

to the Environmental Code. The application according the Environmental Code includes the whole KBS-3-system - the final repository in Forsmark, the existing interim storage facility and the encapsulation plant in Oskarshamn.

The challenges for the implementer and the regulator are the following:

- number of documents to elaborate and structure of these documents
- right of veto of municipalities
- management of a complex licensing process
- change from R&D to industrial operations implying the creation of a sizeable construction department in SKB
- strengthening of technical bases
- application of regulatory framework in a different situation compared to conventional process type nuclear facilities
- understanding and addressing constraints from post-closure safety related to the construction and operation of the repository
- management of the time frames of repository operation requiring flexibility and continued development of disposal concept
- flexible regulations: 1st use as basis for licensing a new nuclear facility; making adjustments for structural changes during construction and operation
- ensuring excavation/construction/backfill activities do not jeopardize conditions for passive post-closure
- application of general regulations for a KBS-3 type repository with consideration to the specific character of facility, i.e. continuous construction
- Traditional SAR - may not be appropriate for a facility in a state of continuous change
- maintaining public confidence, openness and transparency with public, host communities, and other stakeholders
- production reports that provide evidence of compliance with safety requirements and feasibility of construction

Preparing as an organization, to submit or to review a construction license application for a DGR of ILW and HLW in France

French National Case – Andra - Preparing to Submit Cigéo's Creation License Application

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The reversible repository in a deep geological formation is the French reference solution for the long-term management of high-level and intermediate-level long-lived radioactive waste. Since the first French Act on nuclear waste management research (Act of the 30th of December 1991), Andra has carried out twenty years of conceptual and basic studies on the subject, leading in particular to the feasibility demonstration in 2005 and to the choice of the detailed reconnaissance zone (ZIRA) in 2010. Taking advantage from this work, Andra has now reached a new phase where the project is engaging in the design of the industrial installation named Cigéo. At this stage, the further development of the project implies that Andra undertakes a multiplicity of actions in order to successfully reach various external and internal key milestones. Of paramount importance is the careful articulation between a) the regulatory authorization and decision processes and b) the outcome of the industrial installation design phases.

The French Act on radioactive waste of the 28th of June 2006 and the other French nuclear regulations (e.g. the Decree of the 2nd of November 2007) build a regulatory framework that plans a succession of step by step decisions stages (**dates in bold** are fixed by the 2006 Act):

2013 – Public debate organized by the Public Debate National Commission;

Some of the main issues that will be debated during this phase of dialogue with the public concern the reversibility, the memory keeping and the environmental and health survey modalities. In addition to the debate, a dialogue has started with the local stakeholders within the framework of the inter-district territorial scheme elaborated under the aegis of the Meuse Prefecture. Its goal is in particular to harmoniously define and plan the external infrastructures that have to be developed to support the construction and the operation of Cigéo (roads, railway tracks and terminal, power and water supplies, housing and territorial development...). This territorial scheme will be presented during the public debate. The Meuse and Haute-Marne districts request a sustainable partnership for hosting Cigéo. Prior to the public debate, Andra will propose a location for the surface facilities based on the current local dialogue and on technical studies. The location of the surface facilities will be validated after the public debate;

2015 – Creation license application and start of the regulatory review process;

The content of the application file is defined by the 2007 Decree. It comprises notably various plans of the installation, the description of the solution envisaged for the closure of the facility, the preliminary safety case (operational safety, long-term safety, protection against malevolent actions, management of incidental situations, preliminary acceptance criteria...), the environmental impact studies (health, salubrity, transports, human activities, nature, patrimonial aspects...). These elements shall be produced on the basis of a sufficient detailed design, so that the safety authority can appreciate their industrial feasibility and their required performance in terms of safety. Furthermore, the review process of Cigeo's creation license application includes its evaluation by the national evaluation commission (CNE), the local councils and the parliamentary office for technical and scientific choices (OPECST). At the end of the review process, the government will present a bill in parliament in order to define the conditions of reversibility;

2016-2017 – New parliamentary Act on the reversibility conditions of the repository;

