The Meuse/Haute Marne Centre : Underground Research Laboratory Technological Exhibition Facility

Marielle Girard
Public relations officer

A new Planning Act 28 June 2006
National management policy

Andra is an industrial and commercial public body established by the December 30th 1991 Waste Act.

- Its role was completed by the June 28th 2006 Planning Act concerning the sustainable management of radioactive materials and waste.
- Andra, which is independent of radioactive waste producers, is supervised by the Ministries for energy, the environment and research.

Andra's role

- Andra is responsible for the sustainable management of all French radioactive waste.
- In France, priority has been given to disposal.
- Andra puts its expertise and its know-how, as a public body under State supervision, to design, operate and monitor radioactive waste disposal facilities by protecting man and the environment from the impact of such waste, over the long term.

Radioactive waste disposal classification

<table>
<tr><th></th><th>Short lived waste</th><th>Long lived waste</th></tr>
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(waste from dismantling operations)</td></tr>
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(operating waste from NPPs)
+ Centre Manche</td><td>Operational 2019
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<tr><td>High level</td><td colspan="2">Disposal site to be commissioned in 2025
(Waste from reprocessing plants)
Research stage – 1991 and 2006 acts</td></tr>
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Andra sites


Siège
Centre de l'Aube
Centre de la Manche
Centre TFA
Laboratoire de recherche souterrain de Meuse / Haute-Marne

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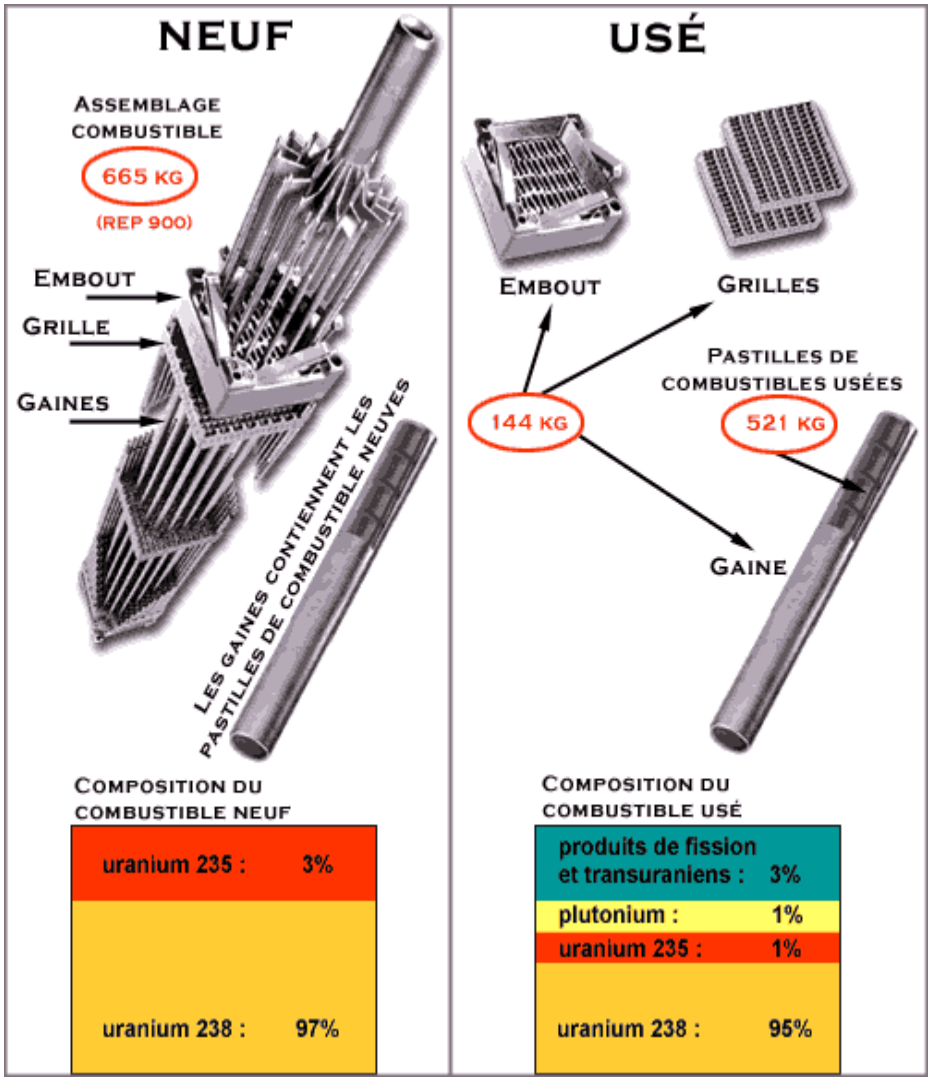
Reprocessing of spent fuel

