for implementation (similar to Element III). For instance, 30% of Canadians said that there isn't anything reasonable about this element.



There are no substantial differences between residents of site communities and residents in the rest of Canada. Within site communities, Involved residents are significantly more likely than general population to say there is nothing reasonable about this – 40% Involved compared to 29% general population site community residents. The difference between the two is evident in the DK/NR that is significantly higher among general population (29% versus 18% for Involved)

Northern and Southern Ontario differ significantly in the perceived benefits of this element. First, 35% of residents of northern Ontario say there is nothing reasonable about this element compared to just 29% in southern Ontario. Residents in southern Ontario are significantly more likely to say that this

element is reasonable because it demonstrates using caution rather than rushing into anything (21% southern Ontario v. 15% northern Ontario) and that it involves a continual process of learning (10% southern Ontario v. 5% northern Ontario).

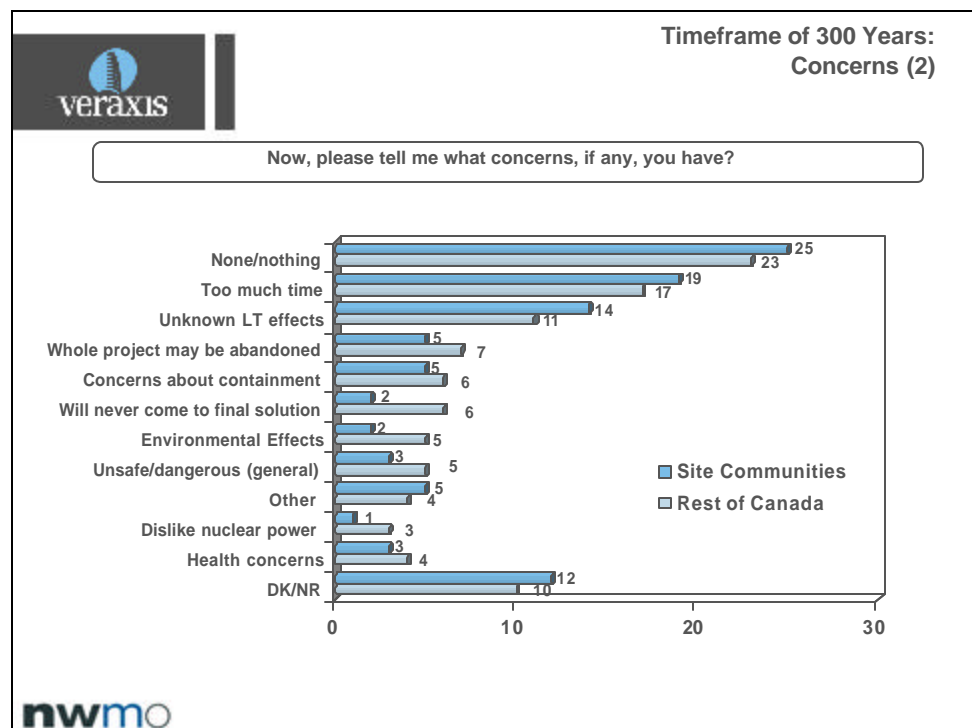
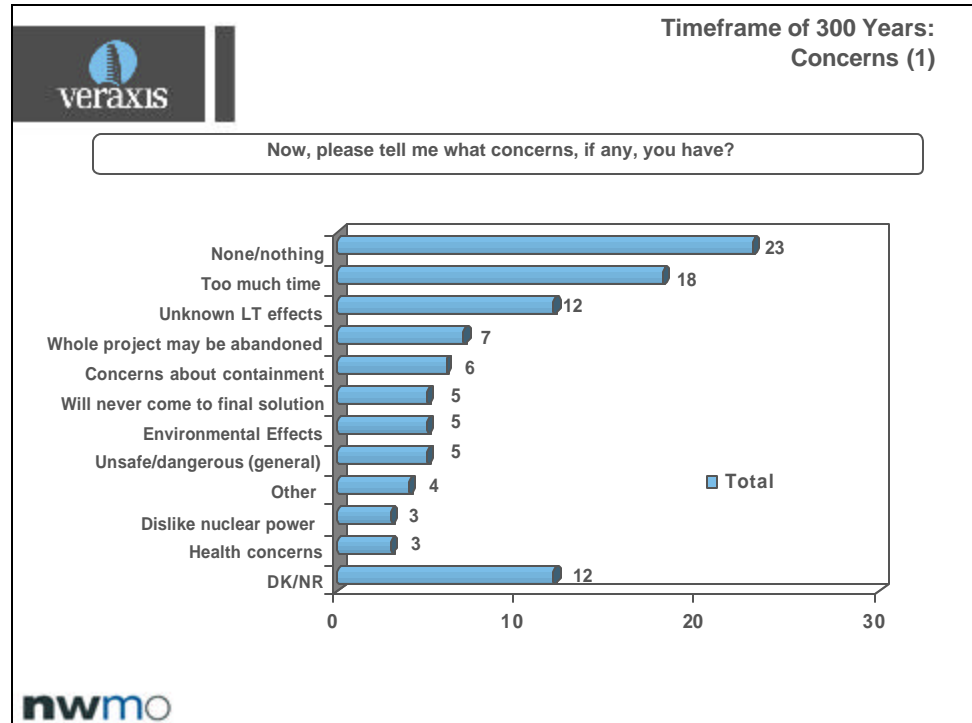


