Plan for Long Term Management of Canada's Used Nuclear Fuel

Learn More Program
May 2011

nwmo

NUCLEAR WASTE MANAGEMENT ORGANIZATION

SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

Presentations

- The NWMO and Canada's plan on the long term management of used nuclear fuel
- The Site Selection Process
- Technical briefings:
  - 1 – Safety and Security
  - 2 – Site Evaluation Process
- Overview of Community Well-Being
- Initial Screening Presentation
- Next Steps and Communications

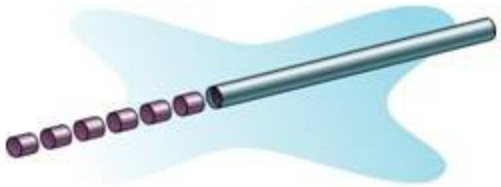
History of Long-Term Management of Used Fuel Programs

- **1978:** Porter Commission on Electricity Planning in Ontario
- **1980:** Atomic Energy Canada Limited assigned responsibility for developing geological disposal
- **1989:** Concept of geological disposal referred to an Environmental Assessment Panel
- **1998:** Panel reports findings
  - Geological disposal technically safe
  - Public acceptance not demonstrated
- **2002:** *Nuclear Fuel Waste Act* requires NWMO be formed

NWMO: Who We Are

- **2002: *Nuclear Fuel Waste Act*** required formation of the Nuclear Waste Management Organization (NWMO)
- ***NWMO Mission statement:*** *The purpose of the NWMO is to develop and implement collaboratively with Canadians, a management approach for the long-term care of Canada's used nuclear fuel that is socially acceptable, technically sound, environmentally responsible and economically feasible*
- NWMO is a corporation that operates as a not-for-profit organization
- Funded by nuclear waste owners (Ontario Power Generation, Hydro-Québec, New Brunswick Power, Atomic Energy of Canada Limited); trust funds in place

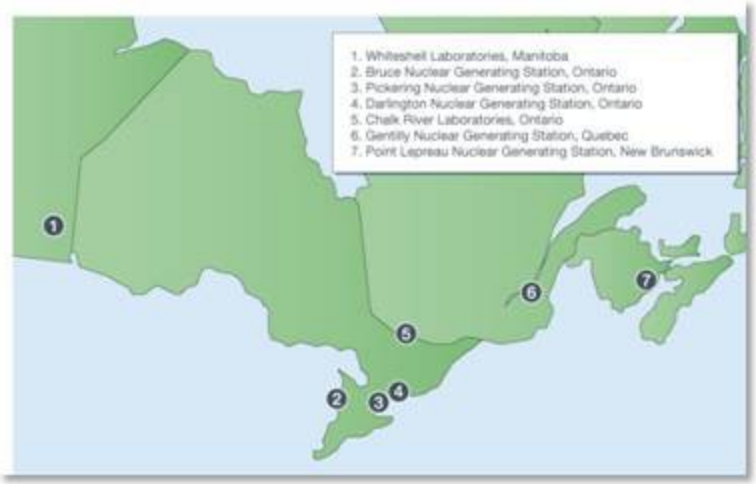
Context – Canada's Used Nuclear Fuel



CANDU fuel bundle

- ~ 20 kg natural uranium dioxide (UO_2)
- ~ 0.5 m length
- ~ 1 million kWh ~ 100 homes for a year

- Over 2 million bundles safely stored
- Approximately 4 million bundles projected by 2035 from existing nuclear facilities
- Used fuel currently stored on an interim basis at 7 major licensed reactor facilities
  - Ontario: ~90%
  - Quebec: ~5%
  - New Brunswick: ~5%
- Excellent storage safety record
- The toxicity of used nuclear fuel reduces with time, but it remains a potential hazard essentially indefinitely



Interim Storage of Used Nuclear Fuel

Used Fuel Storage at OPG western waste Management Facility – Kincardine, ON

Extensive Study of Options (2002-2005)

- *Nuclear Fuel Waste Act (NFWA)* required NWMO to engage Canadians in review of different approaches for managing used fuel

- NWMO study process engaged nation-wide:
  - 18,000 Canadians contributed to 3-year study between 2002-2005
  - 120 information & discussion sessions – every province and territory
  - 2,500 Aboriginal people participated in dialogues

- What Canadians told us:
  - **Safety and security** is top priority
  - This generation must **take action now**: we owe it to future generations
  - Be consistent with best **international standards and practices**
  - Approach must be **adaptable**: allow improvements based on new knowledge or societal priorities

Adaptive Phased Management: Canada's Plan for the Long-Term Management of Used Nuclear Fuel

APM emerged from dialogue with citizens and experts – best met key priorities

A Technical Method

- Centralized containment and isolation of used nuclear fuel in deep geological repository
- Continuous monitoring
- Potential for retrievability
- Optional step of shallow underground storage

A Management System

- Flexibility in pace and manner of implementation
- Phased and adaptive decision-making
- Responsive to advances in technology, research, Aboriginal Traditional Knowledge, societal values
- Open, inclusive, fair siting process - seek informed, willing host community
- Sustained engagement of people and communities throughout implementation

APM approved by Federal government June 2007

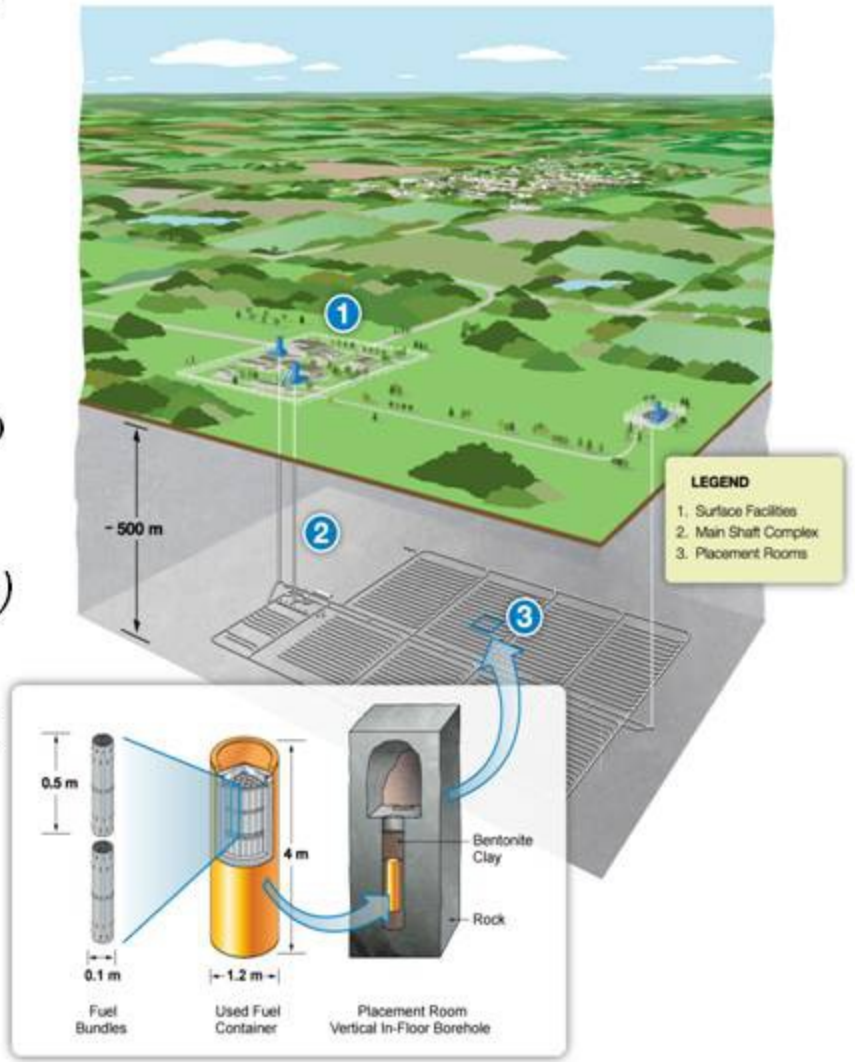
Why Adaptive Phased Management?

Adaptive Phased Management best meets the values and objectives which Canadians said were important:

- It commits this generation of Canadians to take the first steps now to manage the used nuclear fuel we have created
- It will meet rigorous safety and security standards
- It allows flexibility to adapt to experience and societal change
- It provides genuine choice by providing for capacity to be transferred from one generation to the next
- It promotes continuous learning
- It provides a viable, safe and secure long-term storage capability, with the potential for the retrieval of the used fuel
- It is rooted in values and ethics, and it engages citizens throughout implementation

Federally Mandated National Infrastructure Project

- High technology, national infrastructure project
  - Investment of $16-24 billion
  - Will operate as centre of expertise
  - Project requires dedicated *surface* area of ~100 hectares (250 acres) and *subsurface* area of ~2.5 km x 1.5 km (375 hectares/930 acres)
  - If sited in Ontario, ~ 90% of jobs expected to stay in the province, with ~40-60% in host economic region *(hundreds of jobs in host community, thousands of jobs in host region)*
  - Sustainable over more than 100 years
- Highly regulated – strict scientific and technical criteria ensure safety
- Long-term partnership between NWMO and community
- Fosters community well-being
- Multi-barrier system



Deep Geological Repository and National Centre of Expertise

- Surface and underground facilities, e.g. laboratories, offices, public viewing galleries and exhibits

- Drawing on national and international networks and collaboration:
  - Bring together multi-disciplinary core group of scientists and researchers to lead ongoing work in both technical and social aspects of the project, and topics of interest to community
  - Serve as hub for sharing research internationally, with countries such as Switzerland, Sweden, Finland, France, UK and potentially other countries that are following similar paths

- Implementation of centre would require long-term partnership with community and NWMO:
  - Design of the centre would be developed with the community and surrounding region's preferences in mind, and may serve as a focus for community engagement to learn more about the project
  - Complementary features and uses potentially integrated into the facility may include a learning centre, meeting place or welcoming centre.

International Projects

Äspo lab (near Oskarshamn, Sweden)

Mont Teri Project (near Basel, Switzerland)

Ground-level Facilities for Hard Rock Laboratory (Äspo Lab) - Oskarshamn, Sweden

The Site Selection Process

APM DGR Site Selection Process

- Developed through two-year public dialogue
- Initiated in May 2010
- Seeks to identify informed and willing host community with suitable geological formation
- Multiple stages of technical and socio-economic assessments
- Feasibility studies will proceed in future in response to requests of potentially interested communities that meet initial screening requirements.
- Identification of 1 to 2 candidate communities to proceed for detailed site examination (Step 4) not anticipated before 2013/2014
- Site selection process requires engagement of communities along transportation route to address their questions and concerns
- Transportation feasibility study will be undertaken by NWMO as part of Step 4 detailed site evaluation

The Siting Process

Step 1

Becoming aware & informed

Steps 2, 3 & 4

Assessing interest & suitability

- Community visioning
- Screening
- Feasibility
- Detailed assessment
- Regional study & involvement
- Centres of expertise launched

Step 5

Community assesses & demonstrates willingness

Step 6

Preferred site identified

- Collaborative agreement established

Step 7

Regulatory review & approvals

- Site is selected

Step 8

National centre of expertise established & construction of underground demonstration facility

Step 9

Construction begins…

APM Deep Geological Repository Video

Safety and Security

Nuclear Fuel Cycle

- Nuclear fuel cycle in Canada and radioactive waste streams
- Used fuel characteristics and management methods
- The Deep Geological Repository Method
- Safety Assessment
- Used fuel transportation

It All Starts with Uranium . . .

