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# URF N Roadmap for Developing a Geological Disposal Program Roadmap

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Network (URF – Network)*

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# URF Network Roadmap

- Idea for roadmap was formulated from discussions at the IAEA Workshop in Albuquerque, NM, 2014 and at the Annual IAEA URF Network Meeting in Daejeon November 17-21, 2014
- Roadmap has several uses:
  - Reach a consensus by the URF Network on the set of activities and technologies needed for repository development
  - Provide a vehicle to forecast training and workshop needs
  - Provides a framework to help plan and coordinate URF Network activities

# URF Network Roadmap Report\*

- **Describe the different phases and activities in a repository development program for the disposal of HLW/SNF –**
- **Identify the links between research and development (R&D) conducted in URLs and the overall repository development program**
- **Describe the role of URLs in the development of new repository technologies and provide examples of these technologies**

\* IAEA-TECDOC-1755 (published in 2014): Planning and Design Considerations for Geological Repository Programmes of Radioactive Waste)

# Repository Development Timeline

## Concept Evaluation

Evaluate Disposal Concepts; FEPs;  
Develop and Demonstrate  
Technologies; Preliminary RD&D

## Note:

*Stages and phases are not necessarily discrete but often overlap  
Stages and phases are typically iterative and not simply sequential  
Stages and phases can differ from country to country*