#### Concerns regarding Element V

One-quarter of Canadians said they have no concerns with this element of the approach. Concerns expressed regarding this element of the approach are predominantly based on the long time frame. Almost one in five Canadians said this process is too lengthy, and another 7% said they are concerned that the project may be abandoned at some point. Five per cent expressed concern that there will never be a final solution.

There are no significant differences in concern level between site community residents and residents in the rest of Canada. Residents outside of site communities are slightly more worried about long term effects and that the long time frame means we may never arrive at a final solution. Within site communities, the Involved population is significantly less likely to say they have no concerns – 13% Involved v. 29% general population. The Involveds are more likely to offer as their concern ‘too many different people/bureaucracy/too

disorganized' (8% Involved v. 2% general population) and 'unknown long-term effects' (27% of Involved v. 12% general population).

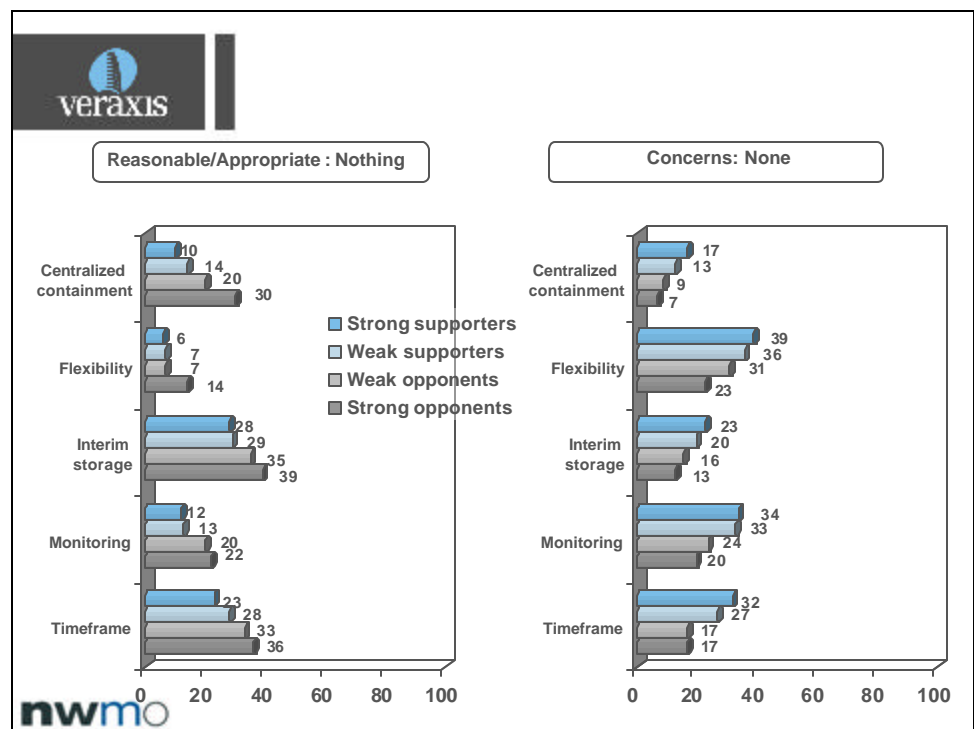


