Canada's Integrated Strategy on Radioactive Waste

YOUTH ROUNDTABLE #1

SEPTEMBER 21, 2021

LAND ACKNOWLEDGEMENT

OPENING PRAYER

ABOUT THE ROUNDTABLES

How should Canada handle its **low and intermediate level radioactive** waste so that it remains safe for the very long term?

How should we be **making decisions** about issues that will impact **future generations**?

How might we create a strategy informed by **different worldviews and ways of knowing**?

The roundtables are independently hosted by Groundswell Projects, Tawi:ne Consulting and Shake Up the Establishment.

ABOUT THE ROUNDTABLES

3 **working group-style roundtables** to help us **build relationships** and **practice shared decision-making**:

September 21, 2021 | 6-8pm EST

October 5, 2021 | 6-8pm EST

October 19, 2021 | 6-8pm EST

AGENDA

6:00pm	Welcome & Opening Prayer
6:20pm	Getting to know each other
6:35pm	Presentations + Q&A
7:05pm	Break
7:10pm	Break-out group discussion
7:50pm	Closing Prayer

COMMUNITY AGREEMENTS

- we are all learners and teachers
- we will uplift and support each other
- we will see disagreements as generative opportunities
- we will all work to create a welcoming environment for everyone to contribute
- we will take risks and foster each others' courage to create meaningful learning and exchange opportunities

GETTING TO KNOW EACH OTHER

DISCUSS IN PAIRS

1. **Introduce yourself and where you're from**
2. **Choose from the following questions:**
   - What brings you joy?
   - What have you heard about your strengths?
   - What are you hoping we can accomplish together at these gatherings?
   - What are you bringing to these gatherings? / How do you want to contribute?
3. **Do you want to add or make any changes to the community agreements?**

PRESENTATIONS + Q&A

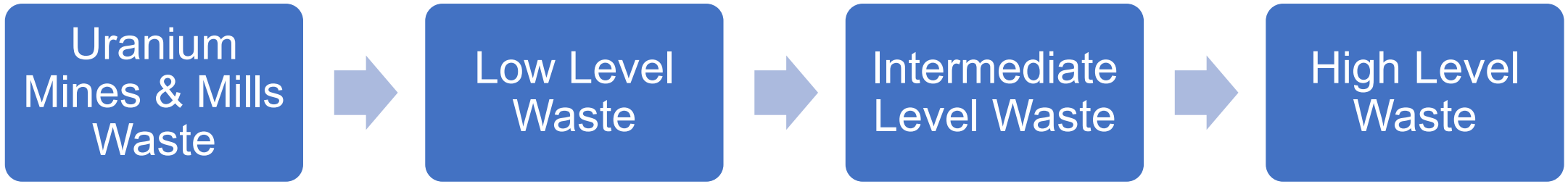

from all activities are monitored by our federal regulator,
A NEXT STEP

Uranium Mine & Mill Waste	Low Level Waste	Intermediate Level Waste	High Level Waste
Tailings and waste rock generated by the mining and milling of uranium ore	Mop heads, rags and paper towels. Medical Isotopes	Filters, resins and used reactor components Medical / Industrial Sources	Primarily used nuclear fuel
No Heat Generated	No Heat Generated	No or Little Heat Generated	Significant Heat Generated
Long-lived radioactivity does not decrease significantly over extended time periods	Isolation and containment up to a few hundred years (less than 300 years)	isolation and containment for periods greater than several hundred years	Hundreds of thousands of years
Near Surface Repository	Near Surface Repository	Deep Geological Repository (DGR)	Deep Geological Repository (DGR)
Only practical option for these wastes, given the large volumes of waste generated	More radioactive than clearance levels & exemption quantities	Generally requires a higher level of containment and isolation than can be provided in near surface repositories.	Significant quantities of long-lived radionuclides necessitating long-term isolation

Low Level Waste	Intermediate Level Waste
Mop heads, rags and paper towels. Medical Isotopes	Filters, resins and used reactor components Medical / Industrial Sources
No Heat Generated	No or Little Heat Generated
Isolation and containment up to a few hundred years (less than 300 years)	isolation and containment for periods greater than several hundred years
Near Surface Repository	Deep Geological Repository (DGR)
More radioactive than clearance levels & exemption quantities	Generally requires a higher level of containment and isolation than can be provided in near surface repositories.

RADIOACTIVE WASTE CLASSIFICATION (CANADA)

Classes of radioactive waste are **organized according to the degree of containment and isolation required** to ensure safety in the short- and long-term and take into consideration the risk to the health and safety of humans and the environment



REGDOC-2.11.1, Volume III: Assessing the Long-Term Safety of Radioactive Waste Management

Areas for input

- What is **most important to get right** when developing an Integrated Strategy for Canada's Radioactive Waste?

- How do we best deal with Canada's **Low-Level Waste** and **Intermediate-Level Waste** over the long-term?
  - What type(s) of facilities should we use?
  - Rolling stewardship vs disposal
  - How many of them should we build?

- **Who** should be responsible for implementing the strategy?

Q&A

DISCUSSION QUESTIONS

1. What surprised you?
2. What outstanding questions do you have? What do you want to learn more about?

Break

5 mins

BREAK-OUT GROUP DISCUSSION

HOPES FOR THE FUTURE

Discussion questions:

- What do you love about your community and/or environment?
- What do you want the most for your community in the future?
- What are your hopes for how we relate to each other in the future?