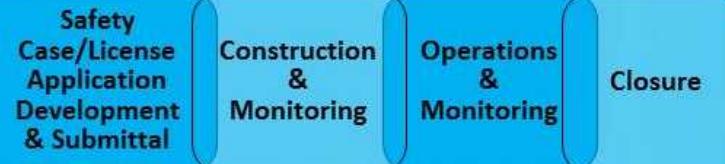
## Site Selection



## Site Characterization

Characterization of Selected Site

## Repository Development



Generic RD&D

Site Specific RD&D

Site Characterization, Repository Design, Safety Evaluation

# Repository Development Phases



## Repository Development Program and its Major Activities

Major Development Phases	Planning, R&D, and Concept Evaluation	Site Selection: A consent-based process				Site Characterization	Repository Development			
		Elicitation of Interested Host Communities	Initial Site Evaluation	Candidate Sites Evaluated	Preferred Site Selected		Characterization of Selected Site	License Application	Construction and Monitoring	Operations and Monitoring
Management, Planning, and Project Implementation	<ul style="list-style-type: none"> <li>Develop waste management policy</li> <li>Establish institutional and legal framework</li> <li>Develop waste management strategy and plan for achieving regulatory requirements including:           <ul style="list-style-type: none"> <li>High-level transportation and storage plan</li> <li>High-level repository construction schedule</li> <li>Safety Case</li> </ul> </li> <li>Develop consent-based siting process</li> <li>Establish baseline program schedule and costs</li> <li>Establish quality assurance program</li> <li>Establish plan, structure, and schedule for Safety Case and License Application for Construction</li> </ul>	<ul style="list-style-type: none"> <li>Establish working relationships with stakeholders and public</li> <li>Enhance scientific and institutional credibility</li> <li>Build awareness among communities of siting process, waste management plan, Safety Case, and opportunities/benefits</li> <li>Develop consent-based siting process</li> <li>Identify communities interested in participating and learning more</li> </ul>	<ul style="list-style-type: none"> <li>Engage and establish working relationships with interested communities and stakeholders</li> <li>Communicate Waste Management Plan, Siting Process, and opportunities/benefits to Stakeholders and communities</li> <li>Respond to stakeholder and community concerns and inquiries</li> <li>Engage and communicate Initial Site Evaluations</li> <li>Identify communities with potentially suitable sites that offer to continue in the process</li> </ul>	<ul style="list-style-type: none"> <li>Engage communities with potentially suitable sites and communicate site evaluation plan and schedule</li> <li>Collaborate and communicate with communities on site evaluations</li> <li>Collaborate with communities to conduct and understand environmental assessments</li> <li>Collaborate with communities on the assessment of potential cultural, social, and economic impacts</li> <li>Collaborate with communities on evaluation of potentially suitable sites</li> <li>Identify communities with suitable sites that offer to continue to the next step</li> </ul>	<ul style="list-style-type: none"> <li>Communicate Updated Waste Management Plan and schedule, Site Selection Process, and opportunities/benefits to Stakeholders and communities</li> <li>Communicate potential repository design and preliminary safety assessment</li> <li>Communicate Site Characterization Plan and schedule</li> <li>Establish terms and conditions with communities offering to participate in the site characterization process</li> <li>Site Selected and endorsed by Government, stakeholders, and host and affected communities</li> <li>Assess the need and use of a site specific underground research laboratory</li> </ul>	<ul style="list-style-type: none"> <li>Communicate Updated Waste Management Plan and schedule, Site Characterization Process and Plan</li> <li>Communicate and collaborate with communities on characterization of site(s)</li> <li>Engage and inform stakeholders and communities on progress of site characterization, repository design, transportation plan, preclosure safety, postclosure safety assessment, environmental impact assessment, and Safety Case</li> <li>Endorsement by the Government, stakeholders, and host and affected communities to proceed with the License Application</li> <li>Submission of the License Application</li> </ul>	<ul style="list-style-type: none"> <li>Communicate and collaborate with stakeholders on final plans and schedules for detailed</li> <li>Site characterization</li> <li>Repository design</li> <li>Transportation</li> <li>Storage</li> <li>Preclosure Safety Assessment</li> <li>Postclosure Safety Assessment</li> <li>Safety Case</li> <li>License Application</li> </ul>			
	<ul style="list-style-type: none"> <li>national and geological use of potential ions, volcanic and seismic fault zones</li> <li>repository national and geological migration</li> </ul>	<ul style="list-style-type: none"> <li>Establish geological guidelines for suitable sites and host media</li> <li>Develop Generic Site Characterization Plan and Budget: Phased approach with Initial Site Investigations based on regional surveys and available information</li> </ul>	<ul style="list-style-type: none"> <li>Using existing information and siting guidelines, conduct initial site evaluations using existing information and identify any potential issues that may mitigate suitability of proposed sites</li> </ul>	<ul style="list-style-type: none"> <li>Develop Site Specific Draft Characterization Plans</li> <li>Conduct assessments of the effects on public health and safety and the environment of the site characterization activities described in the final site characterization plan</li> <li>Identify location and extent of</li> </ul>	<ul style="list-style-type: none"> <li>Executive field work begins to collect site specific data to develop geological, hydrogeological, geochemical, and thermal mechanical/geotechnical models of the host rock and natural barrier system</li> </ul>	<ul style="list-style-type: none"> <li>Executive field work continues to reduce uncertainty in site specific data and understanding of the following areas: geological, hydrogeological, geochemical, geotechnical; climatology</li> </ul>	<ul style="list-style-type: none"> <li>Geological models and geoscientific understanding of site has been confirmed, with acceptable residual uncertainty in host rock and geosphere parameter values and features, events, and processes (FEPs)</li> </ul>	<ul style="list-style-type: none"> <li>Establish criteria and investigations for evaluation and confirmation/selection of emplacement areas</li> <li>Site investigations to collect data important to PAA/Post-Closure Safety</li> </ul>	<ul style="list-style-type: none"> <li>Monitor and confirm data important to Post-Closure Safety</li> </ul>	

Development Activities



Member A at beginning of their program



URF Member A

Time

# Roadmap Report

The Need for a Roadmap – the Roadmap will help answer the following questions.

**Where are we?** The current understanding of how URFs support disposal will be summarized by presenting a Repository Development Timeline/Matrix

**Where are we going?** The URF Network wants to:

Encourage the preservation, sharing and transfer of knowledge and technologies,  
Work on solutions for Member States currently without URFs,  
Supplement national efforts and promote public confidence in waste disposal  
schemes, and  
Contribute to the resolution of key technical issues.

**How will we get there?** Repository development phases and objectives, activities, and outcomes:

Organize information to allow the URF Network to readily identify what solutions are and are not available

Describe technologies and disposal concepts and their readiness for deployment

Describe key technical issues that have been resolved and those that are outstanding

A summary of URFs and technologies and the types of investigations and results that exist

The roadmap will be used to identify, prioritize, and plan future URF Activities