Southern Ontario residents are significantly more likely than northern Ontario residents to say they have no concerns (28% southern Ontario v. 20% northern Ontario), however, there is no one outstanding concern particular to northern Ontarians.

### Reactions to Phased Management Option By Attitudes to Nuclear Energy

Reactions to the Phased Management elements are not predominantly determined by attitudes to nuclear energy generation. A majority of supporters and of opponents offered concerns and reasonable aspects to the elements.

As evidenced by the graph, opponents of nuclear energy were more likely than supporters of nuclear energy to say that nothing was reasonable about the Elements. However, a majority of opponents of nuclear energy did find something reasonable about each element. Similarly, supporters of nuclear energy were more likely than opponents of nuclear energy to say they had no concerns about the elements of the Option, but a majority still expressed some concern about each option.





## Waste Management Requirements

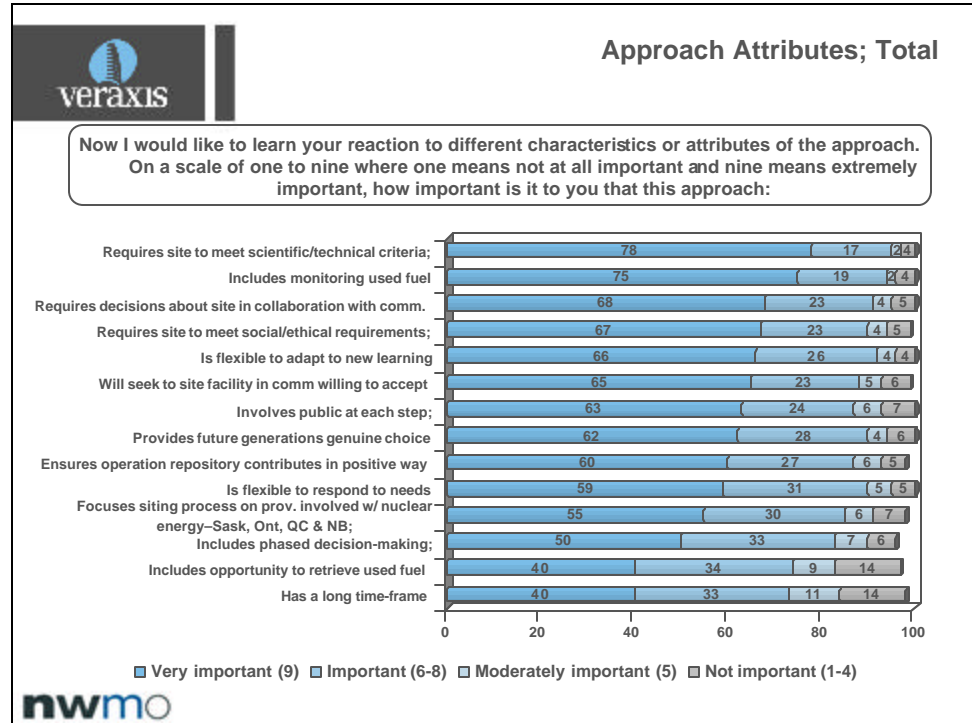
Fourteen requirements for a nuclear used fuel management process were tested. Each received overwhelming support by Canadians.