Oklo uranium ore body, Africa

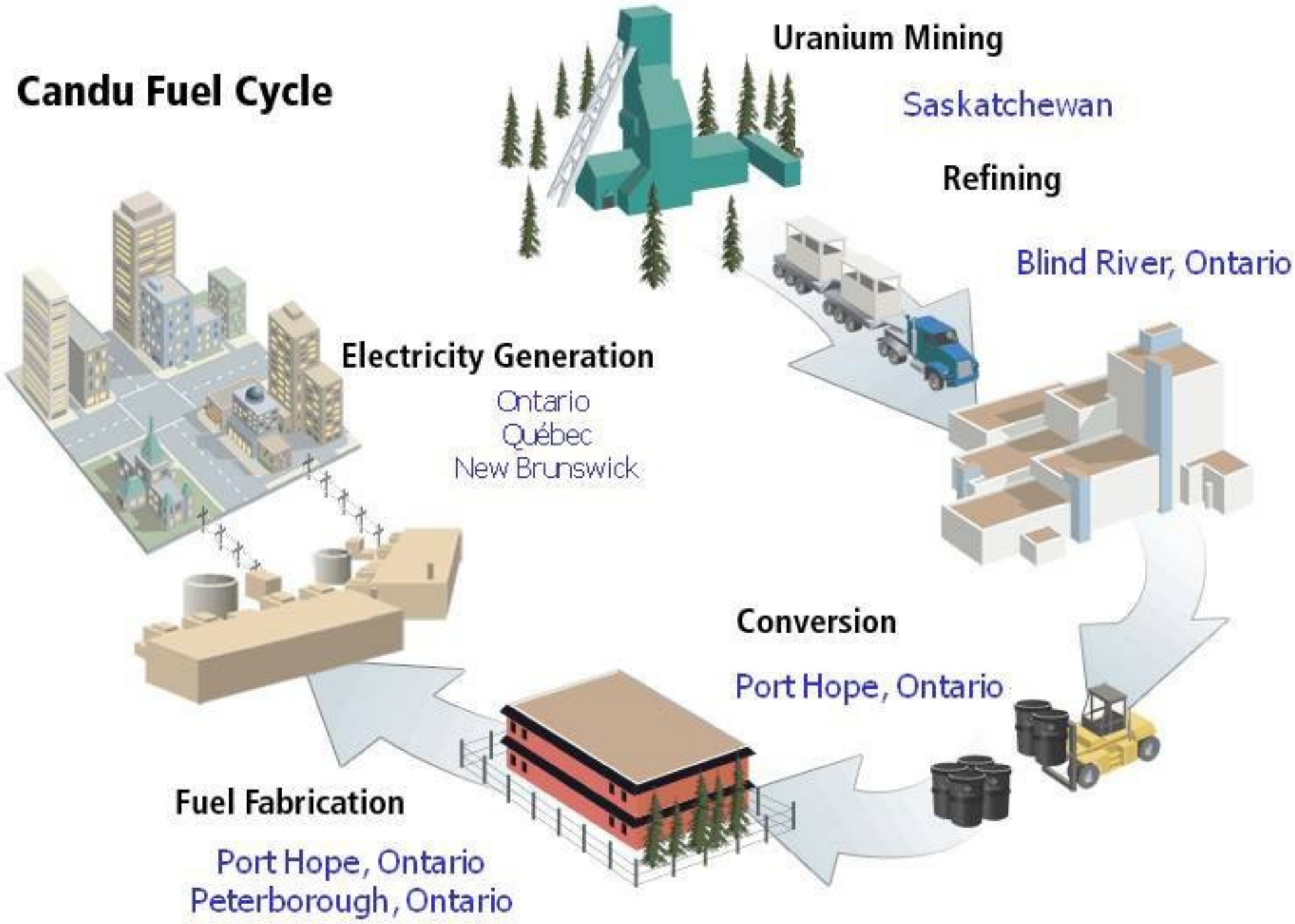
- The basic element of the nuclear fuel cycle is uranium
- Natural uranium is radioactive, but at a low level
- Canada is one of the largest producer of uranium in the world

Carnotite, Colorado

Pitchblende, Canada

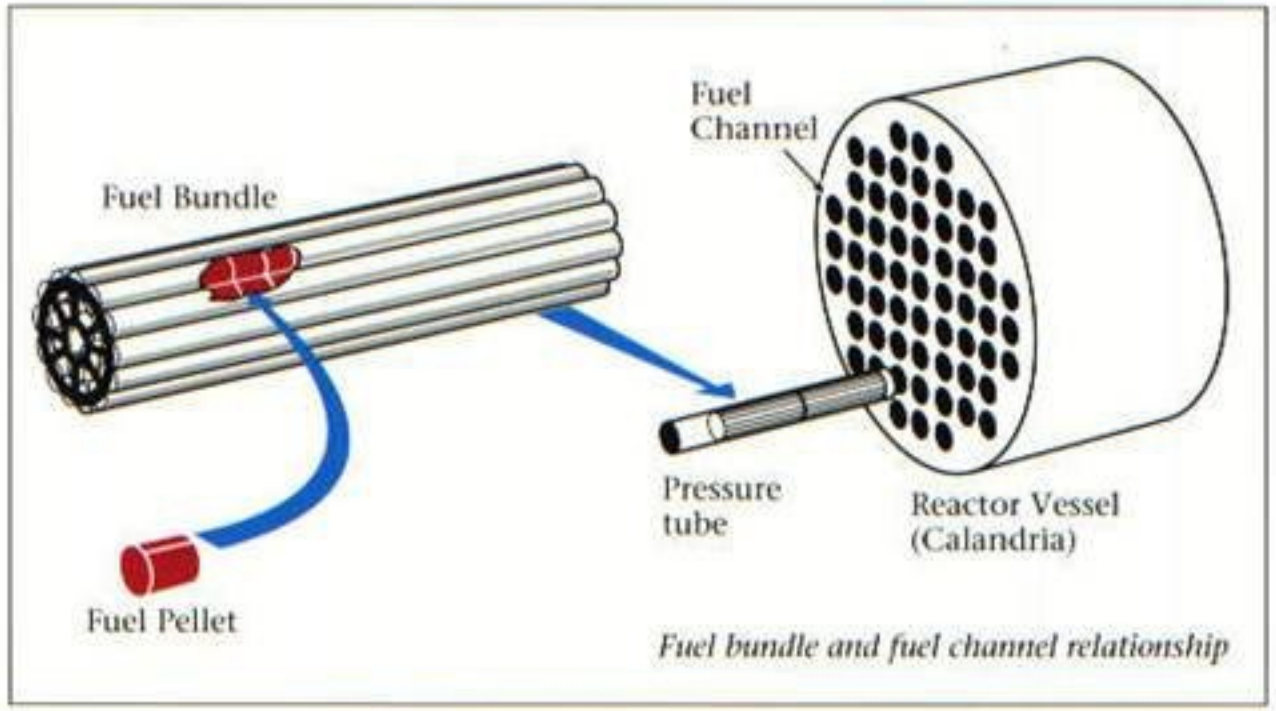
Nuclear Fuel Cycle in Canada

Candu Fuel Cycle



Based on Cameco figure

CANDU Reactor



Fuel bundle and fuel channel relationship

Nuclear reactor being installed

- About 5000 bundles per reactor
- Each bundle stays in reactor for about 15 months
- One bundle provides about 1 million kWh electricity or enough for 100 homes for one year

Figures from www.nuclearfaq.ca

APM is not about – Low and Intermediate Level Waste

Low Level Waste

mop heads, rags, paper towels, floor sweepings and protective clothing used in the nuclear stations during routine operation and maintenance.

Intermediate Level Waste

used reactor components, as well as the resins and filters used to keep reactor water systems clean.

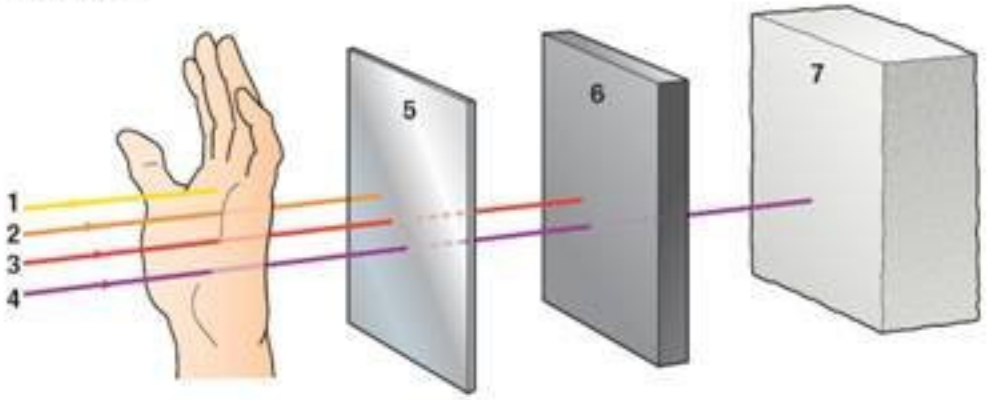
Nature of the Hazard- Radioactivity

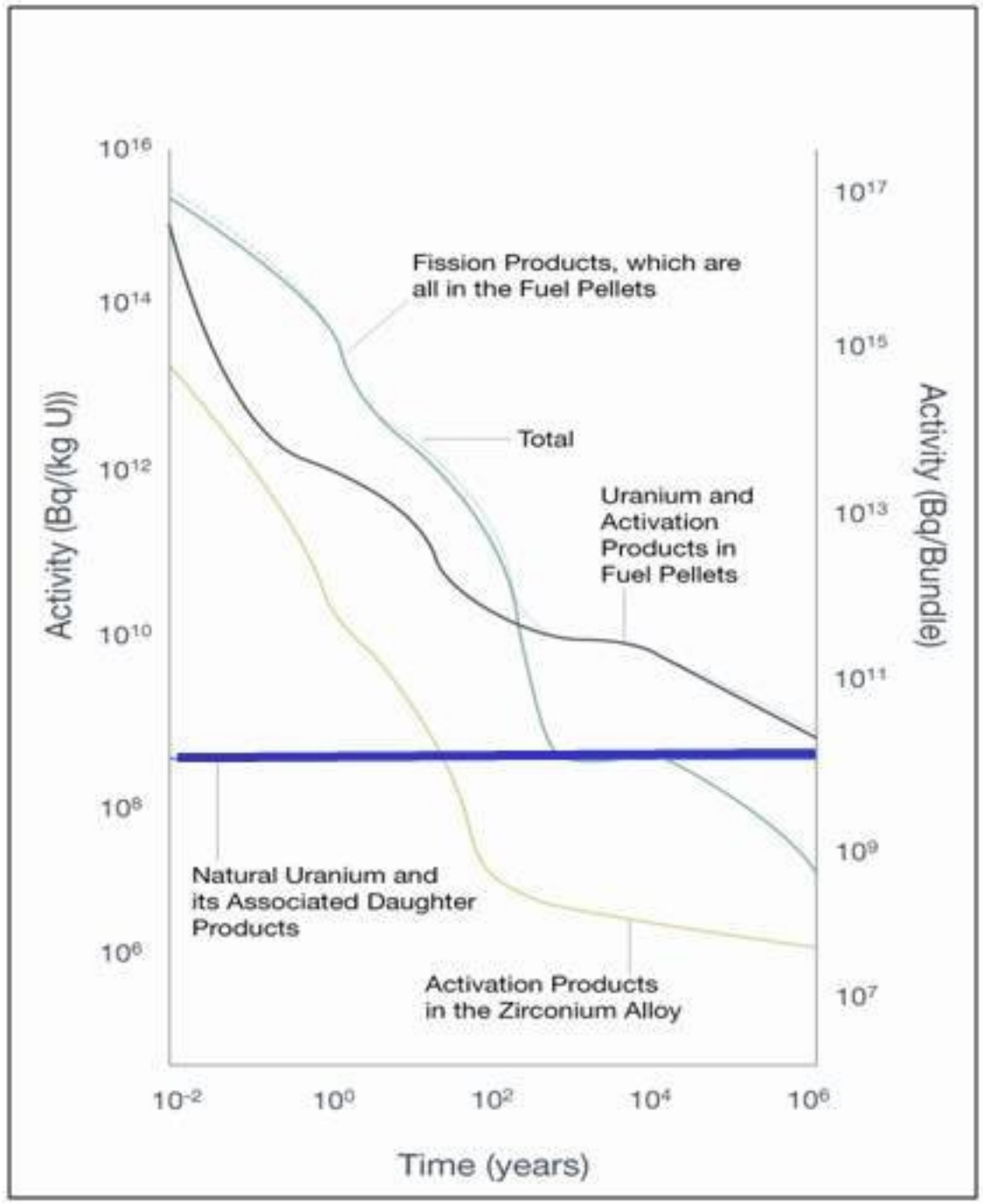
Pathways and regulatory limits

- External exposure to radiation
- Internal exposure (e.g., inhalation or ingestion of radioactive material)
- Public dose limit = 1 mSv/a