SHARE BACK

CLOSING DISCUSSION

Please share a reflection on:

- A key takeaway or learning from this roundtable

- What you'd like to discuss in the future roundtables

NEXT ROUNDTABLE

3 **working group-style roundtables** to help us **build relationships** and **practice shared decision-making**:

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October 5, 2021 | 6-8pm EST

October 19, 2021 | 6-8pm EST

CLOSING PRAYER

Canada's Integrated Strategy on Radioactive Waste

YOUTH ROUNDTABLE #2

OCTOBER 5, 2021

LAND ACKNOWLEDGEMENT

OPENING PRAYER

ABOUT THE ROUNDTABLES

Introduction of the host team:

Groundswell Projects
Tawi:ne Consulting
Shake Up the Establishment

OBJECTIVES

How should Canada handle its **low and intermediate level radioactive** waste so that it remains safe for the very long term?

How should we be **making decisions** about issues that will impact **future generations**?

How might we create a strategy informed by **different worldviews and ways of knowing**?

ABOUT THE ROUNDTABLES

3 **working group-style roundtables** to help us **build relationships** and **practice shared decision-making**:

September 21, 2021 | 6-8pm EST

October 5, 2021 | 6-8pm EST

October 19, 2021 | 6-8pm EST

AGENDA

6:00pm **Welcome & Opening Prayer**

6:25pm **Presentations + Q&A**

- Roundtable #1 Recap
- Video on how radioactive waste is regulated
- Learnings from bringing together Western science and Traditional Indigenous Knowledge
- Q&A

7:15pm **Break-out group discussion**

- Exploring intergenerational stewardship

7:55pm **Closing Prayer**

COMMUNITY AGREEMENTS

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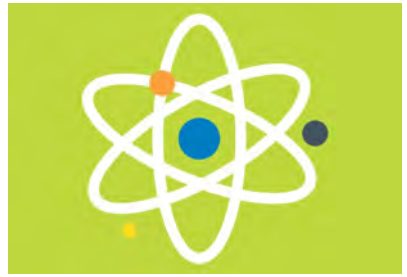
ROUNDTABLE #1 RECAP

ISRW PROJECT

In November 2020, the Minister of Natural Resources Canada asked the NWMO to lead the development of an **integrated strategy on radioactive waste (ISRW)**

- Radioactive waste safely managed today
- Several long-term plans and projects exist
- Some gaps exist
- This strategy represents a **next step**





Uranium Mine & Mill Waste	Low Level Waste	Intermediate Level Waste	High Level Waste
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Near Surface Repository	Near Surface Repository	Deep Geological Repository (DGR)	Deep Geological Repository (DGR)
Only practical option for these wastes, given the large volumes of waste generated	More radioactive than clearance levels & exemption quantities	Generally requires a higher level of containment and isolation than can be provided in near surface repositories.	Significant quantities of long-lived radionuclides necessitating long-term isolation

FOCUS IS ON GAPS IN EXISTING PLANS

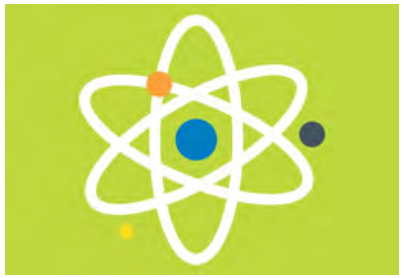
NO GAPS:

- **High level radioactive waste** - a long-term plan is in place through the NWMO's DGR project
- **Uranium mine and mill waste** - disposal facilities are in operation

GAPS:

- Some long-term planning is underway for **low-level radioactive waste,** but several gaps exist
- **No long-term management plans in place for any of Canada's intermediate-level waste** - this is also a gap in the system.

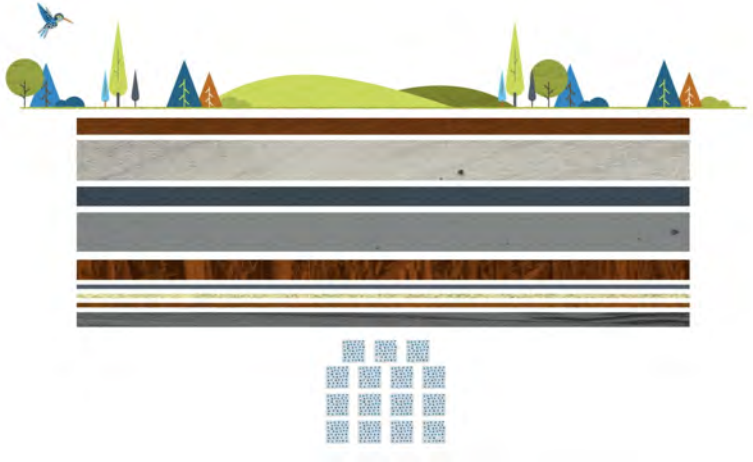




WHAT WILL IT INCLUDE?

Taking Stock of Current Waste Management Situation

Engaging on Options to Address the Gaps



Making Recommendations for Long-Term Management Solutions

Q&A

ROUNDTABLE 1 RECAP

Q1: What do you love about your community and/or environment?

- Green space and access to nature
- Community connections, collaboration and support.
- Community identity and culture that includes connection to nature and environment

Q2: What do you want the most for your community in the future?

- Basic needs for all communities
- Investing into our communities based on their priorities
- Caring for our communities together
- Centering Indigenous knowledge and languages: recognizing the interconnection between the health of community and land

Q2: What are your hopes for how we relate to each other in the future?