Those characteristics that involve meeting scientific and technical criteria and using the latest technological advances are priority criteria. For instance, 95% of Canadians said that requiring the site to meet scientific and technical criteria was important and 92% said that it is important to have an approach that is able to adapt to new learnings in science and technology. Similarly, 94% said that it is important the approach include monitoring the used fuel over a long period of time.

Community input and meeting social requirements are also high priorities. Ninety-one per cent of Canadians said that it is important that the approach requires that the site work in collaboration with the community to make major decisions. Ninety per cent said it is important that the approach requires the site to meet social and ethical requirements. On-going public participation is key as 88% of Canadians said that the process should seek to site the facility only in willing communities and 87% said that ongoing public involvement is important.

While still receiving a majority support, the criteria that ranked lower than others are those that specify a long time frame for disposal (73%) and continued access for retrieval (74%).

There are no significant differences between residents in the site communities and residents in the rest of Canada. Support for these management attributes is high across both populations for all measures. There are no significant differences between Involveds and general population site community residents.



Based on Analysis of Variance, we know that women attribute significantly higher importance than men to the process of decision making and the requirement that the management approach not simply respect but also respond to social, ethical and community concerns. For instance, women are significantly more likely than men to say the following are requirements:

- phased decision making
- having a long time frame for implementation
- involving the public
- being flexible enough to respond to the needs and concerns of society as they may change over time
- providing future generations with choice in how the approach is implemented
- being willing to locate the facility in a willing community
- focuses the site selection process on the provinces that are directly involved with nuclear waste/power
- requires the site to meet social and ethical criteria
- requires collaboration with the site community on major decisions
- ensures the repository contributes in a positive way to the community in which it is located.

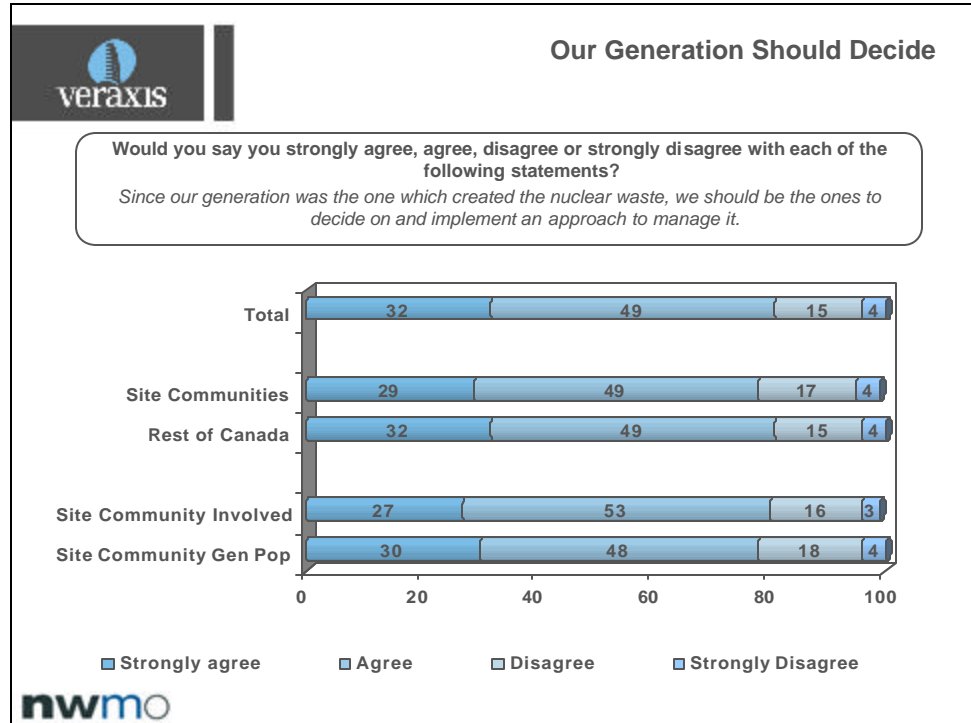
However, it is not the case that women dismiss scientific and technical considerations at the expense of social ones. Women and men were equally supportive of the requirements that the recommended option is:

- Flexible enough to adapt to new learning, and new developments in science and technology
- Includes monitoring of the used fuel over an extended period of time
- Includes the opportunity to retrieve the used fuel over an extended period of time
- Requires the site to meet scientific and technical criteria.