Types of Radiation

1. Alpha
2. Beta
3. Gamma, X-rays
4. Neutrons
5. Aluminum
6. Lead
7. Concrete





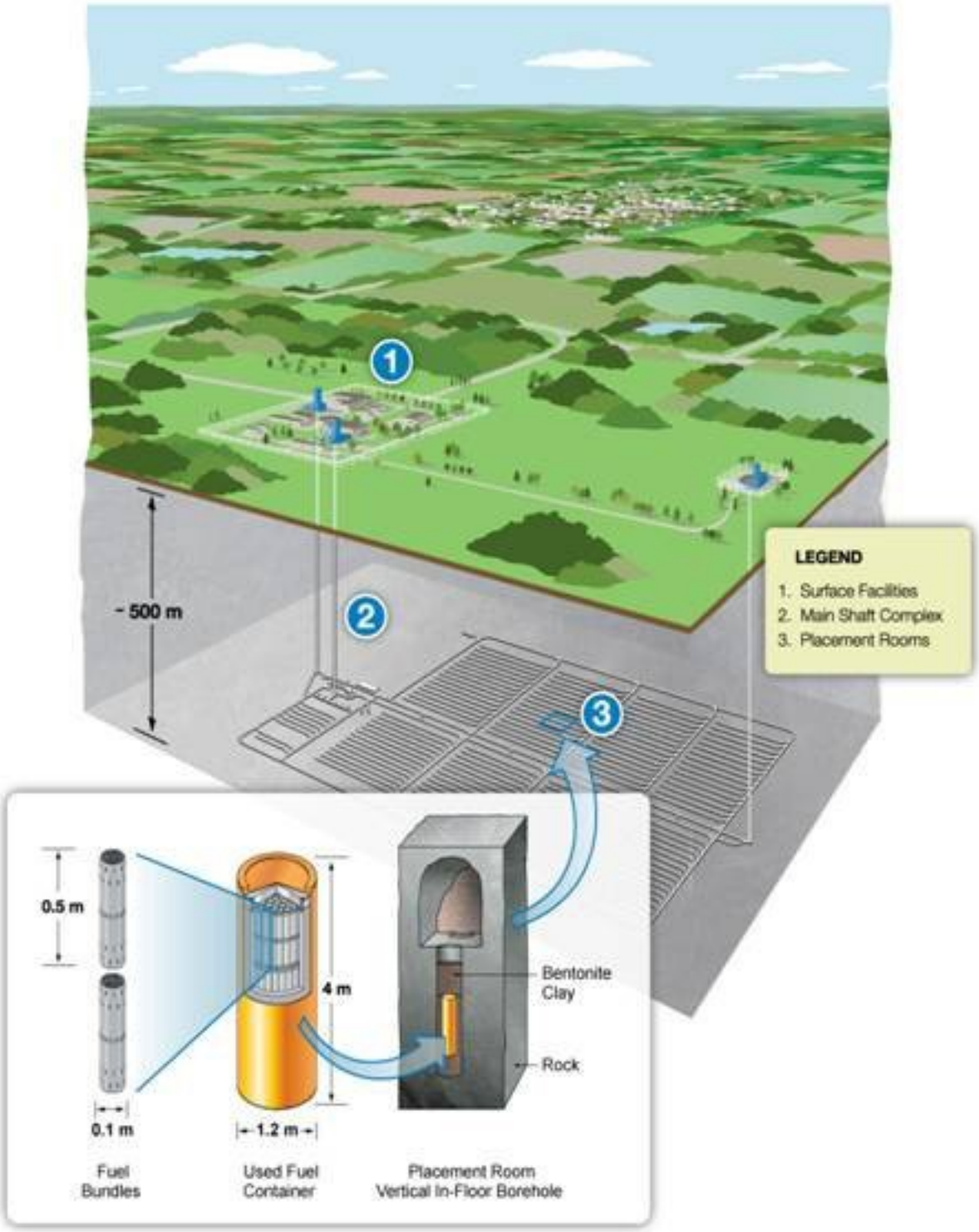
Used Fuel Radioactivity with time

Wet Used Fuel Storage at Reactor Sites

- Used nuclear fuel initially very hot and highly radioactive
- Stored in water pools in reactor buildings for cooling and shielding
- **Pool water is kept separate from other water**

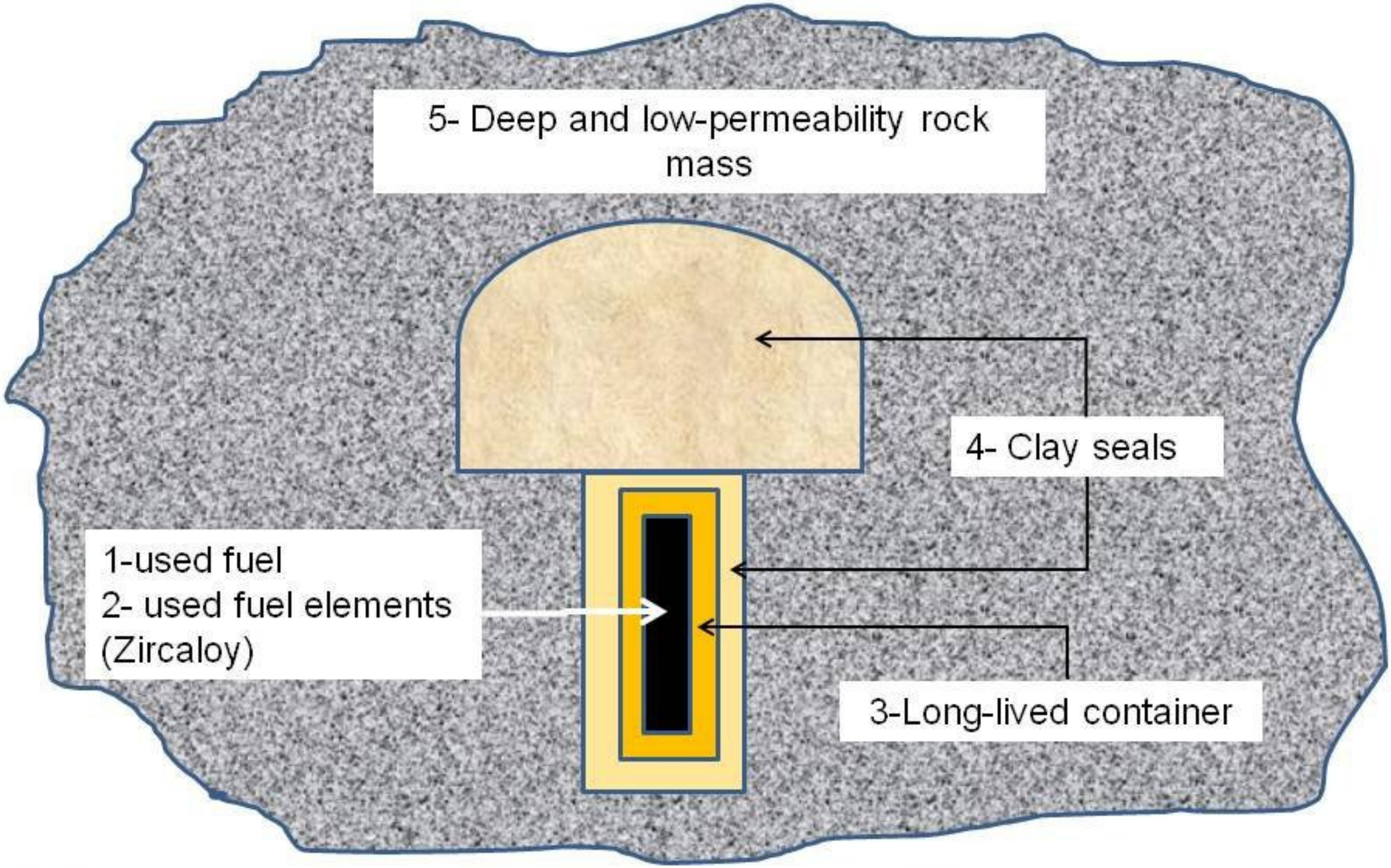
CANDU Fuel Age (years) (out-of-reactor)	Heat Output (watts)
0	28,000
1	73
10	5
100	1

The Deep Geological Repository Concept



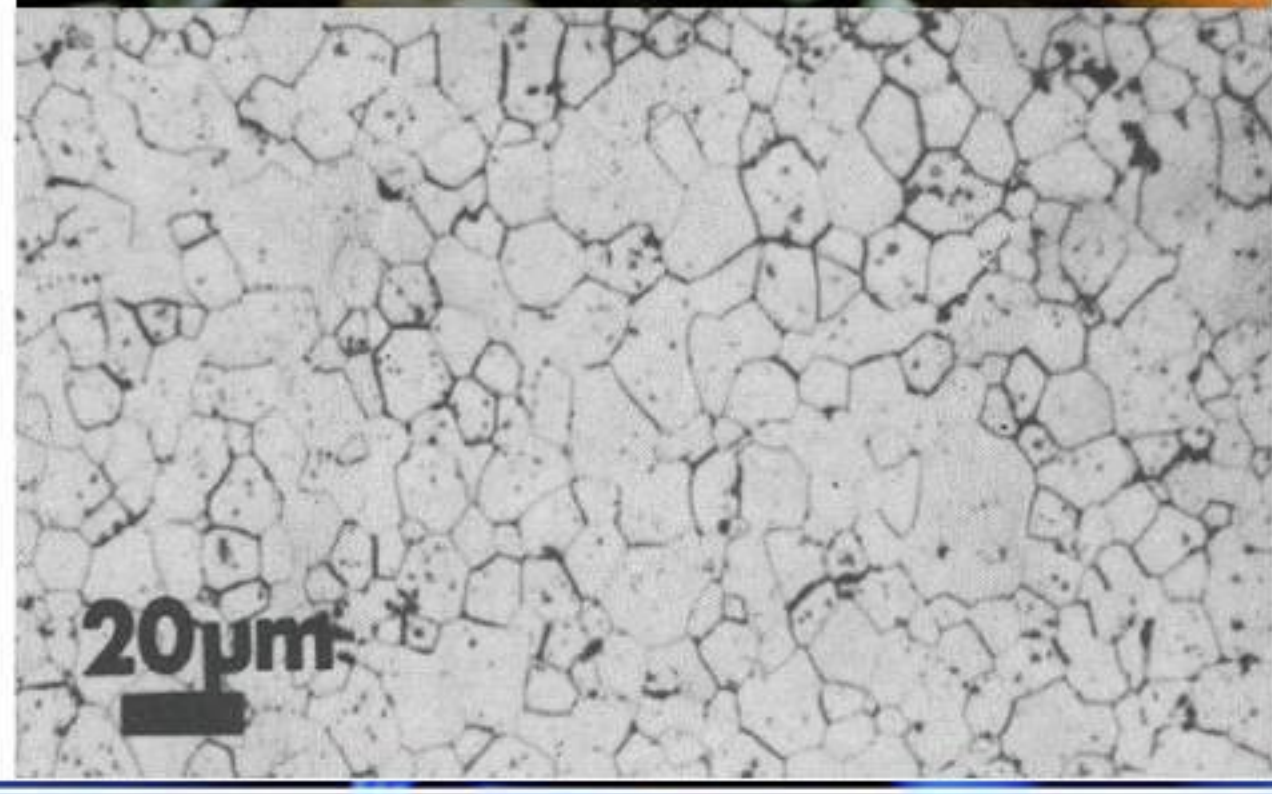
- Depth of about 500m in crystalline or sedimentary rock
- Surface land: 100 hectares (250 acres)
- Repository Area at depth : about 2.5 km x 1.5 km
- Includes an underground technology demonstration facility
- Multiple barrier system
- Extended monitoring
- Used fuel remains retrievable

