6.1.1 Conceptual planning
Domain Insight

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Overview

The final goal of siting is to find a site and confirm its suitability for the construction of a deep geological repository (DGR). A suitable site in favourable host geological formation and/or environment is essential to provide long-term safety of disposed waste: together with disposal facility it should ensure long-term isolation of waste from the human environment, containment of radionuclides within the system by the preservation of the engineered barriers, limited migration of radionuclides outside the disposal system (retention and retardation) and long-term stability of the disposal system with respect to external disturbances (seismic events and climate changes) and internal evolution of disposal system components [1, 2, 3].

The site must also be recognized as being suitable both on a national and local level and in specific cases when the site is located close to the border with neighbouring country even cross-border consent is needed [4]. Member States (MS) have different approaches how to obtain political and public acceptance of the site, but it is clear that these aspects must be considered and adequately addressed when planning the site selection process [5, 6].

Selection of a suitable site is a process that consists of several stages [7] with various steps and activities and may take many years before achieving its final goal. It starts with a conceptual planning taking into account international, national and local legal frameworks, and continues with area survey, site investigation and site characterisation stage before the site can be confirmed as suitable for disposal of radioactive waste. Good planning of this entire process is of vital importance for successful site selection.

The main purpose of the Conceptual planning is therefore the establishment of an overall plan for the site selection process based on national policy and strategic considerations for long term radioactive waste management, legal, regulatory and environmental requirements and also socio-political aspects and expectations in a country. During the Conceptual planning the criteria for assessing the suitability of potential site(s) should also be defined.

Keywords

Siting, site selection process, site screening, conceptual planning, geological disposal

Key Acronyms

DAD – Decide – Announce - Defend

DGR – deep geological repository

EBS – engineered barrier system

GBS – goals breakdown structure

MS – Member State

NGO – non-governmental organisation

SNF – spent nuclear fuel

WMO – Waste Management Organisation

1 Typical overall goals and activities in the domain of *Conceptual planning*

This section provides the overall goal for this domain, extracted from the EURAD Roadmap goals breakdown structure (GBS). This is supplemented by typical activities, according to phase of implementation, needed to achieve the domain goal. Activities are generic and are common to most geological disposal programmes.

Domain Goal	
6.1.1 Identify key decision points, and develop screening guidelines to enable a facility to be located to match national performance criteria and socio-economic, political, and environmental considerations (conceptual planning).	
Domain Activities	
Phase 1: Programme Initiation	Consider national policy goals and framework for long-term management of radioactive waste and spent fuel and current and future waste inventory; identify all legal and regulatory requirements relevant for a selection of a site for a DGR and potentially suitable disposal concept(s). Decide on the approach to the site selection (siting approach) and identify relevant stakeholders and their roles and responsibilities in the siting process. This might include formal, official stakeholders (e.g. authorities, responsible governmental bodies and other decision-making representatives) as well as interested groups (e.g. NGOs, civil society, media…). Based on the selected siting approach and preliminary disposal concept, develop an overall plan for all phases of the site selection process. This plan should set the requirements for assessing the site, define responsibilities and objectives for the site investigations, identify site selection methodology, and define generic specifications and scope of work with preliminary timeframes for the site selection process. The overall plan should also include an initial plan for public information and stakeholder engagement and rough cost estimates for programme implementation. Prepare initial list of potentially sensitive siting issues that will have to be followed and monitored during the process. These issues are country specific and may include some aspects of volunteer siting (e.g. decision-making process at local level, importance of community veto, approach to the benefits to local communities) or approach to the national screening (when and how to include screening into the siting process). Consider how these siting issues will be addressed, if necessary. For area screening, identify geological and other features that are relevant to the safety requirements for a DGR and define

	exclusion criteria (if possible, also avoidance and suitability criteria) to evaluate potential suitability of the area/site. Define other details important for geological screening (sources of information and data, areas/regions to be screened, resolution of screening, expected outputs, independent review). Define also environmental factors relevant for the assessment of environmental impacts of a DGR. Besides impacts of ionizing radiation consider also other factors relevant for environmental impact assessment (e.g. air quality, noise, surface water bodies and groundwater, land use, flora and fauna, socio-economic factors, …).
Phase 2: DGR Site Identification	Based on the results of the screening in Phase 1 update the overall site selection plan with focus on site investigations for identifying suitable site(s), improve and update the site selection criteria, update and expand the list of potential siting issues of concern to local/regional authorities and officials.
Phase 3: DGR Site Characterisation	Update the overall plan with more detailed planning of underground investigations and activities for site confirmation, update the list of potential issues to local/regional authorities and officials.
Phase 4: DGR Construction	/
Phase 5: DGR Operation and Closure	/

