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RÉPUBLIQUE FRANÇAISE

ANDRA
French national radioactive waste management agency

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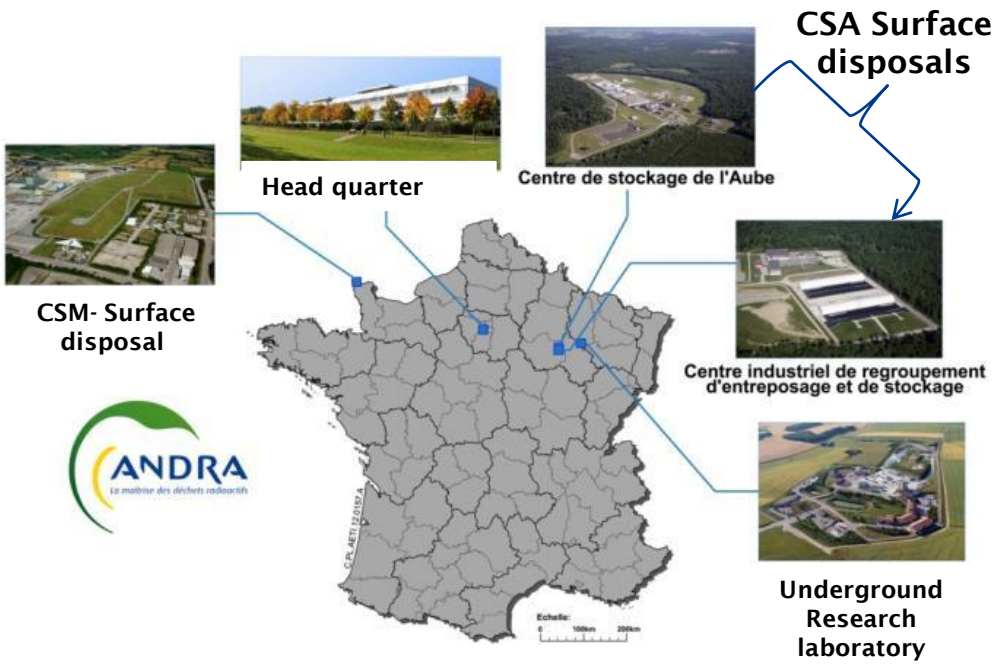
CEO of Andra

6th Review Meeting of Joint Convention Group 2

May 23rd 2018 - Vienna

- **Public organization created in 1991 (law of the 30th of December 1991)**
- **Under the supervision of the ministries in charge of energy, research and the environment**
- **Independent from waste producers**



Its general task and mission defined by law

Siting, design, build and manage radioactive waste disposal centers in order to protect present and future generations and the environment from the hazard associated with this waste, with respect to the long term perspectives of waste production and management, and, to these ends, carry out the necessary studies.

State-Andra Performance agreement 2017-2021

State-Andra Agreement on objectives: implementation of a five-years contract signed in january 2018 by 3 ministries respectively in charge of energy, research and budget

The performance agreement specifies 6 strategic objectives and provides indicators (~25) in order to evaluate each year the progression of the objectives:

- Driving the transformation of the Agency
- Placing the environment and the dialogue with society in the core of our action
- Collectively delivering a successful Cigéo project
- Confirming Andra's industrial excellence and contribute to that of the French nuclear industry
- Developing, capitalizing and transferring knowledge
- Establishing the referent public agency model for safe and proportionate waste management

Operational activities on the surface disposal facilities

LILW-SL : CSA disposal facility

- At the end of 2017: 32.5% of the 1 million m3 authorized capacity (325 600 m3)

VLLW : CIRES disposal facility

- At the end of 2017: 54.2 % of the 650 000 m3 authorized capacity (352 000 m3)
- Commissioning of a cell dedicated to large waste packages (up to 100 tons)

LILW-SL Aube disposal decennial safety review

Objective: Evaluate the conformity of the installation with regard to the applicable rules and reassess the safety of the disposal facility through a global analysis of the safety of the installation

- March 2016: Kick-off meeting with Safety Authority (ASN)
- August 2017: Production / transmission for instruction of the technical files
- 2nd semester 2017: Interactions with IRSN
- Final opinion from ASN: planned end of 2018

Answers to 600 questions on 15 different topics

400 reports and documents submitted

16 technical meetings with IRSN

➔ Operations of the CSA continue and there is an ongoing discussion concerning a very limited number of technical issues