ILW HLW radioactive waste



Reprocessing of uranium pellets :

. 96 % uranium

. 1 % plutonium

. 3 % HLW

ILW (structural materials, ….

ILW canisters

Structural materials

Structural materials in concrete matrix
(before1995)

Compacted structural materials
(since 2002)

ILW radioactive waste

Other wastes

HLW canisters

Vitrification (HLW in vitrified matrix)

Canister of vitrified products

HLW radioactive waste

Temporary storage in the reprocessing plant

ILW HLW radioactive waste

Temporary storage,

La Hague

La Hague
Marcoule
Cadarache

Key dates

1991	Loi « Bataille » - Waste Act
1993	Mediation mission
1994	Choice of the Gard, Haute-Marne, Meuse and Vienne districts

Geological survey 1994 - 1996

Four candidate districts selected :

- **Gard** for its siltite
- **Haute-Marne,Meuse** for its argilite
- **Vienne** for its granite

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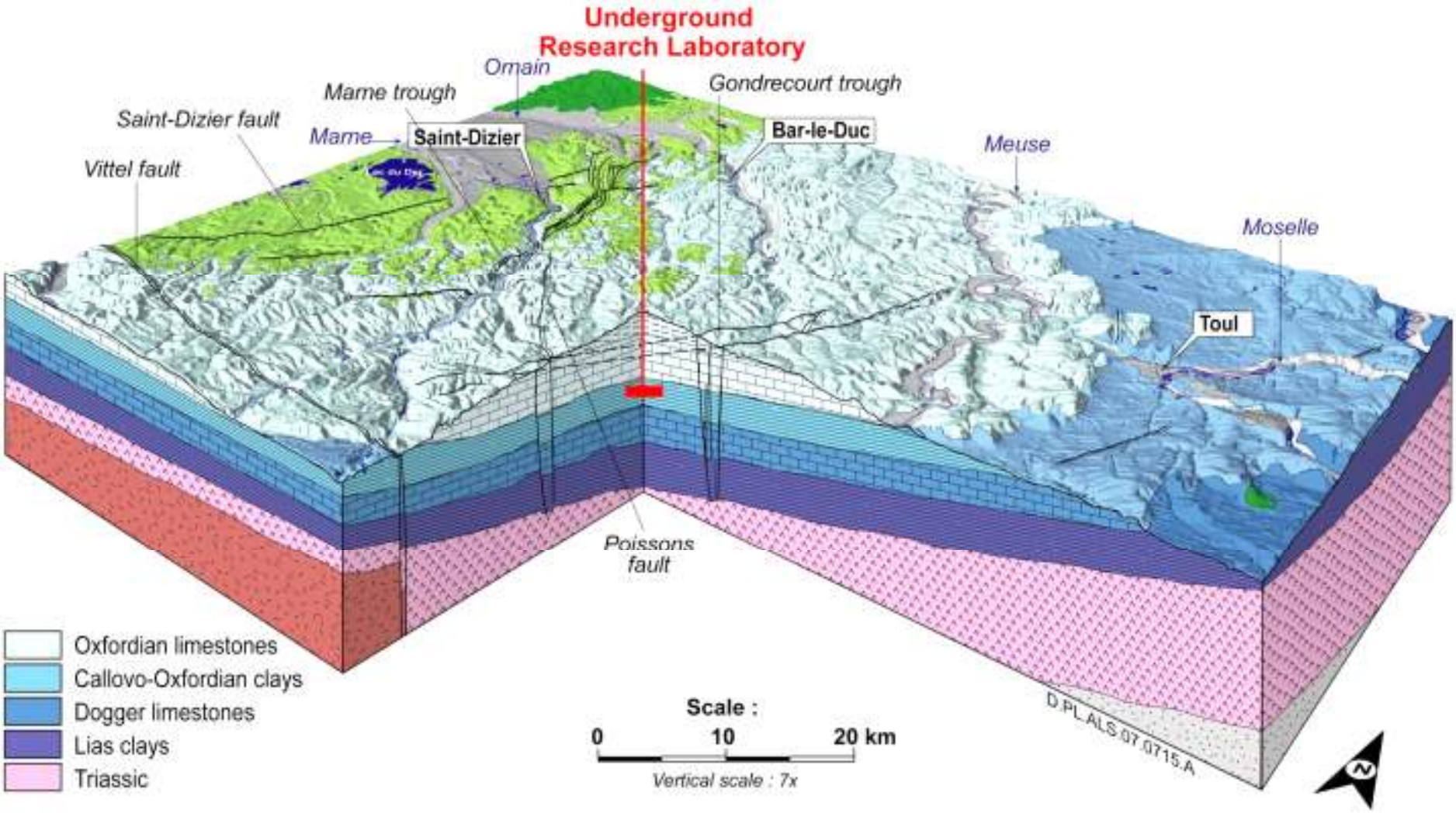
2000 - 2006	Construction of the Meuse/Haute-Marne Laboratory
2000 - 2006	Experiments in the Laboratory