2 Contribution to generic safety functions and implementation goals

This section describes how the Conceptual planning (and its associated information, data, and knowledge) contributes to high-level disposal system requirements using EURAD Roadmap Generic Safety and Implementation Goals (see Domain Insight 7.1.1 Safety Requirements, [1]). It further illustrates in a generic way, how such safety functions and implementation goals are fulfilled. It is recognised that the various national disposal programmes adopt different approaches to how disposal system requirements are specified and organised. Each programme must develop its own requirements, to suit national boundary conditions (national regulations, different spent fuel types, different packaging concept options, different host rock environment, etc.). The generic safety functions and implementation goals developed by EURAD and used below are therefore a guide to programmes on the broad types of requirements that are considered, and are not specific or derived from one programme, or for one specific disposal concept.

2.1 Features, characteristics, or properties of Conceptual planning that contribute to achieving long-term safety of the disposal system

2.1.1 Primary goals - relied upon for achieving long-term safety of the disposal system

Conceptual planning primary goal: isolation of waste

In conceptual planning of the site selection process the primary goal is to find a site for a disposal facility that will ensure isolation of waste from people and biosphere for many thousands or millions of years into the future. The site should be in a stable geological formation and at an appropriate depth that is unlikely to be disturbed by human activities, erosion processes or climate changes now or in the future.

Conceptual planning primary goal: external stability

Long-term stability of the site with respect to external events and environmental evolution is of primary importance for the long-term safety of the disposal system. The DGR site should not be significantly affected by external disturbances like tectonics and climate change. In conceptual planning of the site selection process, the geological formations that could be exposed to large seismic events should be avoided.

2.1.2 Secondary goal – acknowledged but not relied upon for long-term safety of the disposal system

Conceptual planning secondary goal: containment, and retention and retardation of radionuclides

The conceptual planning should also consider a goal of finding a site that together with EBS provides complete containment of radionuclides within a specific barrier component for a required period of time and by retention and retardation limiting the releases of radionuclides from the overall DGR system. The siting should focus on weakly dynamic hydrogeological conditions in natural barrier (host rock), e.g. low host rock permeability, limited availability of mobile water, limited hydraulic gradients to give low local and regional groundwater fluxes, no fast geosphere pathways today or in the future, sorption capacity for many radionuclides, limited solubility of many radionuclides.

Conceptual planning secondary goal: internal stability

The selected site and host rock should also contribute to the long-term safety and stability of the disposal system with respect to internal disturbances during the excavation, construction and closure a repository as well as evolution of the EBS with time.

2.2 Features, characteristics, or properties of Conceptual planning that contribute to achieving feasible implementation of geological disposal

2.2.1 Primary goals – relied upon for achieving feasible implementation of geological disposal

Conceptual planning primary goal: to achieve public and local acceptance of the selected site

Siting process is the first and the most challenging step in establishing a DGR. Public support to the process and participation of potential hosting communities in the site selection have been recognized as essential precondition for achieving local acceptance of the selected site, therefore a proper stakeholder engagement has to be considered and adequately addressed in the siting process from the very beginning .

In different advanced programmes for a DGR diverse approaches and plans have been established to address stakeholders' needs. Such plans could include principles of stakeholder engagement (e.g. role, representation, timeframes, resources), identification of most relevant stakeholders, methods for their engagement, also in relation to the decision-making process, and longer-term vision of engagement also during the repository construction and operation.

Conceptual planning primary goal: environmental impact

When planning and siting a DGR, the environmental impact of such a facility during construction and operation should be considered and reduced as much as possible. Monitoring of all relevant parameters before and during planned activities should be included. The site should be compatible with land use planning. Compatibility with nature and the environment during operational period should also be considered. Other aspects like infrastructure and energy requirements for fabrication, construction and operation, and management of waste materials from excavation and operation of DGR may also contribute to the reduced environmental impact.