Multiple Barrier System – to Contain and Isolate



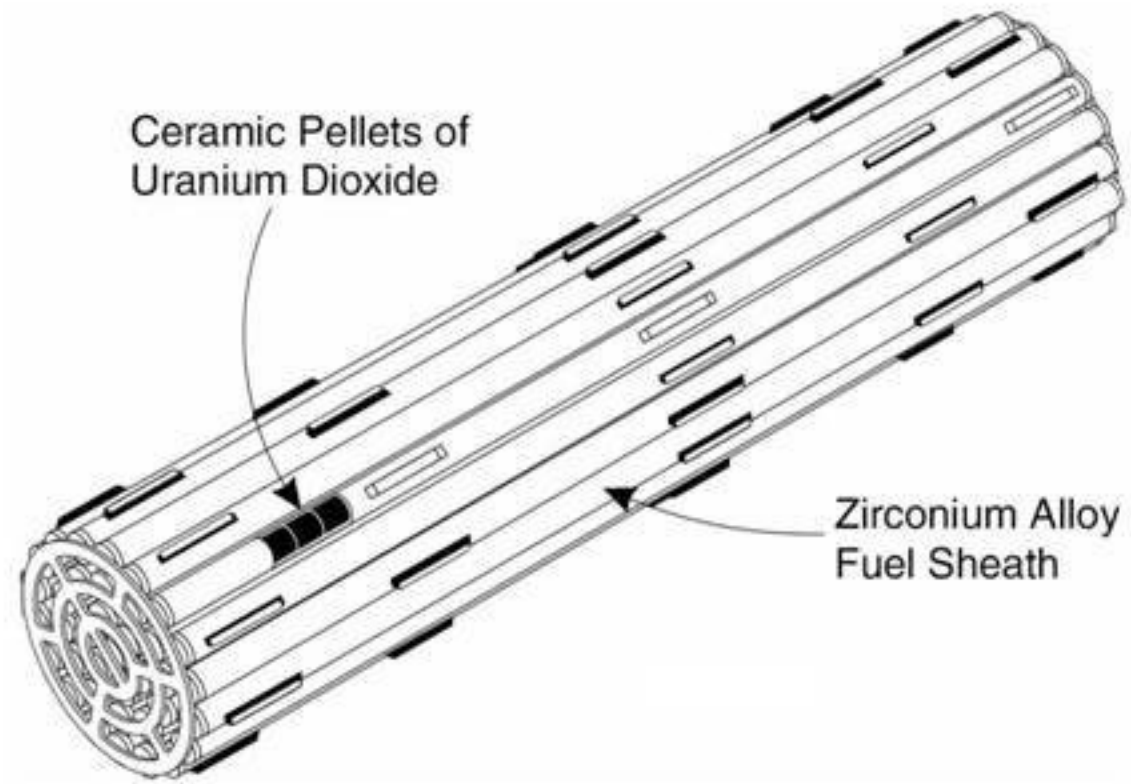
Barrier #1: Used Fuel Pellet

- Uranium dioxide powder is furnace-baked, into a hard, high-density ceramic
- Little physical difference between new and used fuel
- Ceramics are extremely durable – one of the most durable of engineered materials
- Ceramics do not readily dissolve in water



Barrier #2: Zircaloy Fuel Elements and Bundles

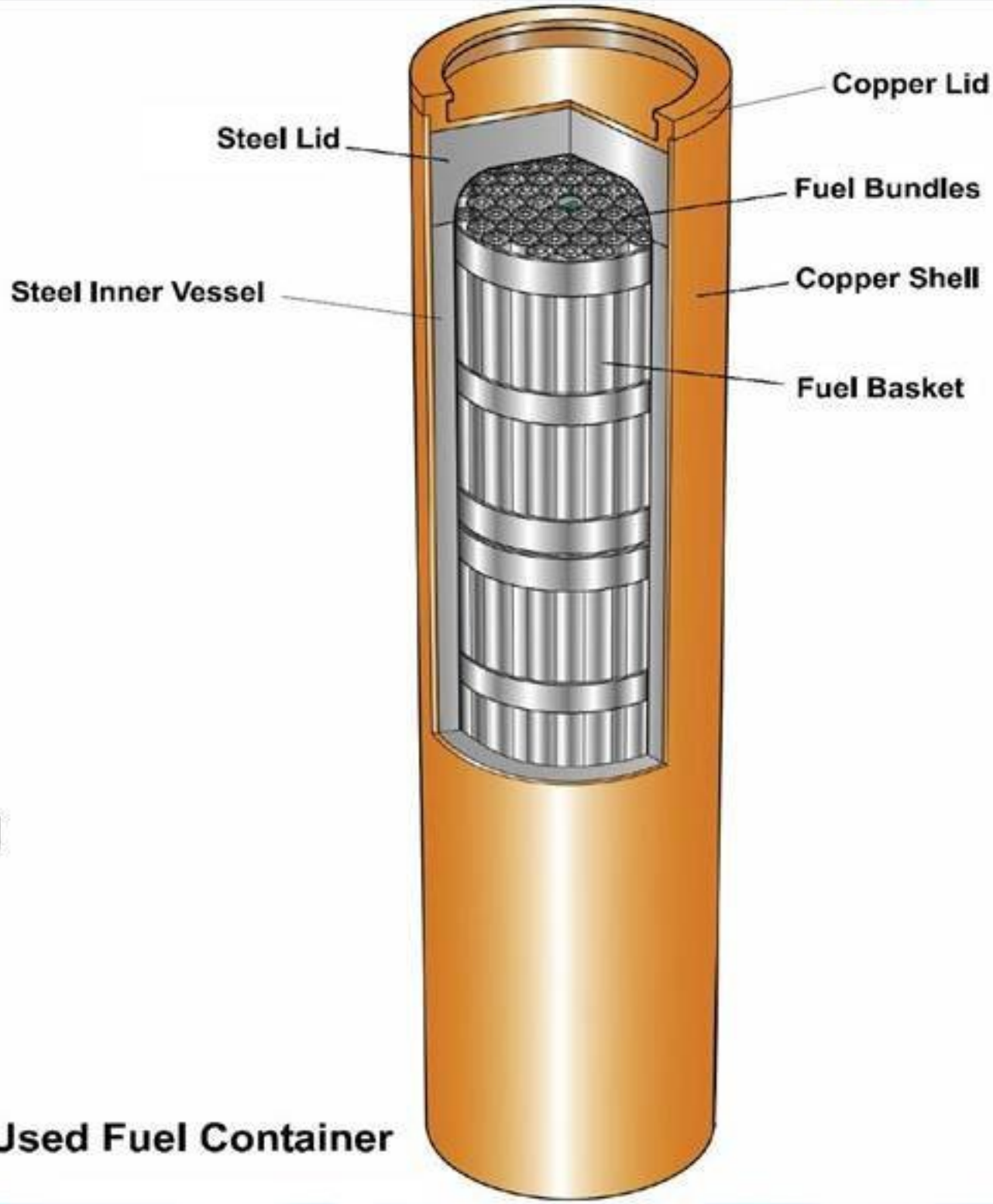
- Used fuel pellets are held in sealed tubes made of Zircaloy (zirconium, Tin, Iron and Chromium).
- Zircaloy is an extremely strong, corrosion-resistant metal.



Barrier #3: Long-Lived Used Fuel Container

Example of long lived container:

- Used fuel bundles are placed into large, very durable containers.
- The inner vessel is made from steel and provides structural resistance.
- The outer shell of the container is corrosion-resistant copper.
- The container isolates the used fuel, preventing water from entering and radionuclides from leaving.



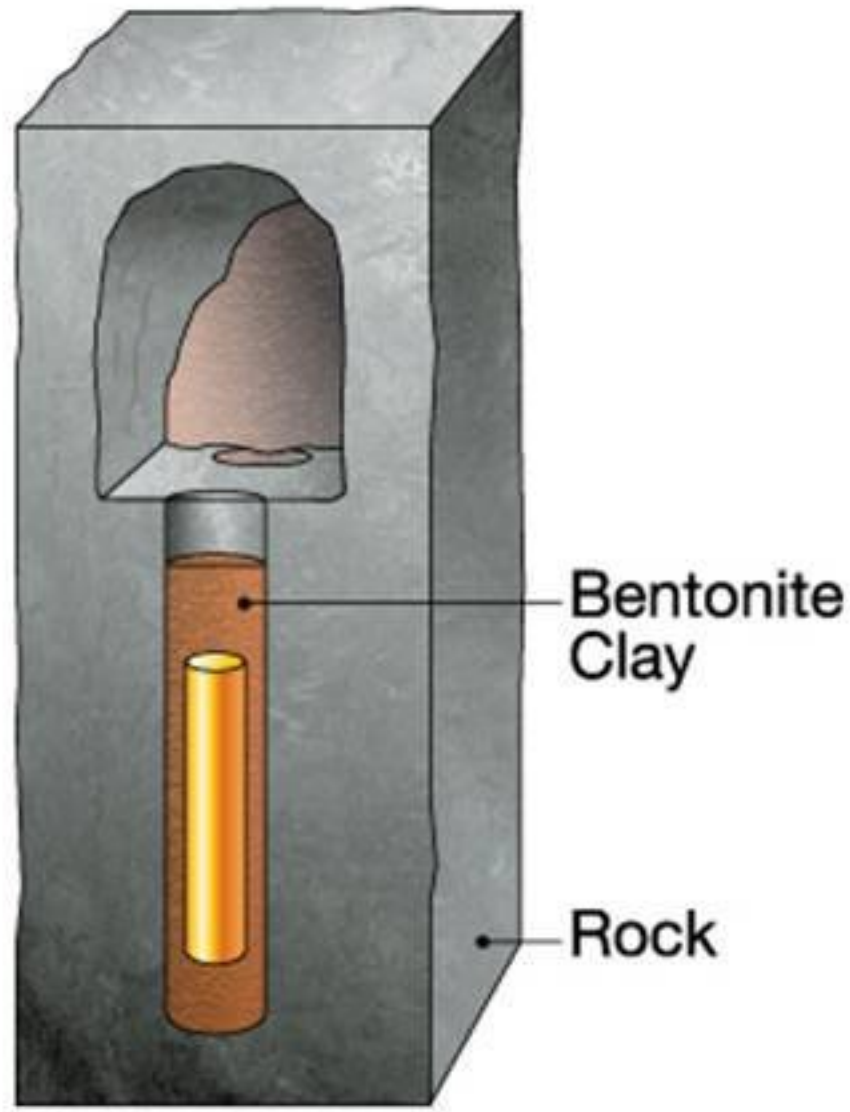
Used Fuel Container

Barrier #3: Used Fuel Container

- Copper sheets found in mudstones from South Devon in England provide a natural analogue for used fuel canisters placed in a clay backfill.
- These copper sheets were formed 200 million years ago and show little corrosion since that time.
- The copper remained stable for millions of years within the clay-rich mudstone.