- Build connections across communities
- End systems that perpetuate inequity and cause harm
- Create more empathy and understanding
- Cultivate a collective mindset, including thinking about and caring for future generations

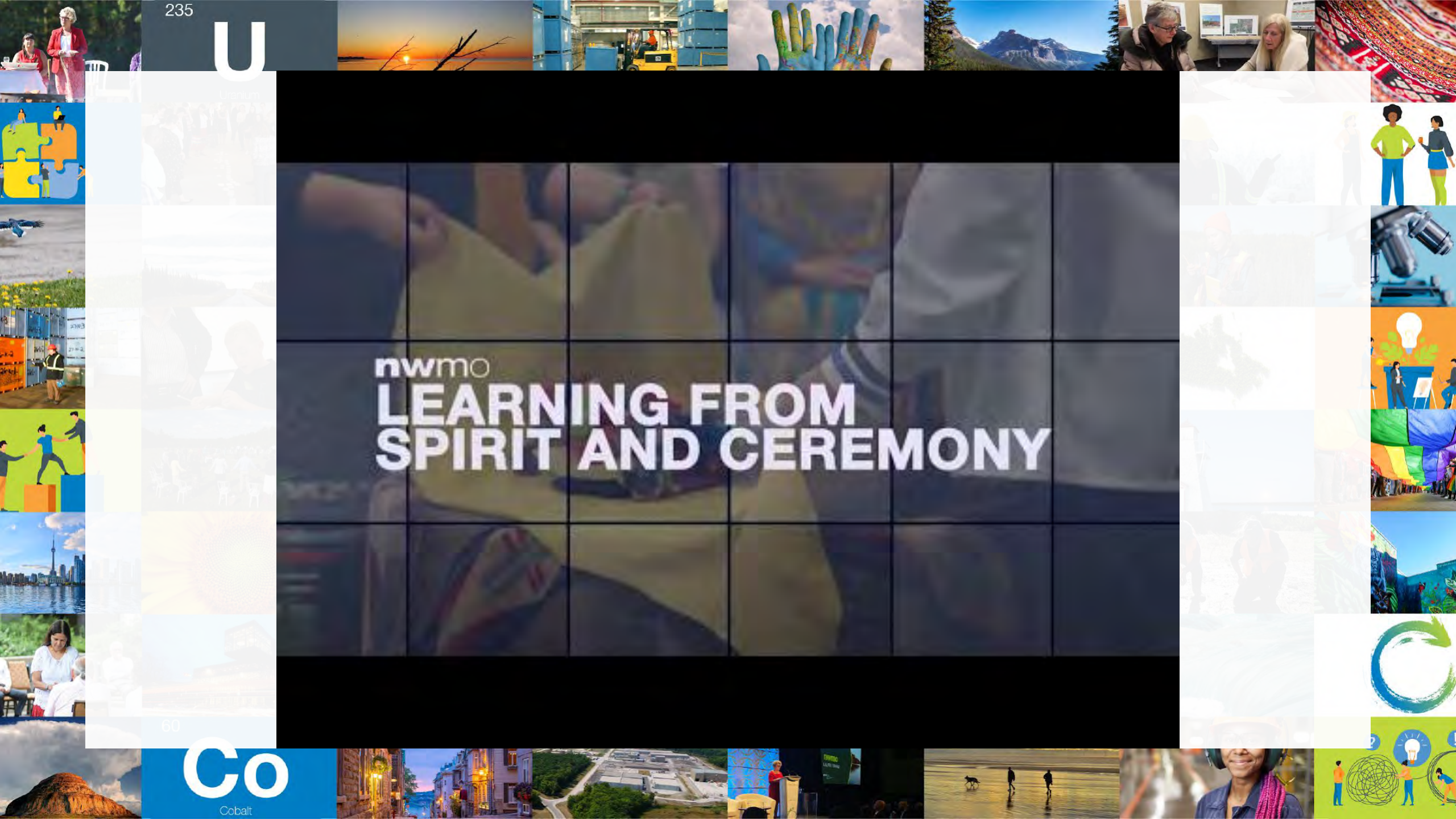
PRESENTATIONS + Q&A

HOW RADIOACTIVE WASTE IS REGULATED


from all activities are monitored by our federal regulator,
A NEXT STEP

Q&A

BRINGING TOGETHER INDIGENOUS KNOWLEDGE & WESTERN SCIENCE


235
U
Uranium
60
Co
Cobalt
nwmo
LEARNING FROM
SPIRIT AND CEREMONY

Q&A

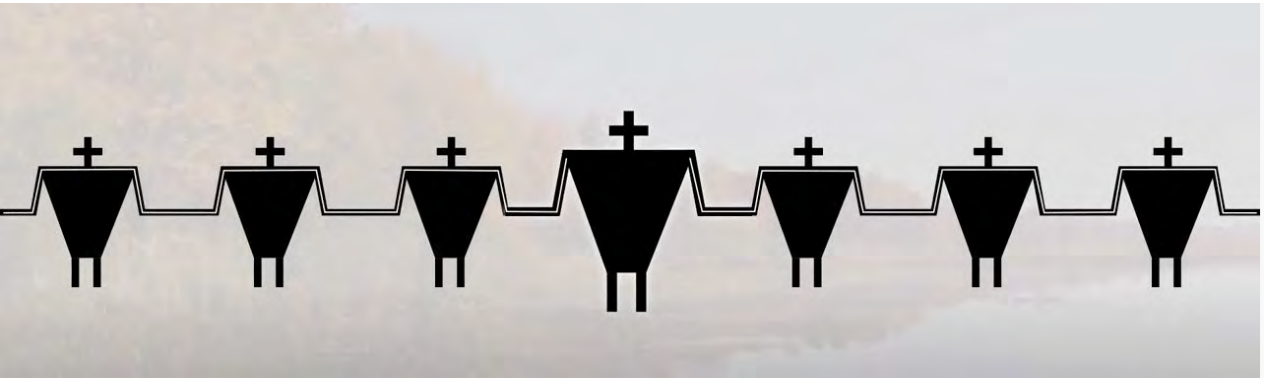
BREAK-OUT GROUP DISCUSSION

INTRODUCTIONS

Introduce yourself to the group. Pick one of the following questions to share:

- Who do you consider to be your heroes (past or present)? What do you admire about them?
- What futuristic idea/ character from a film or book do you wish existed now?
- What technology has been introduced in your lifetime that you can’t imagine living without?

TIMESCALE REFERENCES



7 generations (140 years)

Bowhead whale lifespan (200+ years)

Old growth forest lifespan (200-2,000 years)

Alpacas species in existence (2.5 mln years)

INTERGENERATIONAL STEWARDSHIP

Discussion questions:

- How does thinking about these timescales inform our decision-making today?
- What does responsibility and stewardship mean in the context of these time scales?
- What is most important to get right today with the Integrated Strategy for Radioactive Waste when thinking about impact/implications over such long time periods?

SHARE BACK

CLOSING REFLECTION

Please share in the chat:

- A key takeaway or learning from this roundtable

- What you'd like to discuss at the next roundtable

NEXT ROUNDTABLE

3 **working group-style roundtables** to help us **build relationships** and **practice shared decision-making**:

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October 19, 2021 | 6-8pm EST

CLOSING PRAYER

Canada's Integrated Strategy on Radioactive Waste

YOUTH ROUNDTABLE #3

OCTOBER 19, 2021

LAND ACKNOWLEDGEMENT

OPENING PRAYER

ABOUT THE ROUNDTABLES

Introduction of the host team:

Groundswell Projects
Tawi:ne Consulting
Shake Up the Establishment

ABOUT THE ROUNDTABLES

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October 19, 2021 | 6-8pm EST

AGENDA

6:00pm **Welcome & Opening Prayer**

6:30pm **Presentations + Q&A**

- Roundtable 1 & 2 Recap
- Recap of technical options
- Responsibility for implementation examples
- Q&A

7:05pm **Break-out group discussion**

- How do we best deal with Canada's Low-Level and Intermediate Level Waste over the long-term?
- Who should be responsible for implementing the strategy?

7:55pm **Closing Prayer**

COMMUNITY AGREEMENTS

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ROUNDTABLE 1&2 RECAP

ROUNDTABLE 1 RECAP

Q1: What do you love about your community and/or environment?

- Green space and access to nature
- Community connections, collaboration and support.
- Community identity and culture that includes connection to nature and environment

Q2: What do you want the most for your community in the future?

- Basic needs for all communities
- Investing into our communities based on their priorities
- Caring for our communities together
- Centering Indigenous knowledge and languages: recognizing the interconnection between the health of community and land

Q2: What are your hopes for how we relate to each other in the future?

- Build connections across communities
- End systems that perpetuate inequity and cause harm
- Create more empathy and understanding
- Cultivate a collective mindset, including thinking about and caring for future generations

ROUNDTABLE 2 RECAP

Q1. How does thinking about these timescales inform our decision-making today?

Q2. What does responsibility and stewardship mean in the context of these time scales?

- Thinking about the long-term timescales can be challenging and overwhelming. But it is valuable because this reminds us about our responsibility to the future. We need to do more of this as part of our decision-making.
- Long-term thinking is an opportunity for a dialogue between Indigneous Knowledge and Western science.
- There are parallels between radioactive waste management and climate change as an issue where our actions today will have a long-term impact.

Q3. What is most important to get right today with the ISRW when thinking about impact/implications over long time periods?

- It is important to have broad, diverse and comprehensive engagement, especially with communities that may be directly impacted. This will help us to make better decisions on this issue.
- Focus on an ongoing relationship building with communities to ensure we can address emerging issues and to support intergenerational stewardship.
- Center environmental justice as part of the decision-making.
- Ensure accountability and transparency.
- Provide education that would support participation in decision-making.
- Focus on reducing the amount of waste we create in the future.

TECHNICAL OPTIONS RECAP

Focus Is on Gaps in Existing Plans

NO GAPS:

- **High level radioactive waste** - a long-term plan is in place through the NWMO's DGR project
- **Uranium mine and mill waste** - disposal facilities are in operation

GAPS:

- Some long-term planning is underway for **low-level radioactive waste,** but several gaps exist
- **No long-term management plans in place for any of Canada's intermediate-level waste** - this is also a gap in the system.

How do we best deal with Canada's **Low-Level and Intermediate Level Waste** over the long-term?

- What type(s) of facilities should we use?
- Rolling stewardship vs disposal
- How many of them should we build?

Low Level Waste

Mop heads, rags and paper towels.