2.2.2 Secondary goal – acknowledged but not relied upon for achieving feasible implementation of geological disposal

Conceptual planning secondary goal: flexibility of siting process

In conceptual planning of the siting process with numerous uncertainties that exist and assumptions that are needed at this stage, certain flexibility of the process should be allowed. Due to long time scales from initiation of a siting process to the implementation of a DGR some changes in the disposal programme might be needed to adapt to eventual new situation (e.g. changes in policy or decision-making process, changes in siting approach, addressing new or modified safety or environmental requirements, prolonged time schedules for implementation of different phases, financial/funding issues). When planning, it might also be important that the selected site has the ability for extensions to adapt to inventory changes.

3 International examples of Conceptual planning

Processes of site selection for the disposal facilities for long-lived and high-level radioactive waste were initiated in several countries in eighties and nineties of the last century. These early processes were mainly focused on finding suitable geological environment for the disposal of waste and less attention was given to social aspects and public acceptance of the selected site. Many of these processes have been unsuccessful due to strong local and regional opposition to potential disposal sites. Countries had to modify and redesign their approaches to the site selection (even national legal frameworks had to be adopted) and put more emphasis on interaction with local communities and other stakeholders to achieve local and public consent to the selected site. A brief overview of these siting processes in different countries is provided in [8]. For a few selected countries, these processes are described in more detail below.

Finland

The site selection process for a DGR in Finland is one of the few siting processes without major setbacks. It started 40 years ago and due to clear policy on waste management, transparent and straightforward licencing process and stepwise approach to the siting including early consultations with candidate municipalities, the Government granted a Construction Licence for encapsulation plant and disposal facility near Olkiluoto power plant in Eurajoki municipality in 2015. Start of a DGR operation is scheduled for 2025.

The process started in 1983 after the Finnish Government adopted a policy decision on the management of spent nuclear fuel and defined main goals and milestones for the site selection programme for a deep disposal of spent nuclear fuel (SNF). This policy decision provided a clear framework for more detailed planning of the site selection programme. At first it was conducted by the TVO, the operator of the

Olkiluoto nuclear power plant, later on, the company Posiva Oy, established and funded by the operators of both Finnish nuclear power plants Loviisa and Olkiluoto, took over.

Initial activities were focused on identifying potential areas for hosting a repository for SNF. In 1986 by nationwide screening about 100 potential areas were identified for preliminary site investigations. In parallel discussions and consultations with affected local communities were conducted as the siting process required that local communities express their willingness to participate in the site selection. Through consultations in next years, the number of potential sites was reduced to five for more detailed site investigations. After preliminary investigations two of the five sites were considered less favourable and were excluded from further process.

Between 1993 and 2000, detailed site investigations and environmental impact assessment, required by the Government's 'Decision in Principle' (DiP), were carried out on the remaining three sites. In 1995, after favourable pre-feasibility study, the fourth site near the Loviisa NPP was added for further investigations. During this period, the communication with municipalities intensified and the approach became more tuned to the needs and concerns of the public, more detailed in presenting planned site investigations, the timetable for repository development, its impact on local employment and other potential socio-economic benefits.

According to the results of these investigations and a preliminary safety assessment, all sites were considered as potentially suitable for a DGR. The difference was reflected mainly in the level of public acceptability and potential economic benefits that a disposal facility would bring to the community.

Posiva decided to proceed with more detailed investigations only at Okliluoto site in Eurajoki municipality and submitted an application for the Government's DiP in 1999. After this submission, the Eurajoki Council took its final decision and gave a favourable statement to the responsible ministry for hosting the GDF facility. In 2000, the Government also made a favourable DiP for the Olkiluoto site and in May 2001 Parliament ratified it.

It is important to note that municipalities had a well-defined role in the site selection decision-making process. The municipal council in each potential siting community had to express its willingness to participate in the site selection process and also had the right to veto and decide whether to support the development of the GDF or not.

Once the municipality confirms its approval of the site and the Government adopts its DiP for the proposed site, the ability for the community to withdraw from the process within the scope of the DiP ceases.

Sources:

- NDA Report no. NDA/RWM/157, Geological Disposal – Overview of international siting processes 2017, November 2017 [8]
- Posiva Oy, 'The site selection process for a spent fuel repository in Finland – Summary report', Posiva 2000-15, December 2000 [9]

Sweden

According to the Swedish legislation[1], the producer of nuclear waste has the responsibility for its management and final disposal. Furthermore, the owner and operator of a nuclear power station must carry out and regularly present to the authorities a research and development programme to show that radioactive waste or spent nuclear fuel could be managed and disposed of safely.