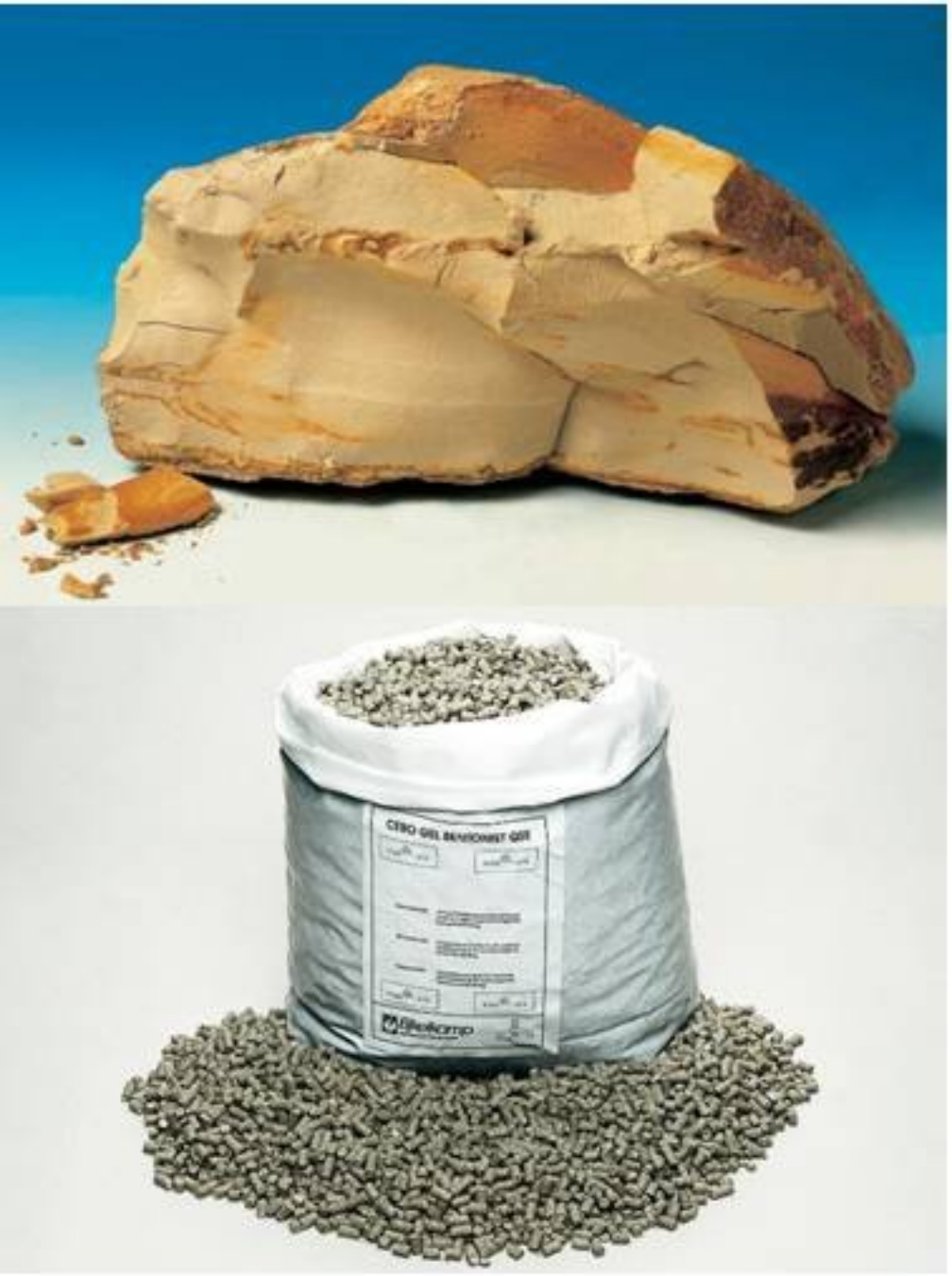
Barrier #4: Bentonite Clay

- Used fuel containers will be surrounded by bentonite clay, providing a powerful barrier against water flow.
- Underground chambers will be filled with bentonite-based materials.
- These engineered materials are designed to minimize the already miniscule movement of water through the repository.
- If a container fails, chemical properties of the clay make it difficult for radionuclides to travel, greatly slowing their release.



Placement Room and Borehole

Barrier #4: Bentonite Clay

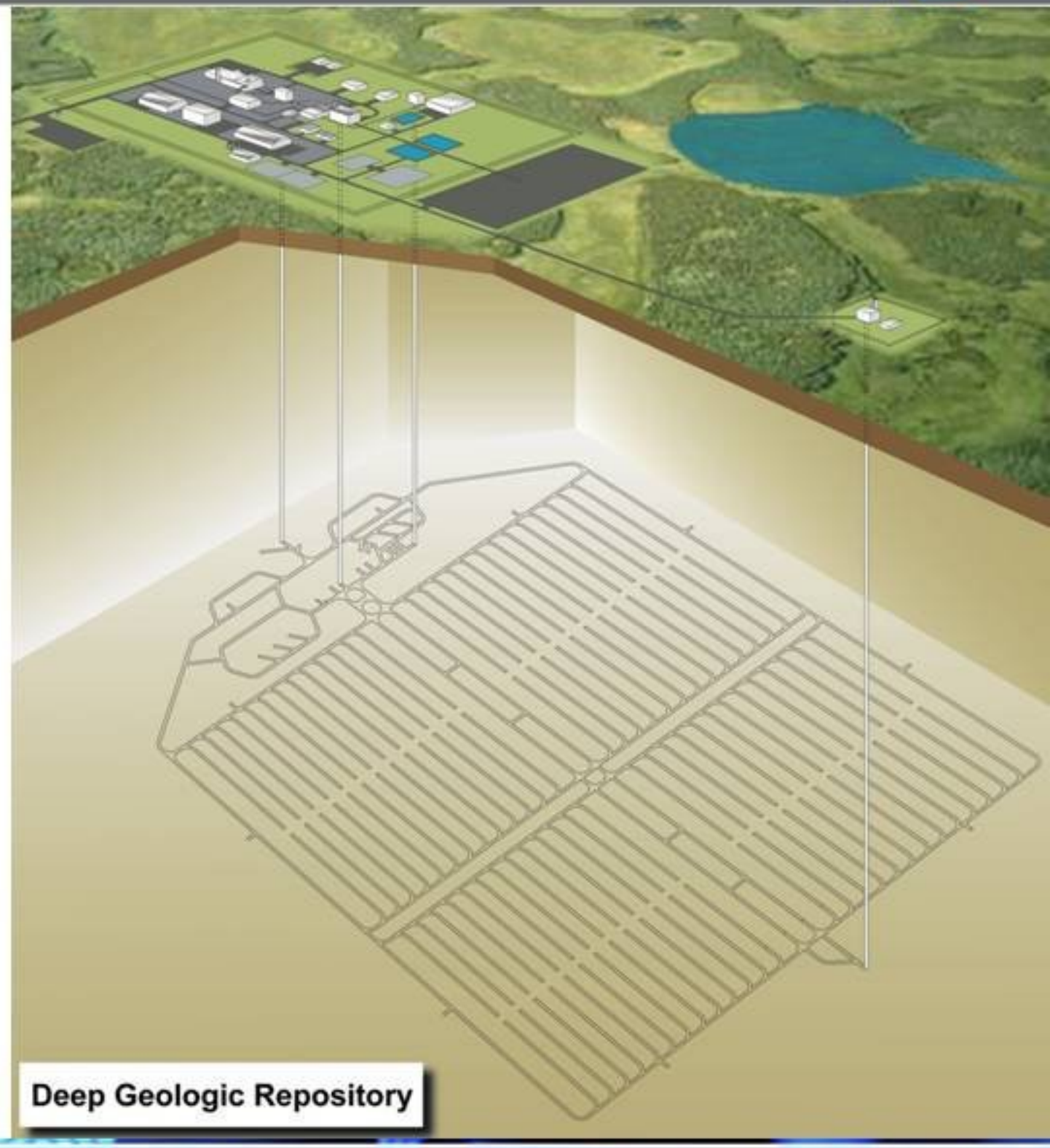


- Bentonite clay is a very stable natural material. It formed millions of years ago.
- Sodium bentonite swells when exposed to water, making an excellent sealing material.
- It provides a powerful barrier to water flow.
- It has the ability to retain radionuclides

The sequoia-like trees in Dunarobba forest, Italy, were buried in clay for 1½ million years. They are still made of wood and have not decomposed.

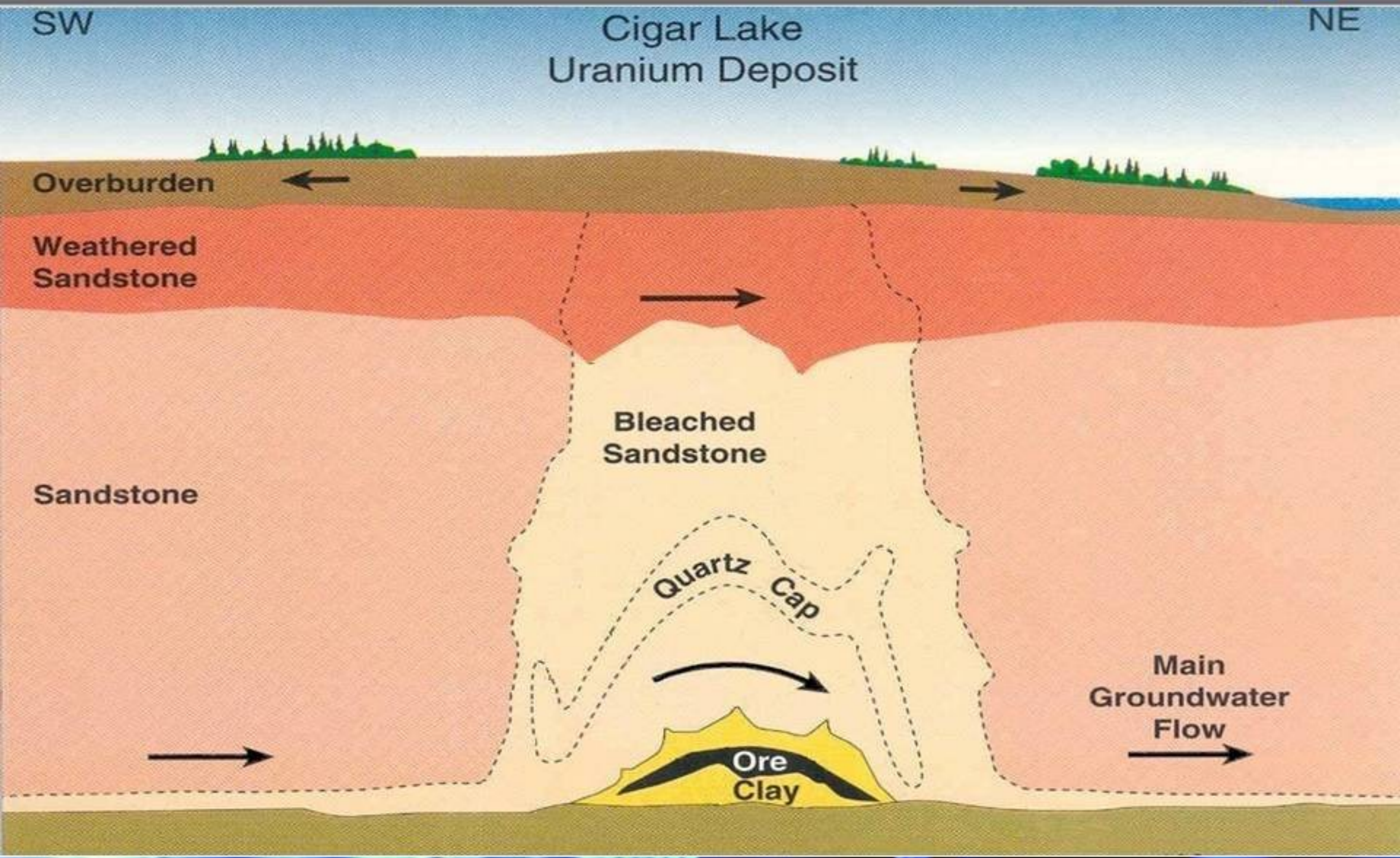
Barrier #5: Geosphere (Host Rock)

- The host rock at depth forms a natural barrier.
- It will protect the repository from natural surface events and human activities.
- The host rock will isolate the used fuel from humans and the environment by limiting the movement of radionuclides if other barriers fail.