The reversibility of the repository should be granted, as a precaution, for at least 100 years (2006 Act). Based on the analysis of the various potential motivations for reversibility, Andra will favor an approach relying on:

- technical measures enhancing the retrievability of waste packages;
- stepwise decision-making to control the disposal and closure processes at their key stages;

The decision-making process, comprising information and involvement of the stakeholders (e.g. during periodical reversibility assessments), may be defined in this Act and therefore be strengthened. According to the 2006 Act, the final closure of the repository can only be authorized by a parliamentary Act;

2018 – Creation license granted by Decree;

According to French regulations, a creation decree must be preceded by a public enquiry. The creation Decree authorizes both the construction of the facility and the nuclear operations to be performed. An explicit and unequivocal safety demonstration has to be provided for these operations in the license application. In the case of Cigéo, the authorization for operations foreseen in the far future may be granted on the prerequisite that complementary dedicated files are transmitted in due time. This regulatory mechanism may be generalized to all operations for which complementary elements are found necessary by the regulator;

2025 - Commissioning of the repository;

The nuclear operations will start with the reception of the first waste package provided that the repository is commissioned by the safety authority. At this stage, the commissioning encompasses only the first part of the facility. Beyond 2025, construction and equipment work will be carried out concurrently with nuclear operations in the previously commissioned parts.

Besides the above mentioned procedures, Andra faces a number of other regulatory steps. Amongst these, the most notable are:

- Safeguard and security (physical protection of the facility and of information) regulatory authorization procedures;
- Declaration of “public benefit” of the project and building permit administrative process;
- Land acquisition and site preparation (preventive archeology, land clearing and woodcutting permit);
- Euratom declarations.

Internally, Andra has planned the outcomes of the successive facility design phases with the preparation of the various above mentioned application files to be transmitted to the regulators. The associated safety analyses are used to support the license application files and to iteratively feed the facility design:

2011 - Launch of the industrial project (requirements and technical specifications achieved, tender for the selection of system prime-contractor). The contract was signed early January 2012 with the Gaiya group, made up of the two engineering companies Technip and Ingérop;

2012 - Outcome of the sketch industrial design phase at the end of the year;

2014 - Outcome of the basic industrial design phase, with a more detailed level for the issues related to safety;

2015 - License application;

2016 - Outcome of the detailed industrial design phase.

In parallel with the regulatory procedures, continuous exchanges are undertaken with the waste producers, namely to identify and meet their industrial needs and to plan the reception of the waste over the period of operation. An international review of the project could also be envisaged.

During the periods of design, construction and operation of the repository, research and technical developments will constantly be carried out in Andra's underground research laboratory in Bure and in laboratories at surface in order to verify parameters, develop equipment, optimize disposal solutions and tackle potential emerging issues. The license of Andra's underground research laboratory in Bure has been extended until 2030.

Preparing to review the license application of the French geological disposal facility - Issues, challenges and perspectives – G. Dandrieux (ASN)

Context for GDR authorization

- Radioactive waste from the whole fuel cycle (58 NPP, dozens of research reactors and labs, reprocessing facilities)
- Project of national interest (political issues, cost issues, number of reviewers and stakeholders...)
- Long term project (development spans over decades)
- Specific authorization processes (e.g. in France - Parliament)
- Specific technical issues - A DGR is a complex object
- Public involvement

A French dedicated legislative framework

28th June 2006 Act on sustainable management of radioactive materials and waste

- The GDR is the reference solution for the management of long lived high and intermediate level radioactive waste (+ reprocessing policy)
- Defines the framework and proceedings for DGR licensing
- Gives the national agency for radioactive waste management Andra (state owned organization) the mission to design, construct and operate disposal facilities
- Defines milestones for preparation of the license application and plans for intermediate reviews
- Plans for R&D programs to be implemented (siting/safety demonstration/construction/..) in an URL hosted in the same host rock as the DGR
- Defines the funding system for the DGR
- Defines the roles of the actors (ASN, CNE, Andra, ...)
- Includes Public consultations and Parliament involvement in the licensing process
- Requires the DGR to be reversible for at least 100 years