Medical Isotopes

No Heat Generated

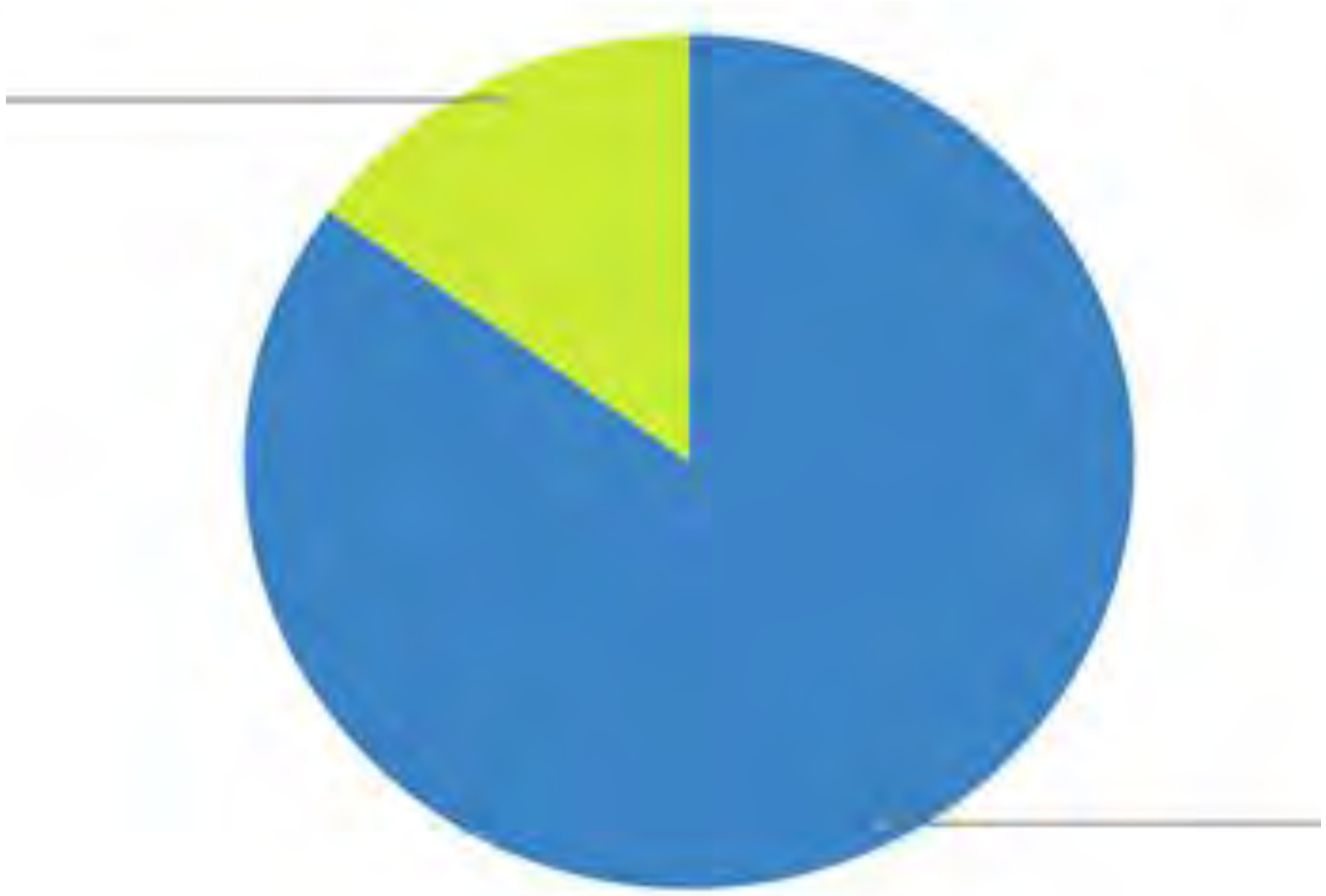
Isolation and containment up to a few hundred years (less than 300 years)

Near Surface Repository

More radioactive than clearance levels & exemption quantities

Every hospital has radioactive sources and produces radioactive waste!

L&ILW With No Current Long-Term Plans



Reference: Technical Options Report Figure 4.1:
Lifecycle L&ILW with No Current Long-Term Management Plans Organized by Radioactive Classification

LLW Technical Options

1. Engineered Containment Mound
2. Concrete Vault (tied with Shallow Rock Cavern)
3. Shallow Rock Cavern (tied with Concrete Vault)
4. Deep Geological Repository
5. Rolling Stewardship (not a disposal option)





Engineered Containment Mound

- Uses layers of natural materials in combination with synthetic materials.
- May be constructed in several types of soil.
- Similar to the design of a landfill for domestic waste.
- In operation in Canada, France, Sweden, and the U.S.

Visualization of the Engineered Containment Mound at Port Hope

Concrete Vault

- Simple, modular design.
- Expandable according to need.
- Suitable for low-level waste in various packages, including waste that may become compacted over time, such as clothing and paper products.
- May be constructed in several types of soil.
- In operation in the Czech Republic, France, Japan, Slovakia, Spain, and the UK.