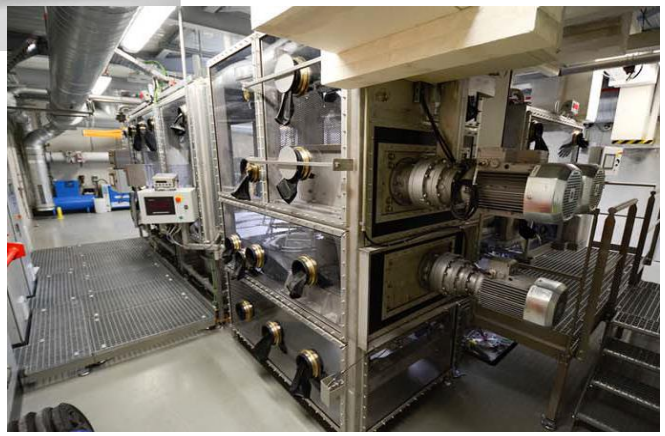
New facilities

CSA - Waste packages control facility :

Final authorization granted by the safety authority in march 2018.
Progressive start of the operations scheduled in 2018 (cold tests, commissioning).

CIRES - Waste Predisposal Treatment :

Start in 2016 of the waste sorting and treatment operations at the new dedicated facility.



Low level long lived waste : a graded approach

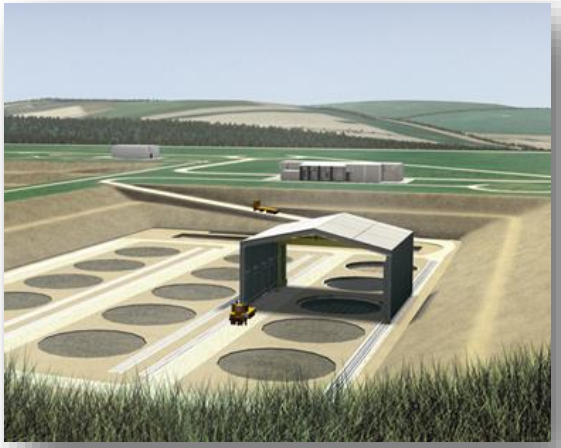
A shallow depth disposal solution complementary to surface and deep geological disposal that fits with the hazardousness of wastes

Concerned Inventory :

- Wide variety of waste : Graphite, Bituminous, Radiferous
- Total conditioned volume of 230 000 m3

How to address safety concerns ?

- Water transfer
- Erosion, intrusion



A progress report has been transmitted to the Safety Authority in 2015.

➔ **In 2016, the PNGMDR 2016-2018 recommends to pursue geological investigations and present in 2019 a report considering the technical and safety options for the envisaged disposal.**

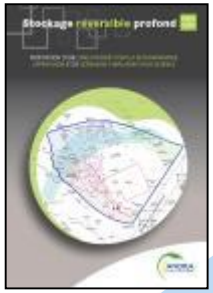
➔ **Since 2017 detailed geological investigations are being performed in the vicinity of Vendeuvre-Soulaines municipalities.**

A process still going on

- Improvement of waste characterization (graphite and bituminous waste)
- Detailed geological surveys in Soulaines-Dhuys area on potential disposal sites

➔ **on going exchanges on Man and Environmental protection objectives**

CIGEO project : A step-by-step process



2005
demonstration of the feasibility of geological disposal

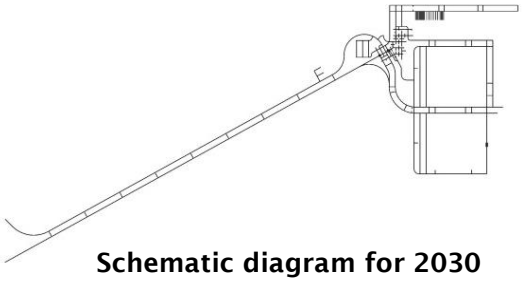
2009
precise siting based on a detailed geological survey