URL Site Main Geological Features

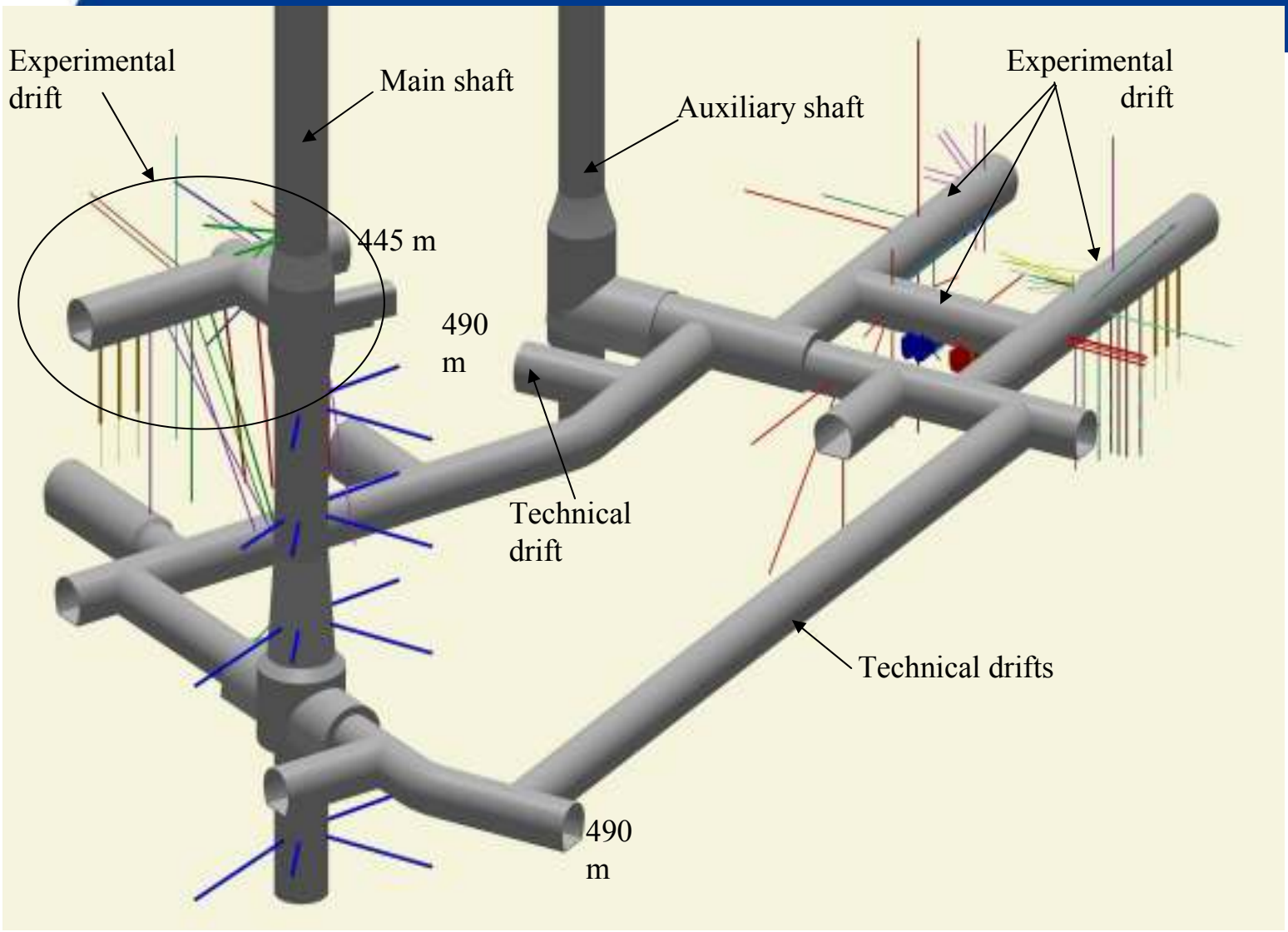


Callovo-oxfordian argilite

130 m thick
160 million years old

very low permeability

View of the Meuse/Haute-Marne URL


Experimental drift
Main shaft
Auxiliary shaft
Experimental drift
445 m
490 m
Technical drift
Technical drifts
490 m

Experimental Drift GEX

Experimental program and results

J Delay

Key dates

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2000 - 2006	Experiments in the Laboratory
2005	Report to the government (« dossier 2005 »)