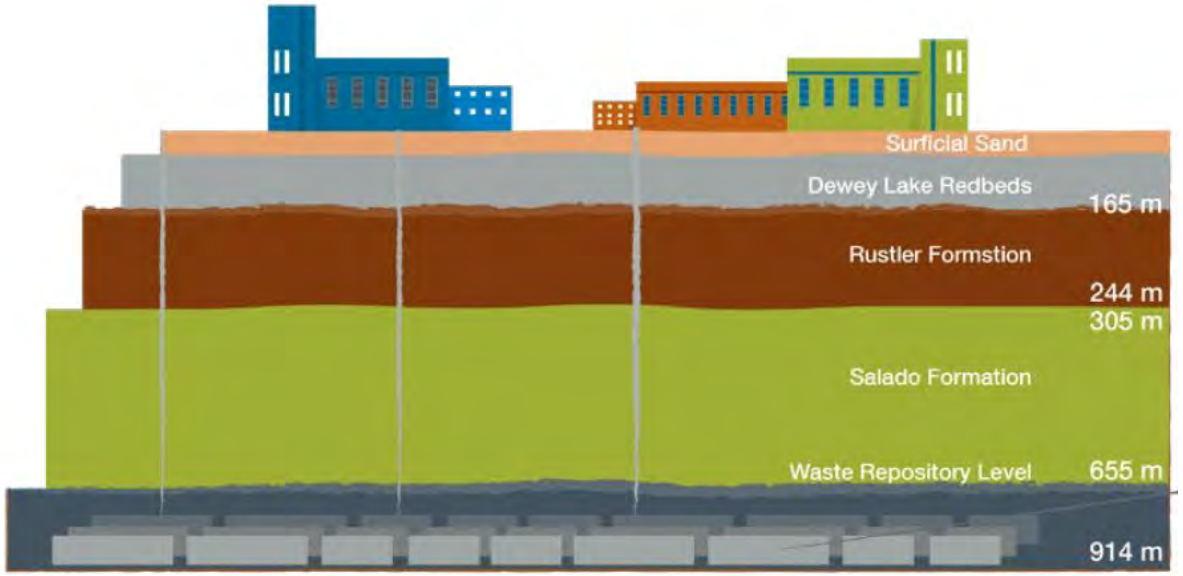
Shallow Rock Cavern

- Suitable for low-level waste, including waste that may reduce in volume or compact over time, such as paper products.
- Requires suitable geology.
- Makes use of natural barriers.
- Buildings on the surface are relatively small.
- In operation in Finland and Sweden.

One of the rock caverns for LLW inside Sweden's SFR facility

Deep Geological Repository

- International best practice for intermediate- and high-level waste requiring isolation for more than a few hundred years.
- Requires suitable geology.
- Makes use of natural and engineered barriers.
- In operation in Hungary and the U.S.



Layout of the Waste Isolation Pilot Plant (WIPP)

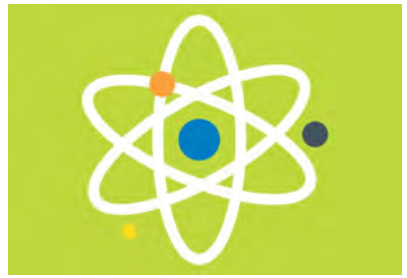




Rolling Stewardship

- A way to manage waste indefinitely, not to dispose of it. Keeps options open for the future.
- Assumes future technology will present a permanent disposal option.
- Requires continuous monitoring, inspection, and renewal of waste packages and storage facilities for many years.
- Requires work and investment by future generations.
- Not recognized internationally as a method for the disposal of radioactive waste.

Space in COVRA's climate-controlled L&ILW storage facility in the Netherlands is rented to museums as a depot to store priceless artwork for the next 100 years.



Intermediate Level Waste

Filters, resins and used reactor components

Medical / Industrial Sources

No or Little Heat Generated

isolation and containment for periods greater than several hundred years

Deep Geological Repository (DGR)

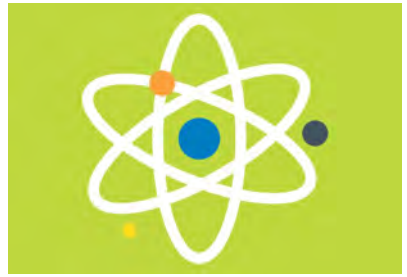
Generally requires a higher level of containment and isolation than can be provided in near surface repositories.

Only 1.4% of all radioactive waste
No long-term management plan exists for this type of waste.