2016
safety option files and instruction by the safety authority

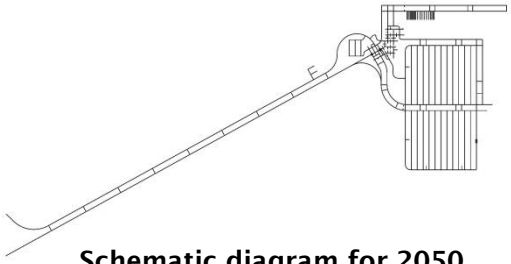
2019
licensing application

Towards application instruction and licensing

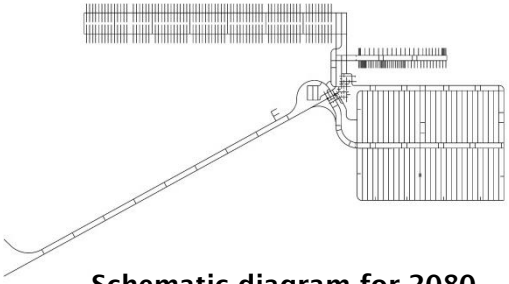
Rollout of underground section will continue until completion



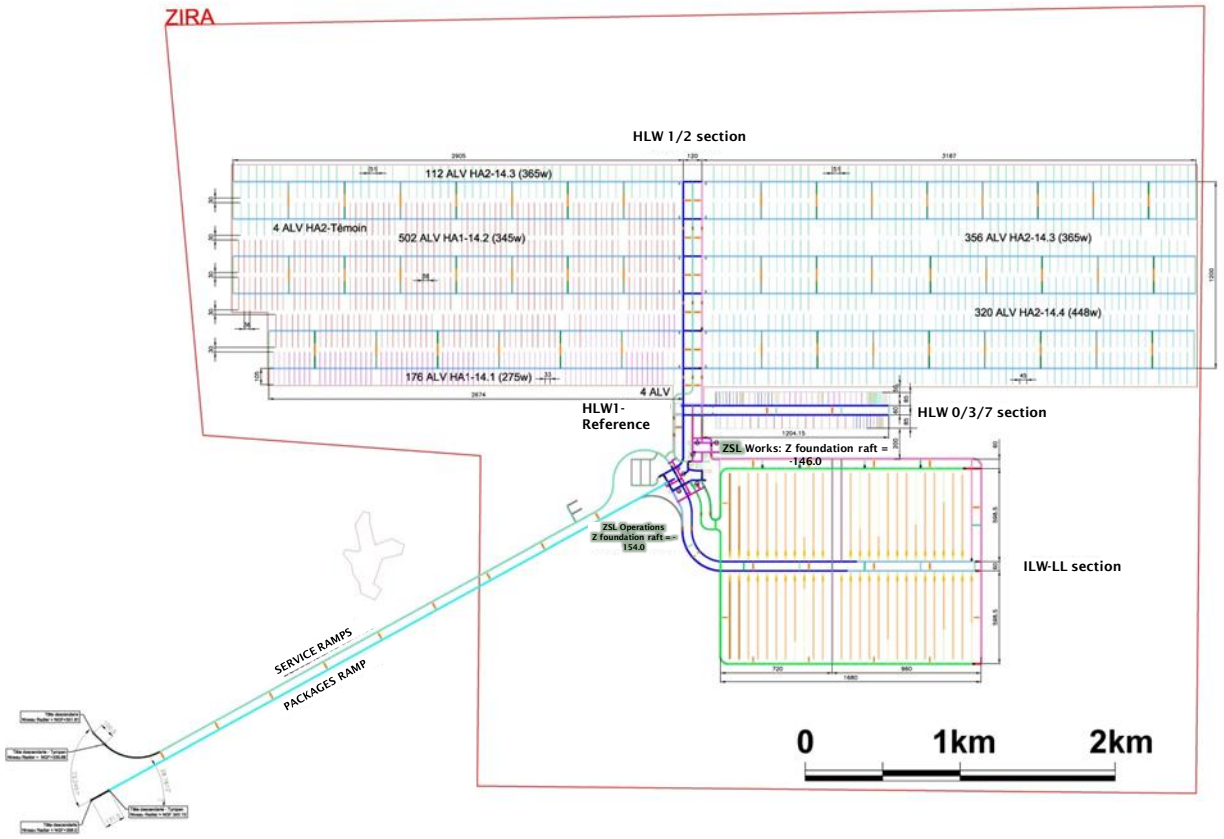
Schematic diagram for 2030



Schematic diagram for 2050



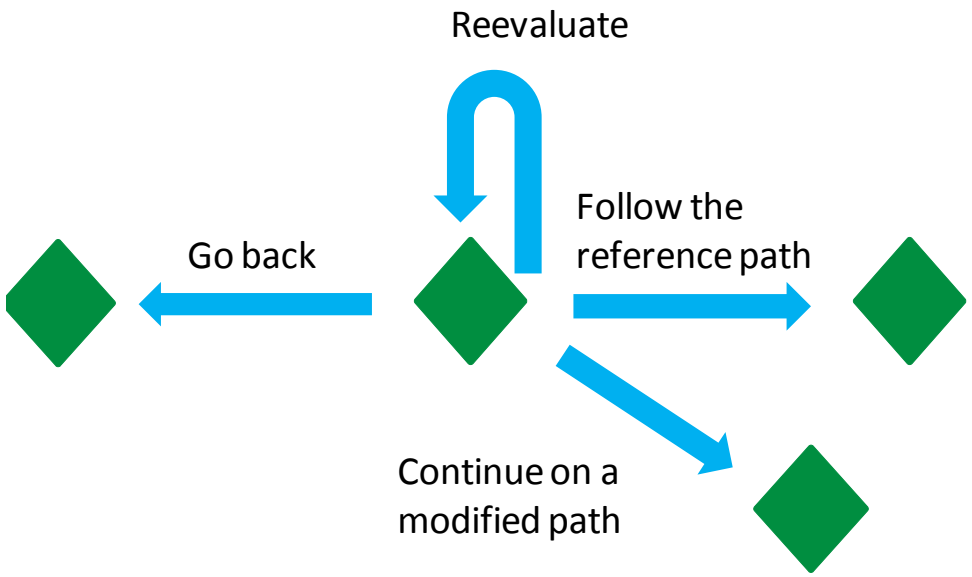
Schematic diagram for 2080



Schematic diagram for ~2140/2150

Reversibility

- Reversible disposal may be defined as a progressive process, where freedom of choice is left at each step



So that:

- The process may be **controlled**
- **Alternative waste management options** may be chosen if relevant
- In case of undesired repository evolution, **corrective actions** may be implemented
- If waste becomes a **resource**, it may be retrieved.

The reversibility « toolbox »

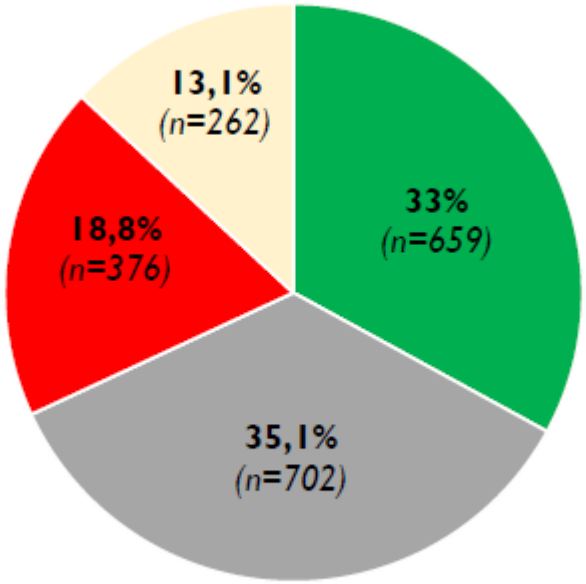
The **toolbox** contains :

- G Continuous improvement of knowledge, from continued R&D and from the monitoring and oversight programme
- T Progressivity of construction and incremental development of the underground disposal facility
- T Flexibility of operations and schedules
- T Flexibility and adaptability of installations
- T Retrievability
- G Transparency, knowledge management and transmission
- G Involvement of society
- G Control by State and assessing bodies

G: Governance measure T: Technical measure

Local and social acceptance

- Strong implication from local elected officials
- A high rate of favorable opinions (increasing within the close perimeter to the future installations)
- But a population fed up with both police controls and the presence of opponents



Direct support by the Minister of Ecological and Solidarity Transition

Sébastien Lecornu, Secretary of State to the Minister of Ecological and Solidarity Transition, exchanged with the local elected officials during his visit to Bure and recalled that the government will accompany the territory both in terms of security and economic development.

"*The legitimate opposition to this project must, however, be able to express itself in the framework of the law.* " also said Sébastien Lecornu.

Sébastien LECORNU visiting Bure (Jan 2018)

The Government strengthens the consultation and transparency for the Cigéo project – Mar. 18

"On this extraordinary project, the Government takes its responsibilities and gives itself the means to organize a consultation mobilizing all the expertise - experts, elected representatives and citizens - both at local and national level.