Deep Geologic Repository

Barrier #5: Geosphere (natural analogue)



Safety Analysis

Safety is assessed throughout the project's life cycle:

- Construction (conventional safety)
- Operation (used fuel handling, packaging and placement)
- Transportation (used fuel loading, transport and receipt)
- Post-operation (long-term safety)

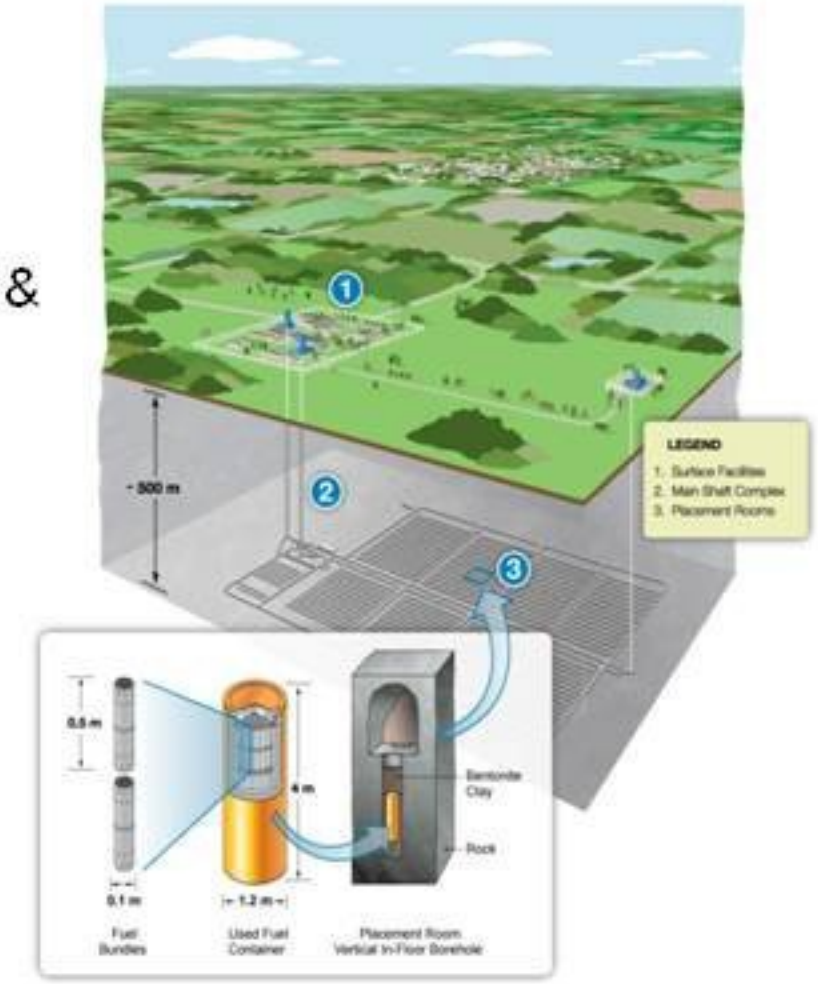
Safety assessment approach:

- Analysis is based on normal scenarios: components and systems are assumed to function as designed
- Sensitivity Analysis: analysis of "what if" and worse case scenarios

Example- Assessment of Long-term Safety

Reference Case:

- Assume some used fuel containers are defective
- Assumes people living "off the land" close to the repository (drinking and irrigation waters from local wells, farming, crops & livestock)
- Conduct deterministic & probabilistic analyses over several million years



Example of "What-If" Scenarios:

- Used fuel more soluble in water (10x or higher)
- Container defect more important (10x larger)
- All containers fail at 100,000 years
- Sealing materials more permeable (10x higher)
- Assume some damage in the rock around the placement rooms (permeability 10x higher)
- No credit for sorption in host rock and in buffer (i.e., no ability to retain radionuclides),
- etc.

Questions – Safety and Security

Site Evaluation Process

Site Evaluation Process

- Technical site evaluation criteria
- Technical site evaluation process
- Technical site evaluation activities

Highlights of the Technical Site Evaluation Process

- Ensure technical safety to protect humans and the environment, now and in the future
- Progressive and thorough technical site evaluation process (7-10 years)
- Comprehensive technical site evaluation criteria
- Community involvement at all steps
- Evaluation process and results are subject to third-party reviews

Main Site Evaluation Stages

Site evaluation process is driven by community's interest to participate:

Initial Screening
Several months

Desktop studies to evaluate the potential suitability of the community against a list of initial screening criteria

Feasibility Study
1 -2 years

Desktop studies to determine whether a site in the community has the potential to meet the detailed requirements for the project (possibility of limited field work):

- Technical evaluation
- Social, economic and cultural assessment (community well-being)

Detailed Site Characterization
~ 5 years

Detailed field investigations at one or two sites to confirm suitability of the site based on detailed site evaluation criteria:

- Technical evaluation (detailed field investigations).
- Continue social, economic and cultural assessment
- Regional study

Initial Screening Criteria

- Enough land to accommodate surface and underground facilities
- Outside protected areas, heritage sites, provincial/national parks
- Land must not contain groundwater resources at repository depth
- Land must not contain known economically exploitable natural resources
- Land must not be located in areas with known geological and hydrogeological features that prevent site from being safe

Detailed Technical Site Evaluation Criteria

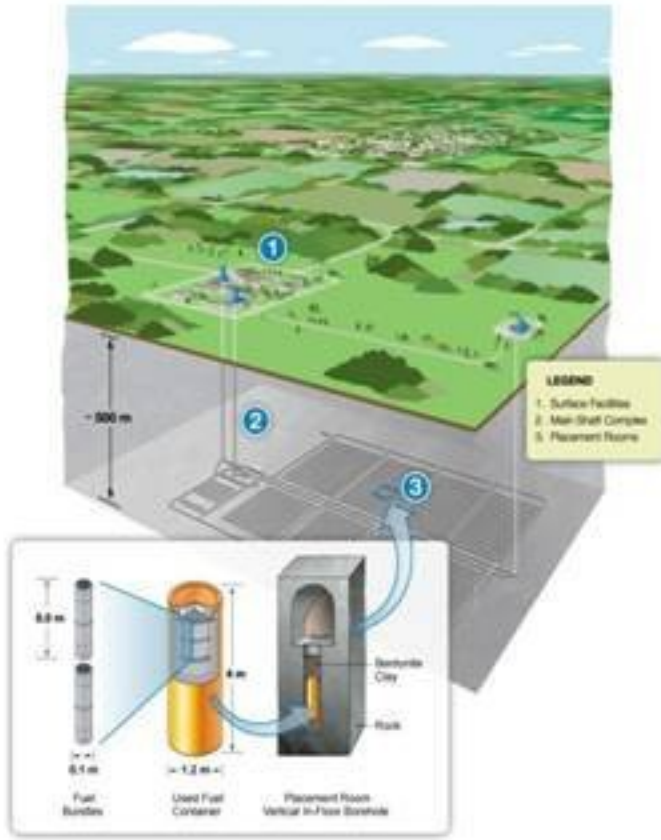
Suitable sites must satisfy six safety functions

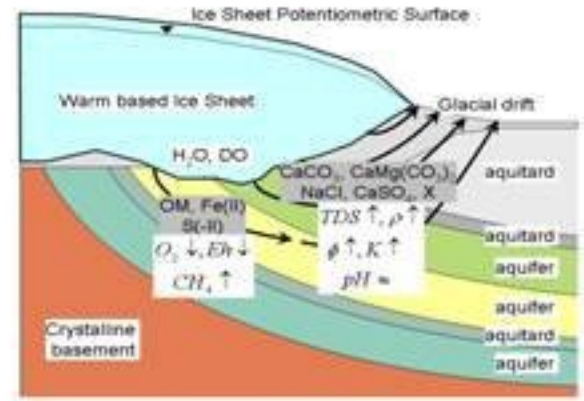
1. Safe containment and isolation of used nuclear fuel
2. Long-term resilience to future geological processes and climate change
3. Isolation of used fuel from future human activities
4. Amenable to site characterization and data interpretation activities
5. Safe construction, operation and closure of the repository
6. Safe and secure transportation routes

Technical Site Evaluation Criteria

1. **Site characteristics are appropriate to ensure the long-term containment and isolation of used nuclear fuel from the environment and surface disturbances**

   - Sufficient depth
   - Sufficient volume of competent rock
   - Low groundwater movement at repository depth
   - Favourable chemical composition of the rock and water at repository depth
   - Favourable thermal properties of the rock

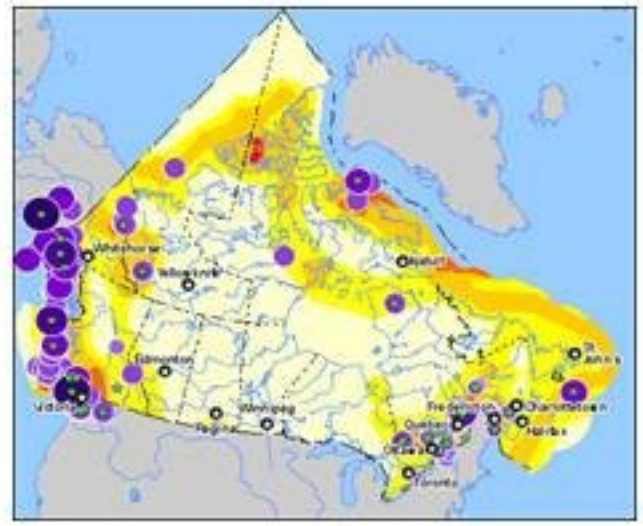


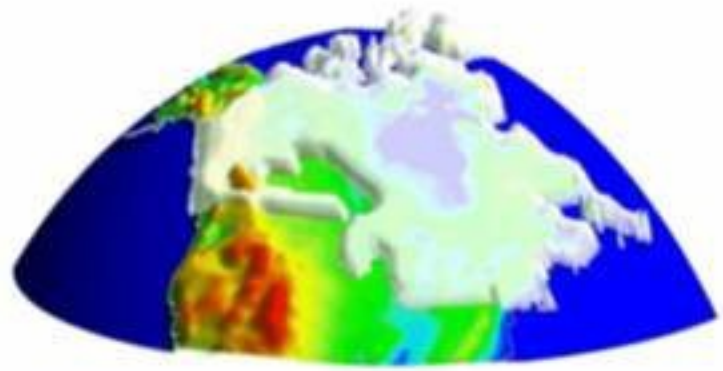


Technical Site Evaluation Criteria

2. The site is stable and not likely to be substantially affected by future geological processes and climate changes

- Resilience to earthquakes
- Impact of land movements (uplift, subsidence, erosion)
- Resilience to glaciation cycles
- Proximity of active deformation zones and faults





Technical Site Evaluation Criteria

3. Isolation from future human activities- Prevent human intrusion

» Avoid areas containing exploitable groundwater resources at repository depth

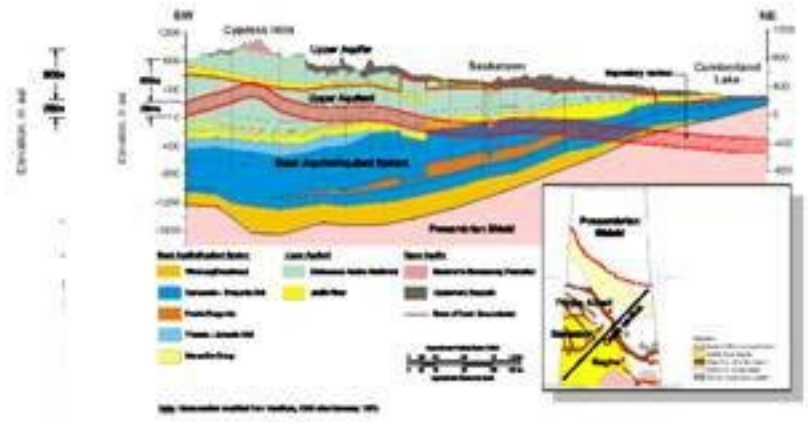
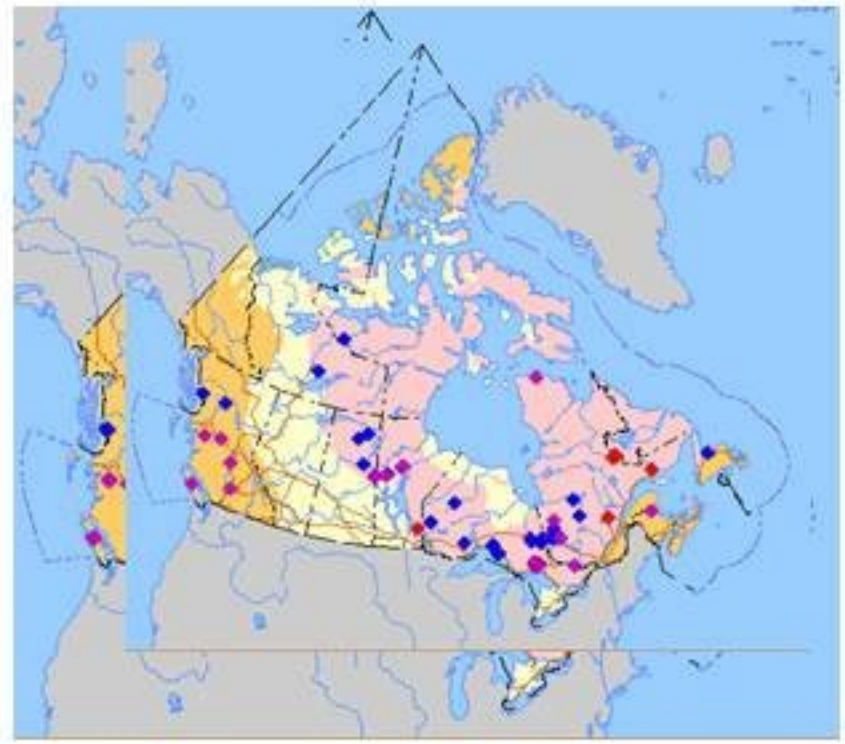