ILW Technical Options

1. Deep Geological Repository
2. Deep Borehole





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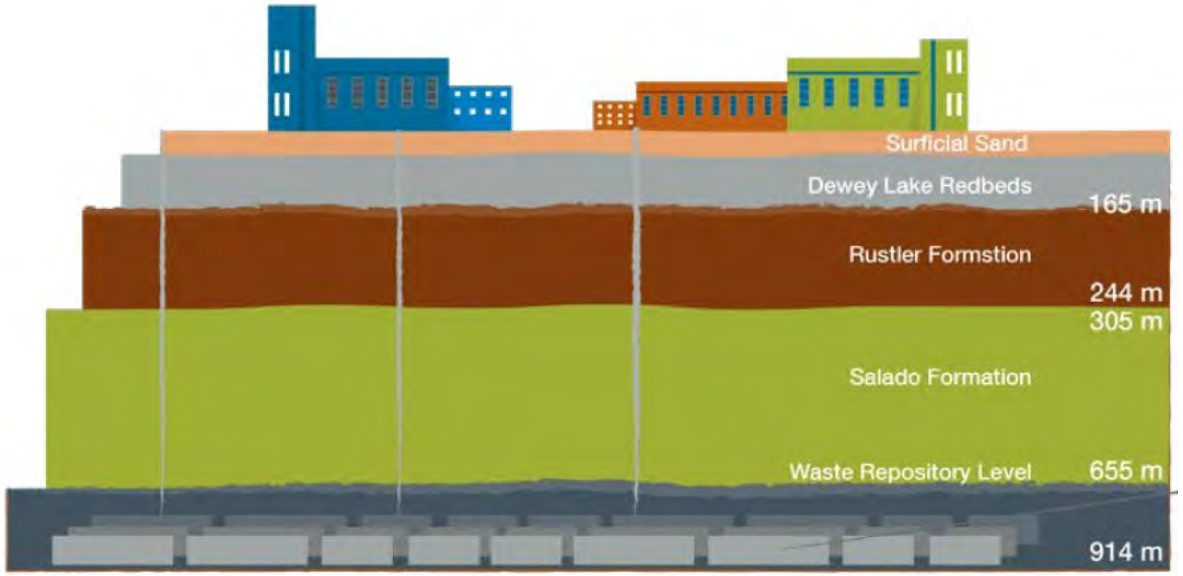
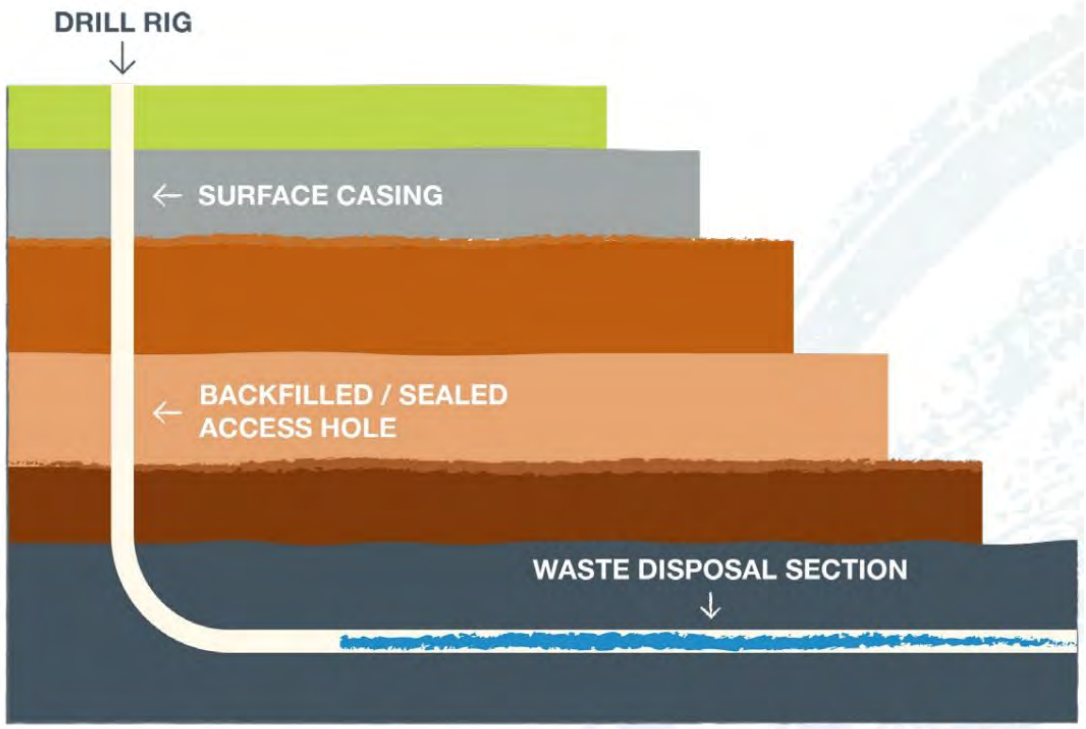


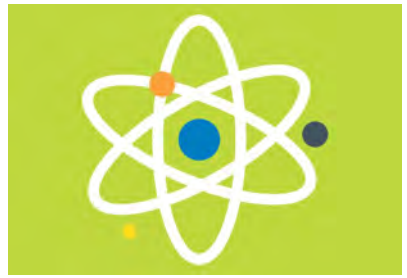
Layout of the Waste Isolation Pilot Plant (WIPP)

Deep Borehole

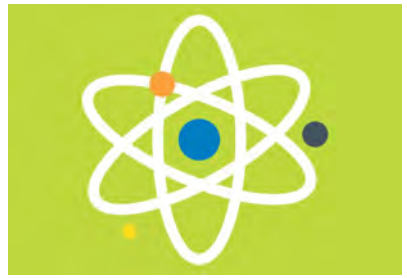
- Relatively simple to construct and operate, compared to larger facilities.
- May be suitable for small volumes of intermediate-level waste.
- Requires suitable geology.
- Makes use of natural barriers.
- Limited in size.



ENVIRONMENTAL PROTECTION MEASURES



Who should be responsible for implementing the strategy?



FUNDING WASTE & DECOMMISSIONING

- All licensees are required to establish funding for waste and decommissioning
- Two key principles: "polluter pays" and "intergenerational equity"
- There must be a financial guarantee instrument for the full estimated future cost, kept separate from their operating assets
- The CNSC has access to these funds, so that if the licensee/waste producer becomes insolvent, the Crown is not left with the liability

REGDOC-3.3.1, Financial guarantees for decommissioning of nuclear facilities and termination of licensed activities

EXAMPLES FROM OTHER COUNTRIES

- **NWMO** is mandated to collaboratively develop and implement a long-term management approach for Canada's used nuclear fuel.
- In France, a **separate government body** was established to be responsible for building facilities for all radioactive waste.
- In the US, low & intermediate waste is managed by **private businesses** that operate disposal and management facilities.
- In Sweden & Finland, each of the **waste owners** operates their own low & intermediate facilities.