To comply with these requirements in 1977 the utilities established SKB - Swedish Nuclear Fuel and Waste Management Company - to perform all activities related to SNF and radioactive waste management.

[1] Nuclear Activities Act, 1984

SKB initiated first studies on geological suitability of crystalline bedrock for disposal of SNF and performed initial siting activities at 10 preselected sites across Sweden to identify suitable areas. Although these early studies showed that crystalline bedrock in Sweden is potentially suitable for a DGR, SKB decided to stop this project and to change the site selection approach due to strong local opposition.

In 1992, SKB presented a new plan for a siting process. The new siting process focused on municipalities with suitable conditions, which were at the same time willing to participate in the process and interested in further site explorations. SKB also clearly stated that showing interest would not mean a future commitment and that communities could opt out of the process if they did not want to proceed.

Between 1992 and 2000, SKB held discussions on feasibility studies with about twenty municipalities in different parts of the country. In eight municipalities feasibility studies have also been conducted. In other cases, the discussions and cooperation were discontinued because either the municipalities were not interested or prospects for favourable results of feasibility study were poor. In continuation, SKB focused on five municipalities with already existing nuclear facilities. The feasibility studies were conducted in three municipalities: Oskarshamn, Nyköping and Östhammar. For these sites, an extensive body of geological data already existed that indicated good siting possibilities and also the municipalities expressed willingness to continue with the process.

After careful considerations of the results of feasibility studies and other factors, in November 2000 SKB announced the choice of three sites for site investigation phase: Simpevarp in Oskarshamn Municipality, Forsmark in Östhammar Municipality and Tierp north in Tierp Municipality. The site investigations were conditional on the consent of the concerned municipalities. In Tierp this consent was not achieved, and the site investigations continued only in Oskarshamn and Östhammar.

Detailed site investigations started in 2002, and in 2009, Forsmark site in Östhammar Municipality was selected to host a DGR for SNF, and in 2011, SKB submitted an application for DGR development at this site.

The licencing process in Sweden is complex. It has several stages and involves different authorities: Government, Swedish Radiation Safety Authority (SSM), the Swedish Environmental Court and the Municipality Council. At first stage the application was reviewed, and permissibility assessed by the SSM and the Environmental Court. The application was then passed to the Government, which after receiving approval from the Municipality Council in 2022 granted SKB a license to build a repository for SNF. The case has returned to the Land and Environment Court and the Swedish Radiation Safety Authority to impose conditions for the operations and only after that, the construction can start.

Sources:

- SKB, ‘Site selection – siting of the final repository for spent nuclear fuel’, R-11-07, March 2011 [10]
- Björn Dverstorpand, Bo Strömberg, SSM’s licensing review of a spent nuclear fuel repository in Sweden, NEA/RWM/R(2013)9 [11]

UK

After two unsuccessful site selection processes in 1980s and 1990s, in 2018 the UK Government published a policy paper that set out an updated framework for the long-term management of higher activity radioactive waste through implementing geological disposal[2], which introduced the consent-based approach to finding a suitable site for a geological disposal facility within a willing host community.

[2] https://www.gov.uk/government/publications/implementing-geological-disposal-working-with-communities-long-term-management-of-higher-activity-radioactive-waste

The policy paper also provided the context for the siting process and the basis for planning and the regulatory framework.

In parallel with this policy document, the Radioactive Waste Management Ltd (RWM), the developer of a DGR, published a detailed guidance on how they intend to work with communities, several regional reports with the results of national geological screening to provide communities with information about the geology across the country and a site evaluation document for consultation, describing the factors used in evaluating prospective sites for a DGR. The siting factors are divided into six groups addressing safety and security implications, community aspects, environment, engineering feasibility, transport and cost of implementing a disposal facility at proposed location.

Involvement of local communities is a vital part of this site selection process. The DGR cannot be sited and constructed without the consent of a local community. To implement this Government policy the responsible organization for the development of the DGR has prepared and published a document explaining their approach to the work with local communities. In early stages it includes involvement of working groups and later partnership with local communities.

About 15-20 years period is planned to find a suitable site and get consent of a local community.