Figure 17 The Geological and Hydrogeological Stratigraphy of the Western Canada Basin, Saskatchewan showing a hypothetical "Repository Horizon"

» Avoid areas containing economically exploitable natural resources



Technical Site Evaluation Criteria

4. **Site amenable to characterization and data interpretation activities**

   - Simple and predictable rock geometry and structure

5. **Safe construction, operation and closure of the repository**

   - Adequate rock strength and in-situ stresses

Technical Site Evaluation Criteria

6. Safe and secure transportation routes

- Transportation route exists or can be constructed to safely transport used nuclear fuel from storage sites to the central repository site

- Routes allows for security and emergency response measures to be implemented

Technical Site Evaluation Activities
Initial Screening

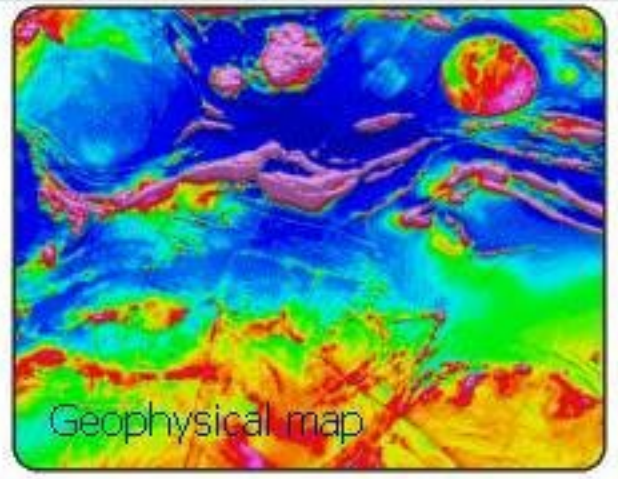
Screening objective and criteria:

- Early identification of sites that are obviously not suitable for safely hosting a deep geological repository for used nuclear fuel
- Pre-established screening criteria (exclusion criteria)

Screening activities

- Preliminary review of readily available information
- Review of geological and geophysical maps
- Review of seismic hazard maps
- Review of groundwater and natural resources maps
- Identification of protected areas
- Identification of current and planned land use plans
- Etc.

Technical Site Evaluation Activities
Feasibility Studies

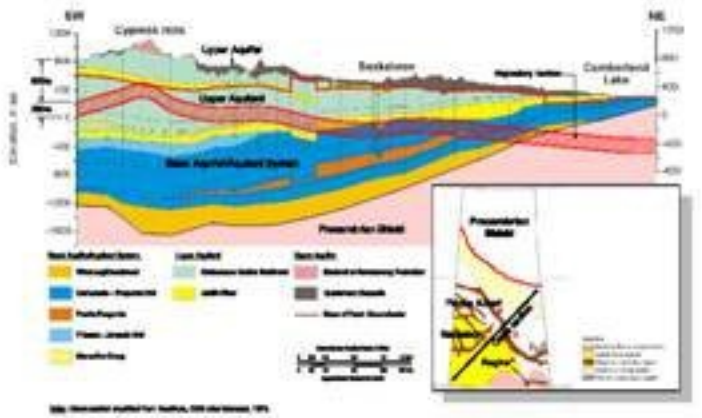


Feasibility study objective and criteria:

- Assess potential suitability of sites to safely host a deep geological repository
- Detailed site evaluation criteria

Feasibility study activities

- Systematic review and evaluation of available geoscientific characteristics of the sites (Possibility of limited field investigations)
- Detailed analysis of available geological, geophysical and seismic hazard maps
- Review of existing borehole databases
- Detailed analysis of groundwater and natural resources maps
- Etc.



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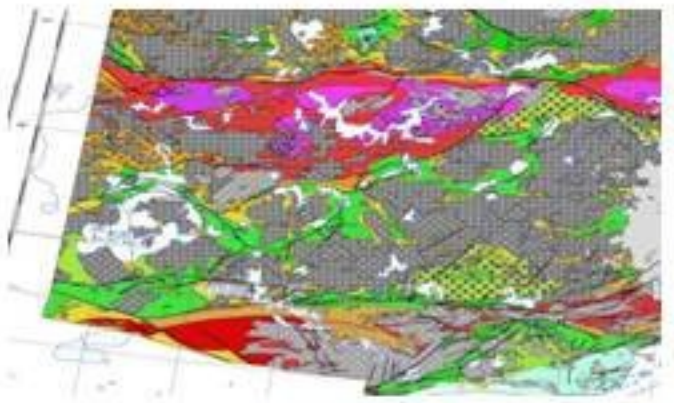


Technical Site Evaluation Activities
Detailed Site Characterization

Detailed site characterization objective and criteria:

- Confirm the suitability of one or more sites
- Detailed site evaluation criteria

Detailed site characterization activities:

- Conduct detailed field investigations to collect regional and site specific information on the geosphere and biosphere
- Baseline environmental monitoring
- Airborne and surface-based geophysical surveys, drilling of boreholes, field testing, laboratory analysis and monitoring activities
- Preliminary engineering design and preliminary safety assessments
- Etc.

Questions – Site Evaluation Process

Community Well-Being

Overview – Community Well-Being

- Why community well-being?
- Initial look at benefits and opportunities
- Initial look at effects that will need to be managed
- Lessons learned from case studies
- Lessons learned from international experience

Why Community Well-being

- NWMO committed to implementing project in a way that contributes to the long-term well-being or quality of life of the community and region
- Communities are encouraged to consider this project in the context of their long-term interests to pave the way for thinking about how the project may affect the community in a variety of dimensions
- Community needs to be involved in a process to help plan and leverage the project/development in a way that enhances its well-being

Partnership and Community Support

- There is no single definition of community well-being
- Ultimately, the vision for the community, and the extent to which the project contributes to this vision in an acceptable way, is a matter for the community to discuss and assess.
- Communities often include:
  - economic health
  - environment
  - safety and security
  - spiritual dimensions
  - social conditions
  - enhancing opportunities for people and communities

Benefits, Opportunities and Effects to be Managed

- Benefits and Opportunities:
  - Project will be implemented in a way that contributes to well-being of community.
  - Project will be an engine for economic development.
  - Potential for benefits at each stage of project
  - Community resources for capacity building to participate supplement and strengthen existing community planning processes

- Other Effects: There will be social, economic and cultural effects to be managed.

Lessons Learned

- Taking a leadership role
- Openness and participation
- Early involvement of opinion leaders, community groups and residents
- Starting with a community vision
- Community preparation
- Being active partner in guiding project implementation

Factors that Influence Community Benefits

» The level and nature of benefits that any community might realize will be influenced by a number of factors such as:

- Geographic location
- Population size, characteristics and dynamics
- Availability and composition of labour, supporting businesses and industry
- State of supporting infrastructure and services
- Vision, goals and objectives of the host community

Initial Look at Benefits and Opportunities

During the Site Selection Process	Benefits and Opportunities
Site Evaluation Process - Initial site evaluation involving desktop studies over a 1- to 2-year period - Detailed site evaluation involving 20–40 workers and spending of tens of millions of dollars each year for about 5 years	**General**: • Participate in an important national infrastructure initiative • Funding to conduct general community visioning exercise and enhance community engagement and decision-making processes to support consideration of this project • Development of social, cultural, economic, environmental and technical knowledge from community-based investigation and/or from sharing of insight with other jurisdictions **Project Specific**: • Funding to hire experts to review work • Funding to engage citizens in decision-making • Economic benefits associated with on-site workers and purchase of goods and services to support project
Establishment of Centre of Expertise - Involving hundreds of workers on site per year and spending of $100 million each year for a period of about 5 years	**General**: • Long-term employment for skilled workers in the Centre of Expertise is added to the mix of workers and households in the community **Project Specific**: • Funding to hire experts to review work • Funding to engage citizens in decision-making • Economic benefits associated with on-site workers associated with construction and purchase of goods and services to support project

Initial Look at Benefits and Opportunities

During Project Implementation	Benefits and Opportunities
Construction of the Deep Geological Repository - Involving 600–800 skilled and semi-skilled workers and spending of hundreds of millions of dollars each year for about 5 years - Annual employment within an economic region (direct, indirect and induced) approximately 3,000 workers	• Economic benefits associated with on-site employment • Development of a larger and more diverse tax base available for investment in new community infrastructure • Significant direct employment opportunities created in the host community for support services such as transportation, catering and equipment supply • Depending on host economic region, wealth creation in the form of business profits and personal income throughout the region is expected to be hundreds of millions of dollars
Operation of the Facilities - Used fuel transportation and placement in the repository involving hundreds of workers and spending of $200 million each year for 30 or more years - Annual employment within an economic region (direct, indirect and induced) approximately 3,000 workers	• Economic benefits associated with on-site employment • Development of a larger and more diverse tax base available for investment in new community infrastructure • Annual employment in host community will be created by the many businesses that will be required to support direct ongoing operations at the facility • Depending on the host economic region, wealth creation in the form of business profits and personal income throughout the host region is expected to be hundreds of millions of dollars per year
Other Support	Resources provided by NWMO to support the community (i.e. contribution to infrastructure development and/or other capacity building) in capturing the benefits and adapting to changes associated with the project in order to further the long-term well-being of the community

Effects That Will Need to be Managed

	Effects
Site Evaluation Process - Initial site evaluation involving desktop studies over a 1- to 2-year period - Detailed site evaluation involving 20–40 workers and spending of tens of millions of dollars each year for about 5 years	• Potential community debate about Canada's plan and/or interest in the project may strengthen or weaken community cohesiveness • Communities may require assistance in coping with the economic and social change introduced by the project
Construction of the Deep Geological Repository - Involving 600–800 workers and spending of hundreds of millions of dollars each year for a period of about 5 years	• Construction phase will be marked by a significant influx of workers and a heightened level of activity. Worker population growth and decline may result in significant socio-economic effects to be managed • The influx of non-local workers may disrupt community • There may be a requirement for additional social services during and after peak project development • The influx of higher wage-earning workers into the community may affect local wage profile • The flow of dollars into local economy may cause a rise in level of economic activity during construction, followed by a difficult drop if not managed • An increase in demand for supplies and services may overtax community infrastructure if not properly prepared for • There may be an escalation in property values as economic activity and employment builds up to service construction and operation phases. Housing and land values may then decline significantly upon the project completion.