Q&A

BREAK-OUT GROUP DISCUSSION

Q1 / How do we best deal with Canada's **Low-Level and Intermediate Level Waste** over the long-term?

- What type(s) of facilities should we use?
- Rolling stewardship vs disposal
- Should we centralize the waste in as few facilities as possible or should we build disposal facilities closer to where the waste is?

25 mins

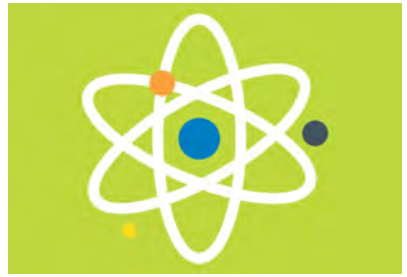
A NEXT STEP
Part of Canada's Radioactive Waste Review

Additional questions

- Do the options presented address your priorities? How?
- If none of these address your priorities, why?
- Are there any other options?
- What do you feel positively about? Why?
- What concerns do you have about the different options?
- What do we need to know more about to inform our thinking about the options?

Q2 / **Who** should be responsible for implementing the strategy?

15 mins



Additional questions

- Based on the examples provided what are your thoughts on possible options for who should be implementing the strategy?
- What is important for us to consider when it comes to implementing the strategy? *Ideas identified in roundtable #2:*
  - Accountability
  - Transparency
  - Making sure environmental justice is at the forefront
  - Centering the priorities, voices and knowledge of Indigenous peoples

- What would addressing these considerations look like? Which options would best help to address these considerations?

SHARE BACK

NEXT STEPS

- **Reflections:**

  “Why did you feel it was important for you to have a voice in this decision-making process?”

  >> record an audio or video note

  >> written quote

- **Summary Report**
- **Feedback survey**
- **Resources & information for further learning**

FURTHER INVOLVEMENT

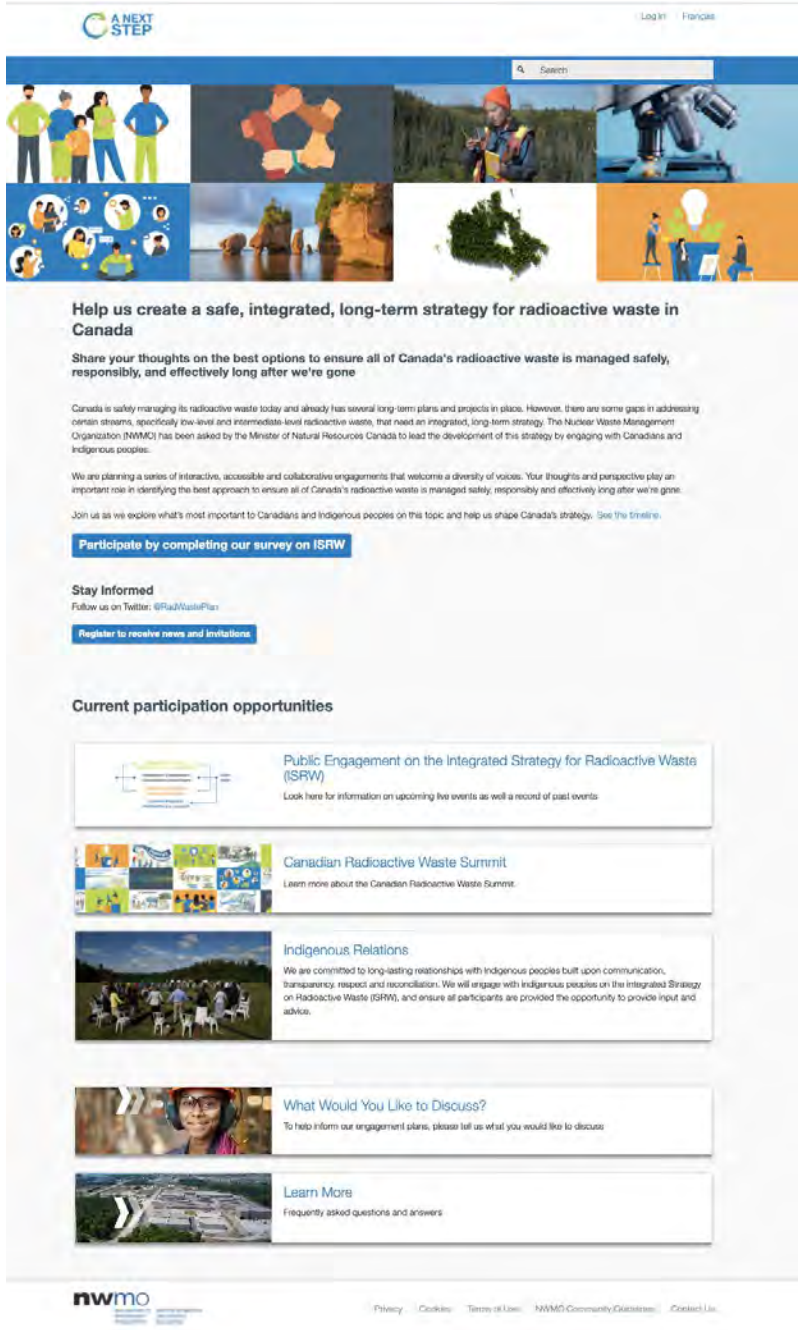
Register for updates

Make a formal submission

Learn More

Take our Survey

www.radwasteplanning.ca



CLOSING PRAYER

THANK YOU

info@radwasteplanning.ca

www.radwasteplanning.ca