Sources:

- Radioactive Waste Management (RWM), Site Evaluation, How we will evaluate sites in England, GOV.UK (www.gov.uk) [12]
- Nuclear Waste Services, Site Evaluation, How we will evaluate sites in England, 2022 [13]
- Implementing Geological Disposal – Working with Communities, An updated framework for the long-term management of higher activity radioactive waste December 2018, Department for Business, Energy & Industrial Strategy [14]

4 Critical background information

The section highlights specific components, key information, processes, data or challenges that have a high impact or are considered most critical for implementing geological disposal, with respect to the domain of Conceptual planning.

Public and local acceptability of the proposed site

Public acceptability of radioactive waste disposal facilities is generally low. Depending on the national situation and historical context, in the past many countries experienced strong resistance to planned and initiated disposal projects and failed site selection processes. For this reason, the former DAD (Decide-Announce-Defend) [7, 14] approach to site selection is nowadays practically substituted with more open and inclusive approaches in which potential host communities have a role and are involved in the decision-making process. Therefore, a plan for public engagement is nowadays considered as a necessary part of the site selection and repository development process [15]. Its main role is to assure that different stakeholders' positions, and in particular local communities' interests are taken into consideration. Such engagement might include veto rights of community council, resources made available to the communities for obtaining independent expert opinions and a more precisely defined process of collaboration between WMO and local community. A well-structured and agreed process of citizens and local communities' engagement in the site selection decision-making process can build confidence in the process, result in successful site selection and also fulfils the requirements of Aarhus Convention on access to information, public participation in decision-making and access to justice in environmental matters [16].

Policy and legal framework

Clear policy on radioactive waste and spent nuclear fuel management with defined main goals and milestones and established legal and regulatory framework that covers all important aspects of disposal programme provide the basis for conceptual planning of the site selection programme. The absence of

policy or incomplete legislation or regulatory requirements or unclear assignments of responsibilities make planning of a siting programme difficult and uncertain. Before planning, all efforts should be made that policy statement on waste/SNF management is formulated, adequate legislation and regulations are established, and responsibilities clearly assigned.

Flexibility and adaptability of the siting process

Siting of a geological disposal facility is a process that may take several decades before the site is selected and licensed. For planning of the process this long-time span may be challenging, because many things may change during this time period: political views may change, public and local support to the siting process may decrease or disappear, new requirements may be imposed, or new concepts and technical solutions might become available. Programme that expands over several decades has to consider how to maintain public and local acceptability and support through different phases of the process, how to respond to eventual new requirements or due to distant final goals, how to keep implementer's staff motivation and build or adjust necessary competencies.

For this reason, the siting plan should keep certain flexibility to allow necessary adaptation to a new situation, if needed, which should be considered already in conceptual planning.

4.1 Integrated information, data or knowledge (from other domains) that impacts understanding of Conceptual planning

The conceptual planning of the site selection process has strong interface with the Theme 1 on Programme management.

- The conceptual plan should be developed consistently with the national policy and plan for radioactive waste and spent fuel management (see 1.1, Programme planning) that defines a nuclear fuel cycle strategy, high-level goals and broad timetable for implementing radioactive waste management activities. It is important to ensure public information exchange and a process for public participation (see 1.1.3, Public information and participation).
- Legal framework and regulatory system with criteria for waste management facilities, allocation of responsibilities for radioactive waste and SNF management and defined licensing system (see 1.2, Programme organization) should be carefully considered and respected when developing the Conceptual plan.
- The Conceptual planning of the site selection should also take into account the selected disposal route and disposal concept based on current and estimated future waste inventory (see 1.5, Management solutions).

The conceptual planning has also an interface with the Theme 4 on *Geoscience* where geological information for site selection is assembled, Theme 5 on *Disposal facility design and optimization* with the design of a facility that fulfils safety and security requirements and Theme 7 on Safety Case where safety strategy is established as a basis for the safety assessment.

5 Maturity of knowledge and technology

This section provides an indication of the relative maturity of information, data and knowledge for disposal of Conceptual planning. It includes the latest developments for the most promising advances including innovations at lower levels of technical maturity where ongoing RD&D and industrialization activities continue.

5.1 Advancement of safety case

In the Conceptual planning stage, first the collection of information, data and knowledge relevant for the site selection process starts. At this point also preliminary disposal concepts are designed, and first

preliminary safety assessments are performed in order to understand the behaviour of disposal concepts in a potential host environment. Each of these areas requires specific data and information and together they form the input for the safety case development. The safety case is progressing with new information and data collection, and also feeds the environmental impact report. It has been commonly recognized that in the Conceptual planning the required data and information relevant for the development of the safety case must be carefully planned and regularly updated through the entire site selection process.