There are differences in the importance attributed to these management criteria associated with attitudes to nuclear energy. Those who are more opposed to nuclear energy generation place a greater value on involving the public at each step, on requiring that the waste management process meets social and ethical criteria and requires decisions about the site to be made in collaboration with community where the repository is located.

### **The Future of Nuclear Waste Management**

Eighty per cent of Canadians agree that 'since our generation was the one which caused the nuclear waste, we should be the ones to decide on and implement an approach to manage it'. Almost one-third of Canadians (32%) strongly agree with this statement. Only 4% strongly disagree. Support is universally high across the country. There is no significant difference between site communities and the rest of Canada.



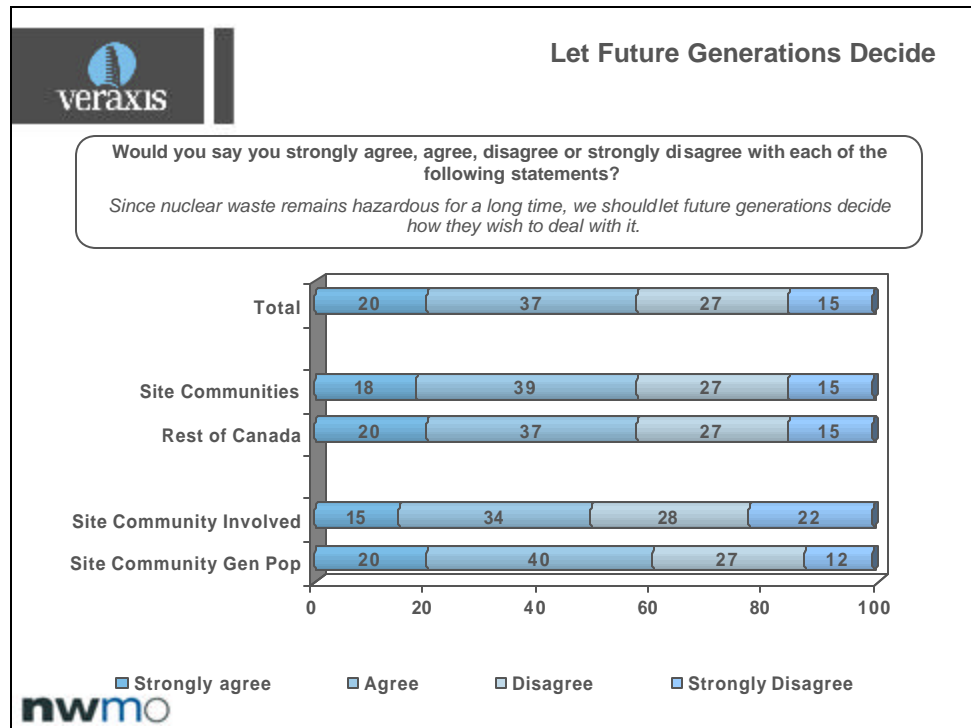
Believing that we should act now to decide on management strategies is not incompatible with the belief that 'since nuclear waste remains hazardous for a long time, we should let future generations decide how they wish to deal with it'. Fifty-seven per cent of Canadians agree with this statement, 20% strongly.

Both site community residents and residents in the rest of Canada are split on this issue with 57% of site community residents believing that we should let future generations decide how they wish to deal with it, and 42% disagreeing with this sentiment. Support for this sentiment is significantly lower in Quebec than in other regions of the country.