Potential Socio-Economic Effects by Project Activity

	Potential Effects
Operation of the Facilities - Used fuel transportation and placement in the repository involving hundreds of workers and spending of $200 million each year for a period of 30 or more years	Operations-related activities can introduce changes to the socio-economic characteristics of an area such as: • Workforce/labour changes, as construction-related workforce and labour are replaced with stable operating workforce for fuel placement activities • Changes to local/regional spending for payroll, materials, services • Infrastructure maintenance, including access routes maintenance • Off-site service requirements, including water, sewer, waste disposal, utilities, emergency response, administrative, etc. • Physical attributes (noise, dust, traffic, visual effects, etc.)
Monitoring: Post-Fuel Placement - Involving approximately 30 workers on-site for security, monitoring and reporting for an indefinite period	• The previously high level of activities is replaced by low level of continuous monitoring, regardless of the management option chosen • Socio-economic and cultural effects will be at a consistent, but low, level.
Closure and Post-closure with Monitoring - Involving dozens of workers on-site during closure, and later, a few workers as monitoring is maintained for an indefinite period	• If and when a decision is made to permanently close the facility, a relatively short period of construction would bring workers onto the site, followed by a low level of activity for as long as monitoring is maintained

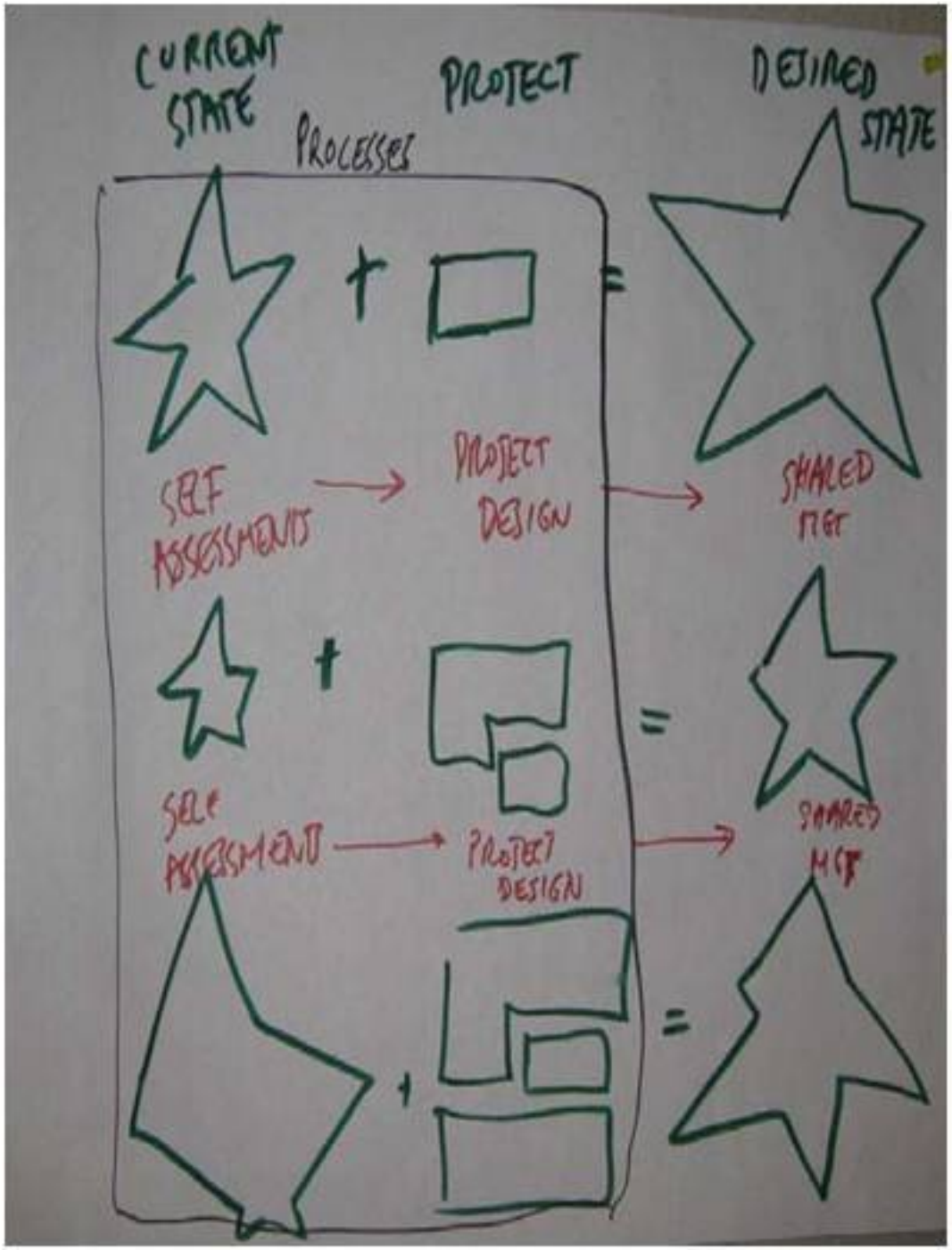
The Work Continues

- NWMO is working with the consulting firm AECOM to refine estimates of economic benefits for various types of communities
- For instance, by size, social and economic circumstances, region and province
- Further understanding of how different types of communities might better capture benefits and distribution of benefits across regions
- Builds on work conducted in 2004
- Uses up-to-date Statistics Canada census information and multipliers

Lessons Learned

- Take a leadership role
- Identify the things that are fundamentally important to the community
- The process of defining community well-being is a good way to inform and involve local people, organizations and citizens.
- Sustainability planning initiatives not only identify what is important or needs to change, but also how community currently sees their future without the project
- Involve key opinion leaders, community groups and residents beginning early in the process
- Prepare for challenges and take the long view

A Community's Well-Being "Star"



- Some use a star to think about a community's well-being
- Each point of the star represents a different component of well-being as defined by the community, such as economics, natural environment, health, social relationships, culture, human skills, and so on
- A community's star may have different sized points (or even be missing points) depending on the degree of well-being which currently exists in particular dimensions
- The community's objective is to develop the weaker elements of their star through the opportunities for employment, incomes, business development, training and education afforded by the project

Community Approach

What Works:

1. Community-driven process
2. Need to involve formal and informal leaders in a community
3. Importance of engaging certain hard-to-reach community groups such as: youth, seniors, unemployed and seasonal residents
4. There may be value in working through an organization that already has the trust of the community, such as universities, colleges and "centres of excellence"
5. Continually inform the public about activities. Be as transparent as possible
6. There may be value in collaborating with the public in a formal way – for instance, by creating a steering committee or advisory committee with stakeholders from multiple levels or pillars of the community
7. Be patient: Learn to expect the unexpected

Issues and Challenges That May Arise

1. **Not all voices or views of community well-being will be the same within the community**
2. Community dynamics change with time: new councils and business leaders; changing population demographics; change in social interest and values over time
3. Identifying interested stakeholders and keeping their interest alive over long periods
4. Understanding which data and information are relevant, and how to collect and organize them in a meaningful framework
5. Dealing with vocal opponents – one can expect two kinds: from inside the community and from outside the community. Each may require a different approach

Example: Newfoundland "Well-Being Account"

Indicator	Current Value	CWB Target
Economic Self-Reliance Ratio		
Income Support Assistance Incidence		
Personal Income Per Capita		
Average Couple Family Income		
Change in Employment		
Employment Insurance Incidence		
Population Change		
Migration Rate		
High School or Above (pop. 18 to 64)		
Bachelor's Degree or Higher (pop. 25 to 54)		
Employment Rate (pop. 18 to 64)		
Life Expectancy		

Example: Victoria "Community Indicators"

Well-Being Domain	Indicators
Social – Healthy, safe and inclusive communities	Personal health and well-being: Self-reported health, life expectancy Community connectedness: Volunteerism, parental participation in schools Personal and community safety: Workplace safety, crime Lifelong learning: Home internet access, school retention Service availability: access to services
Economic – Dynamic resilient economies	Economic activity: business activity, retained retail spending Employment: employment rate, local employment Income and wealth: food security, per capita income Skills: education level achievement, qualifications Work-life balance
Environmental – Sustainable and built natural environments	Open space: access to open spaces Housing: affordable housing Transport accessibility: public transport patronage, number of dedicated walking and cycle paths Sustainable energy use: GHG emissions, renewable energy sources Air quality: air quality measures Biodiversity: native vegetation growth Water: water consumption Waste management: household waste generation, recycling
Democratic – Democratic and engaged communities	Citizen engagement: local female councillors, opportunity to vote for a trustworthy person
Cultural – Culturally rich and vibrant communities	Arts and culture activities: participation rates in arts and cultural activities and events Leisure and recreation: participation rates in sporting and recreational activities Cultural diversity: Community acceptance of diverse cultures

International Experience – Belgium 'Partnership'

1. A 'local partnership' was established
2. It was tasked to develop a specific project proposal, acceptable to all partners
3. The project was subsequently brought before the municipal council for a formal political decision
4. Local politicians and delegates from local environmental, social, cultural, socio-economic and other locally based organizations were involved
5. Individual citizens also involved
6. This takes time and resources
7. Including time to get local people up to speed on what nuclear waste is and how it needs to be managed and build trust and confidence in the project

International Experience – Oskarshamn Model

1. Openness and participation
2. The Council as reference group
3. The public – a resource
4. The environmental groups – a resource
5. Stretching of waste organization to answer questions
6. The competent authorities are our experts

International experience underlines the importance of

- *Community preparation*
- *Leadership*
- *Openness, and*
- *Involvement of community opinion leaders early and throughout the process*

Next Steps and Discussion

Build Understanding of Canada's Plan

NWMO supports a range of community-driven activities:

- Request briefings from NWMO
- Visit a nuclear power plant to see interim storage for used nuclear fuel
- Explore questions of safety and regulatory framework and seek independent perspective:
  - Visit the Canadian Nuclear Safety Commission
  - Contract expert advice to review safety and other topics
- Learn more about nuclear waste management:
  - Engage with Swedish officials to hear about their experience in community-driven process that resulted in willing host community in Sweden (June, Federation of Canadian Municipalities, Halifax)
  - Attend International Waste Conference (Toronto, September)

Engage Community Members

» **Envision the future**

- Engage community members in visioning exercise that enables community to reflect on its longer term goals and priorities
- Learn more about the potential benefits that may be expected from the APM project, and types of impacts to be managed.
- Consider whether the APM project aligns with the community vision or strategic plan

» **Invite community members into the dialogue**

- Provide opportunities for citizens to hear about the project, identify key questions and concerns to be addressed - funding available to convene dialogues, open houses, supported by NWMO
- Begin community outreach with support from NWMO – school visits, seniors' programs, door to door information visits, informal meetings with community groups, opinion leaders, Elders
- Seek assistance from NWMO on communications, media relations
- Engage with surrounding communities, with costs covered by NWMO

Develop Institutional Capacity

NWMO will provide financial and other support to assist a community as it thinks through its next steps and potential interest.

» Establish a Project Manager/Resource Person, through partial FTE funded by NWMO, to reduce load on community administrators

Establish a community liaison group for project. The group could, for example:

- Receive briefings from NWMO on ongoing basis
- Participate in site tours
- Visit the Canadian Nuclear Safety Commission
- Contract third party advice
- Direct third party to lead community visioning project
- Lead communications to the community
- Plan workshops, outreach programs

Laying foundation for feasibility studies

For communities interested in continuing in the process, without obligation, NWMO will work in partnership to lay foundation for feasibility study phase.

» **Learn what is involved in a feasibility study**

- Receive NWMO briefing on: What is a feasibility study and what are its goals and objectives?
- Work with NWMO to confirm plan for feasibility study which addresses both the needs of the NWMO and the priorities and objectives of community
- Discuss possible approaches to engaging surrounding communities and Aboriginal people
- Discuss how NWMO and community will work together to conduct study

» **Identify geographical focus for a feasibility study.**

- Community, with NWMO, identifies areas of potential suitability for future feasibility study.
- Review implications of others potentially affected and future involvement of Province if Crown land involved.

» **Community and NWMO agree on path forward for feasibility study phase**

- Agreement how NWMO and community will work together and how citizens will be engaged.
- Establish nature of community liaison group and/or project liaison staff to oversee project.
- Agree nature of funding and other support to be provided by NWMO to the community through this phase of work

Communications Support

NWMO will support communities with their communications needs.

- Draft communication material for posting on Township website and publishing in local papers following Learn More briefing, to demonstrate transparency.
- Install information kiosks and document stands in key community locations i.e. Township Office, public library etc.
- Respond to issues/concerns that may be raised by NGO's.
- Local/regional media relations support.

Summary

- The NWMO and Canada's plan on the long term management of used nuclear fuel
- Technical briefings
  - Safety and Security
  - Site Evaluation Process
- Community well-being
- Geology
- Round table discussion – next steps
- Communications support