5.2 Optimisation challenges and innovations

The Conceptual planning is an iterative process and is expected to be updated in each phase until the site for a DGR is selected and confirmed. The updates include the optimisation of individual elements, which are part of the conceptual planning as well as of siting process itself. Innovations coming from RD&D activities, new knowledge, international experience and similar should be included in the updates during the iterations.

5.3 Past and ongoing (RD&D) projects

Past (RD&D) Projects:

- ARGONA Project: Suggested Guidelines for Transparency and Participation in Nuclear Waste Management Programmes, 2010,

  https://igdtp.eu/documents/, https://cordis.europa.eu/project/rcn/106449_en.html

- IGD-TP SecIGD2 Project: RD&D Planning Towards Geological Disposal of Radioactive Waste, 2015,

  https://igdtp.eu/documents/, https://cordis.europa.eu/project/rcn/106449_en.html

Ongoing (RD&D) Projects:

- EURAD, ROUTES, 2019-2024, https://www.ejp-eurad.eu/
- EURAD, UMAN, 2019-2024, https://www.ejp-eurad.eu/

5.4 Lessons learnt

Volunteer site selection process versus designated (nominated) site(s)

Early site selection processes for DGR mainly based on the DAD approach and most of them failed due to various socio-political reasons: increased public awareness of environmental issues, evolved norms on transparency (e.g. [17] - Waste Directive, article 10 on Transparency, [16] - Aarhus and [4] - Espoo Conventions) and their adoptions in legal framework. In last decades, a volunteer approach to the site selection has prevailed. The approach is based on stakeholder engagement and local communities' participation in the decision-making process. In some countries, all communities are invited to participate in the process without previous preliminary area survey and assessment of potential suitability of geological environment. The process starts only after their volunteer agreement to participate. The communities are given sufficient time and resources to participate in the process and to enable their further decisions. In some other cases, the technical and geological feasibility to host the geological repository is first assessed and later those designated communities with favourable characteristic are invited to participate in the site selection process. The selection of approach depends entirely on the national situation.

Different geological environments in combination with EBS can provide long-term safety of disposal

Different geological environments and rock types are potentially suitable for hosting a DGR. None of the rocks has ideal properties for disposal of radioactive waste as illustrated in Table 1 of [6]. The suitability

of a rock to host a repository does not depend on a single rock property or group of properties. Long-term safety of a repository depends on the entire disposal system including all barriers. Any deficiencies in one or several individual properties of the rock may be adequately compensated for by other physical attributes or by engineered barrier solutions.

Disposal systems and safety cases have been developed for disposal in crystalline (e.g. granite and metamorphic rocks in Sweden and Finland), sedimentary (e.g. indurated clay rocks in France and Switzerland) and evaporite (e.g. salt rock in the USA and Germany) environments [7].

6 Uncertainties

Uncertainty in geological data

When planning the siting process an important input are the data on geological environment. These data are usually limited, particularly at greater depth, which brings some uncertainty in planning of the extent of site investigations (number of investigated areas and sites, more geological investigations, delays, higher costs, etc.).

Uncertainty in achieving public and local acceptance

Public acceptance and support to the site selection process is one of the most critical aspects of the entire siting process. Although there is a high agreement among the countries that stakeholder engagement and public participation is a necessary part of the siting process there is a great uncertainty whether it will be achieved and whether it will be maintained over long time periods of the site selection. An approach successful in one country may fail in another. Even if the stakeholder engagement and participation in the process is carefully planned, uncertainty in successful implementation always remains.

Uncertainty in time planning

Time planning of the site selection activities is exposed to many challenges. Due to uncertainties in achieving public involvement and local communities support, time schedules may be prolonged and final goals delayed. Also, unexpected or unfavourable results of the site investigations may result in significant time delays.

7 Guidance, Training, Communities of Practice and Capabilities

This section provides links to resources, organisations and networks that can help connect people with people, focussed on the domain of Conceptual planning.