The year 2018 will be an important year for the project, with the prospect of filing an application for a declaration of public utility (DUP) and the licensing application in 2019."

- A national debate on the National Management Plan
- An online interactive platform
- An international commission dedicated to the expertise of the bituminous waste packages
- A study mission on the geological disposal of nuclear waste programs in other countries
- A contract for the development of the territory

Cigéo project progress : the four workflows

Advanced design studies for the preparation of the licensing

- Injecting baseline optimizations in advanced design studies studies
- Technical instruction on the remarks raised by the safety authority after evaluation of the Safety Options files
- Structuring the licensing file (organization / content of the documents)

Organization of operations prior to Cigéo construction (OPCC)

- For those operations both reference and alternative scenarios are studied including the potential role of dedicated law enforcement authorities

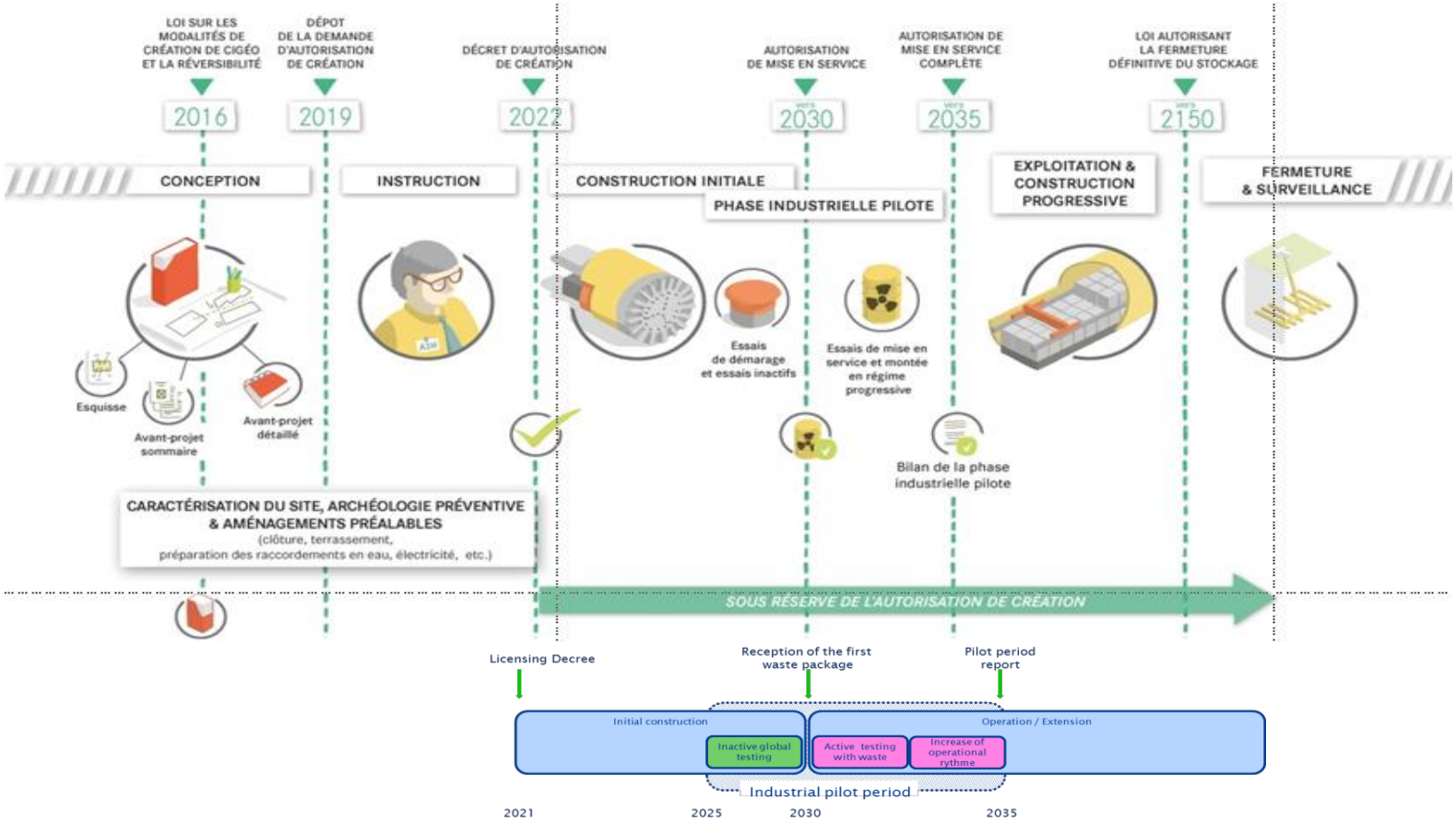
Plannification of regulatory files production