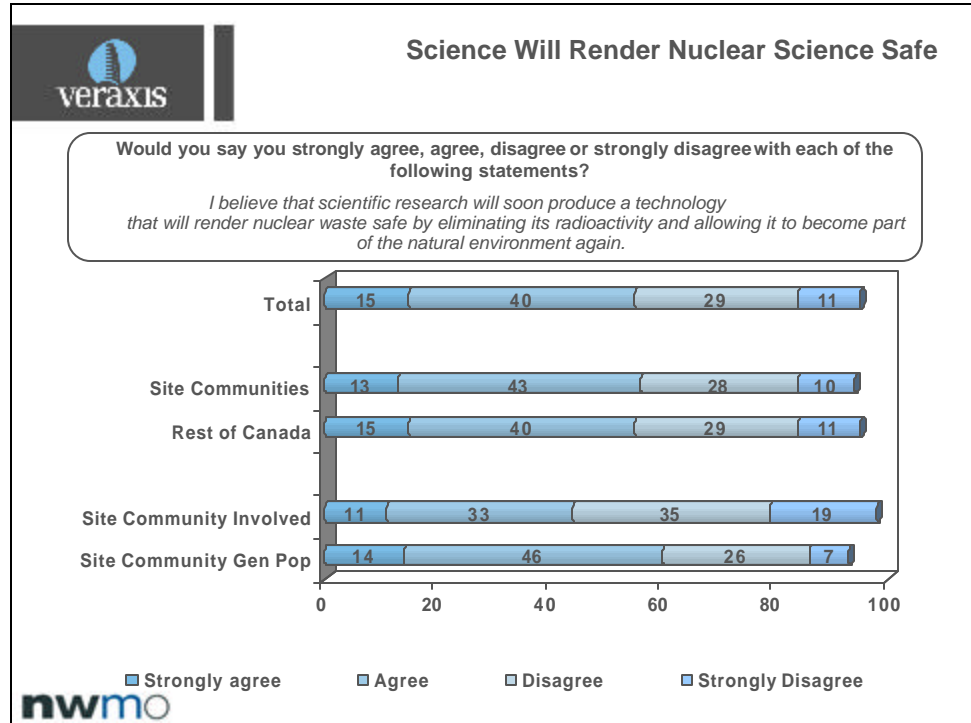
Half of those who believe we should begin implementation now also believe that future generations should have the chance to decide how they wish to deal with it. Roughly speaking, more than 40% of Canadians believe both views. About 30% of the population, do not subscribe to either view. Twenty-five per cent believe we should decide and not allow future generations a decision role.

Involved site community residents are significantly less likely than the general population to believe that it is important to preserve choice for future generations.

While 60% of the general population support preserving choice, just under half (49%) of Involved site community residents feel the same.



Canadians are relatively optimistic about the ability of science and technology into the future. Just over half of Canadians (55%) believe that 'scientific research will soon produce a technology that will render nuclear waste safe by eliminating its radioactivity and allowing it to become part of the natural environment again'. Forty per cent disagree and 5% responded DK/NR. There is no significant difference between site community residents and residents in the rest of Canada. General population site community residents are more likely to believe that science will eventually find a way to render nuclear waste safe (60%) than are Involved Canadians (44%).



Those who estimate that nuclear waste is hazardous for 1000 or more years are more likely to disagree (55%) than are those who believe it is hazardous for shorter periods of time (35%). Not surprisingly, those who believe that future generation should decide what to do with the waste are also significantly more likely to believe that nuclear waste can be rendered neutral.

Canadians feel relatively confident in the long term ability of our society to manage nuclear waste. Just over one-third of Canadians (35%) believe 'that future societies will be less able to deal with this waste than we are today'. Involved site community residents (25%) are even less likely to believe this than general population residents (39%).

Conversely, a strong majority of Canadians (62%) have faith in the ability of future societies. Residents of Quebec are especially pessimistic compared to other regions of the country with 51% believing that future societies will be less able to deal with the waste compared to averages ranging from 29% to 33% in all other regions.