Guidance
P. Ormai, et all (2022): Guidance and Guide-like documents on Geological Disposal of SNF, HLW and Long-lived Waste - Contribution to the EURAD Roadmap Gap Analyses, Deliverable 12.7, EURAD website https://www.ejp-eurad.eu/publications
Trainings
EURAD Training Course on Safety Case Development and Review, https://www.ejp-eurad.eu/events/eurad-training-course-safety-case *EURAD Training course on Uncertainty Management, https://euradschool.eu/event/eurad-training-course-on-uncertainty-management/*

Active communities of practice and networks
IGD-TP https://igdtp.eu/ *SITEX.Network https://www.sitex.network/* *EURADScience (no website yet)* *ENSREG https://www.ensreg.eu/*
Capabilities (Competences and infrastructure)
NEA IGSC https://www.oecd-nea.org/jcms/pl_29043/integration-group-for-the-safety-case-igsc

8 Further reading, external Links and references

8.1 Further Reading

Some high-quality documents that are recommended for the reader:

- IAEA, The Management of the Site Investigation for Radioactive Waste Disposal Facilities, IAEA Nuclear Energy Series No. NW-T-1.40, [IAEA Preprint], 2023, https://preprint.iaea.org/search.aspx?orig_q=RN:54010081
- IAEA, Factors Affecting Public and Political Acceptance for the Implementation of Geological Disposal, IAEA-TECDOC-1566, 2007
- IAEA, Planning And Design Considerations For Geological Repository Programmes of Radioactive Waste, IAEA-TECDOC-1755, 2014
- NDA, Geological Disposal - Overview of International Siting Process 2017, November 2017, Report no. NDA/RWM/157

8.2 External Links

Links to websites that contain more information or useful tools:

- Nuclear Communicator's Toolbox, IAEA, https://www.iaea.org/resources/nuclear-communicators-toolbox
- COWAM2, EC, https://cordis.europa.eu/project/id/508856
- COWAM in Practice, EC, https://cordis.europa.eu/project/id/36455
- InSOTEC, EC, https://cordis.europa.eu/project/id/269906
- IGSC, https://www.oecd-nea.org/jcms/pl_29043/integration-group-for-the-safety-case-igsc
- Forum on Stakeholder Confidence (FSC), NEA, https://www.oecd-nea.org/jcms/pl_26865/forum-on-stakeholder-confidence-fsc

8.3 References

[1.] EURAD, DI 7.1.1 Safety Requirements, draft, J. Andersson, N.Chapman, B.Grambow, P.Zuidema, under review

[2.] IAEA, Disposal of Radioactive Waste, Specific Safety Requirements No. SSR-5, 2011

[3.] IAEA, Geological Disposal Facilities for Radioactive Waste, Specific Safety Guide No. SSG-14, 2011

[4.] UNECE Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention), 1991 (in force since 1997)

[5.] IAEA, The Management System for the Development of Disposal Facilities for Radioactive Waste, IAEA Nuclear Energy Series No. NW-T-1.2, 2011

[6.] IAEA, Planning and Design Considerations for Geological Repository Programmes of Radioactive Waste, IAEA-TECDOC-1755, 2014

[7.] IAEA, The Management of Site Investigations for Radioactive Waste Disposal Facilities, IAEA Nuclear Energy Series No. NW-T-1.40, [IAEA Preprint], 2023, https://preprint.iaea.org/search.aspx?orig_q=RN:54010081

[8.] NDA Report no. NDA/RWM/157, Geological Disposal – Overview of international siting processes 2017, November 2017

[9.] Posiva Oy, The site selection process for a spent fuel repository in Finland – Summary report, Posiva 2000-15, December 2000

[10.] SKB, Site selection – siting of the final repository for spent nuclear fuel, R-11-07, March 2011

[11.] Björn Dverstorpand, Bo Strömberg, SSM's licensing review of a spent nuclear fuel repository in Sweden, NEA/RWM/R(2013)9

[12.] Radioactive Waste Management (RWM), Site Evaluation, How we will evaluate sites in England, GOV.UK (www.gov.uk)

[13.] Nuclear Waste Services, Site Evaluation, How we will evaluate sites in England, 2022

[14.] Implementing Geological Disposal – Working with Communities, An updated framework for the long-term management of higher activity radioactive waste, December 2018, Department of Business, Energy & Industrial Strategy; https://www.gov.uk/government/publications/implementing-geological-disposal-working-with-communities-long-term-management-of-higher-activity-radioactive-waste

[15.] IAEA, Communication and Stakeholder Involvement in Radioactive Waste Disposal, IAEA Nuclear Energy Series No. NW-T-1.16, 2022

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