- Demonstrate as soon as possible the public interest of the Cigéo project
- Focus on the production of the Environmental Impact Assessment file (mid-2018)

Preparation of the future phases of the project

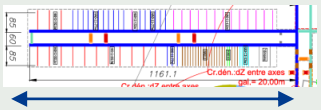
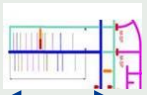
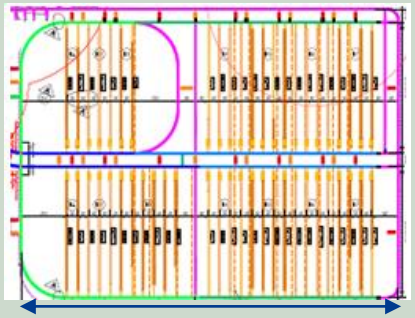
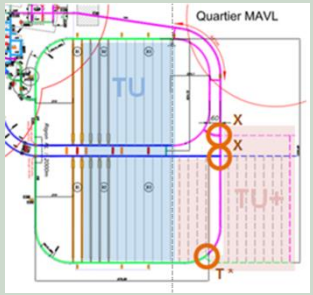
- Update of the post-DAC scenario for the first phase of Cigéo's works (technical allotment - internal working groups)
- Contractual analysis and organizational impacts on project

The project development schedule : Main milestones



- A declaration of public utility in 2018, supported by an environment impact assessment.
- The license application files in 2019, following a detailed design process closed at the beginning of 2019 by a critical design review.
- A decree not expected before the end of 2022 after a minimum three-year instruction.

Evolution of the reference configuration for detailed design studies

Preliminary design configuration		Reference configuration	
HA1/2 AREA (HEAT EMITTING HLW) 	• 6 sub-zones • 1 465 100m long cells • 31 km of access drifts • 52 000 spacers (dummy packages)		• 4 sub-zones • 879 1r0m long cells • 24 km of access drifts • No spacers
HA0 (NON-HEAT EMITTING HLW)  ≈ 1160 m	• 1 single construction phase • 72 80m long cells (no spacers)	 ≈ 320 m	• 1 single construction phase • 20 80m long cells (no spacers) • HA0 waste packages delivered during phase 2 and used as spacers in HA1/2 disposal cells
ILW AREA  ≈ 1730 m	• 50 tunnels • All ILW packages benefit from a disposal overpack • Disposal tunnels excavated with a tunnel boring machine (ramps) or roadheader (disposal tunels)	 ≈ 1000 m	• 22 tunnels • Direct disposal (no overpack) of several ILW packages families • More extensive use of a TBM

The 2016 safety option files evaluation by the Safety Authority: General observations

ASN considers that

- the project has reached a satisfactory technological maturity;
- the safety options file is documented and substantiated and represents a significant progress compared to the "Clay 2005" and "2009 Milestone" files

Andra has

- acquired a detailed knowledge of the MHM site, which allows to confirm the relevance of the area chosen for the implementation of the geological disposal
- conducted numerous studies to characterize the evolutions of the various repository components and constituted an important body of knowledge on this topic
- identified and studied perturbations that may affect the host rock as well as the phenomena that will occur during transients
- adopted satisfactory principles in both the operational and long-term safety approaches

Safety option files evaluation by ASN : Towards the application for authorization

1. Request for complementary data :

Monitoring the installation: the monitoring strategy of the installation and the technical means to be implemented.

Post-accident situations : safety issues, both operational and long-term, related to the restoration of various repository functions following an accidental situation

2. Request for justification development:

Repository architecture : disposal architecture that enhances the overall containment capacity of the facility

Dimensioning of the installation to the aggressions : Especially with regard to the earthquake in the post-closure safety

3. The bitumen issue : ASN considers that the search for the neutralization of the chemical reactivity of bituminized waste packages should be favored