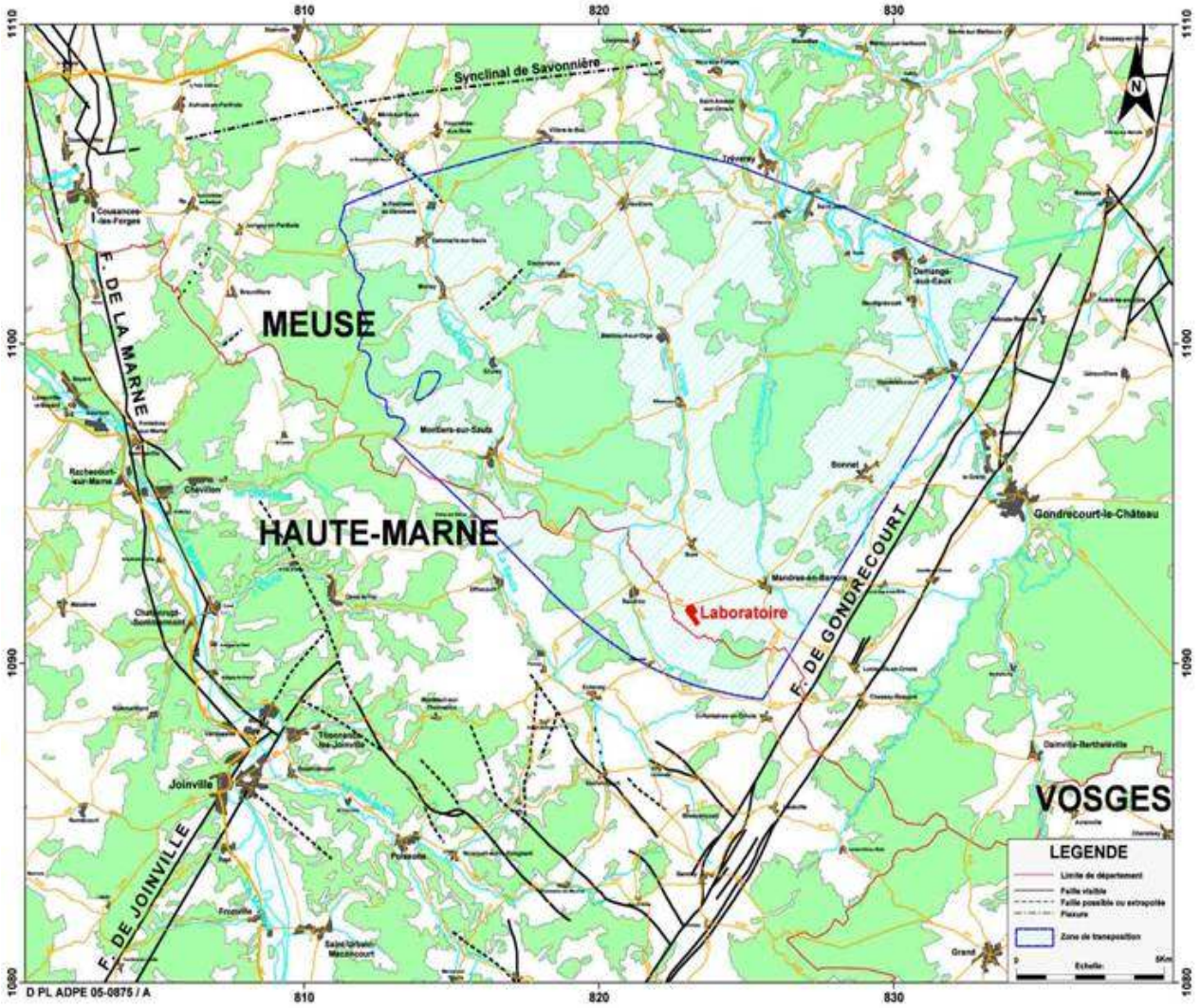
A well-documented site
and a geological medium that offers favourable properties

- A simple, well-documented geological context
- Sector located away from faults and a fault-free clay formation
- Seismic stability
- Thick (130 m at the laboratory site) and homogeneous layer
- Very low permeability argillaceous rock capable of trapping radioactive elements
- Zone extending for at least 250 km^2 with properties similar to those of the underground laboratory site

Transposition zone

- **Transposition zone =** geographical domain geologically equivalent to the underground laboratory site

 Identification of a zone of about 250 km²



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1998 - 1999	Government decision, Licensing decrees,
2000 - 2006	Construction of the Meuse/Haute-Marne Laboratory
2000 - 2006	Experiments in the laboratories (Bure / Mont-Terri)
2005	Report to the governement (« dossier 2005 »)
2006	New Act voted by the Parliament

Planning Act, 28 june 2006

Article 12 of the planning Act of 28 june 2006 says that "…any licence application to create such an installation (deep geological repository) shall only concern a geological formation that has been investigated through an underground laboratory".

The 2006 Planning Act adopted the disposal concept as the reference solution for the long-term management of HL and IL-LL radioactive waste

Today, research is continuing into the design and siting of the disposal facility which could be commissioned by 2025, if its licence is granted in 2015.

Three major objectives for the works beyond 2006

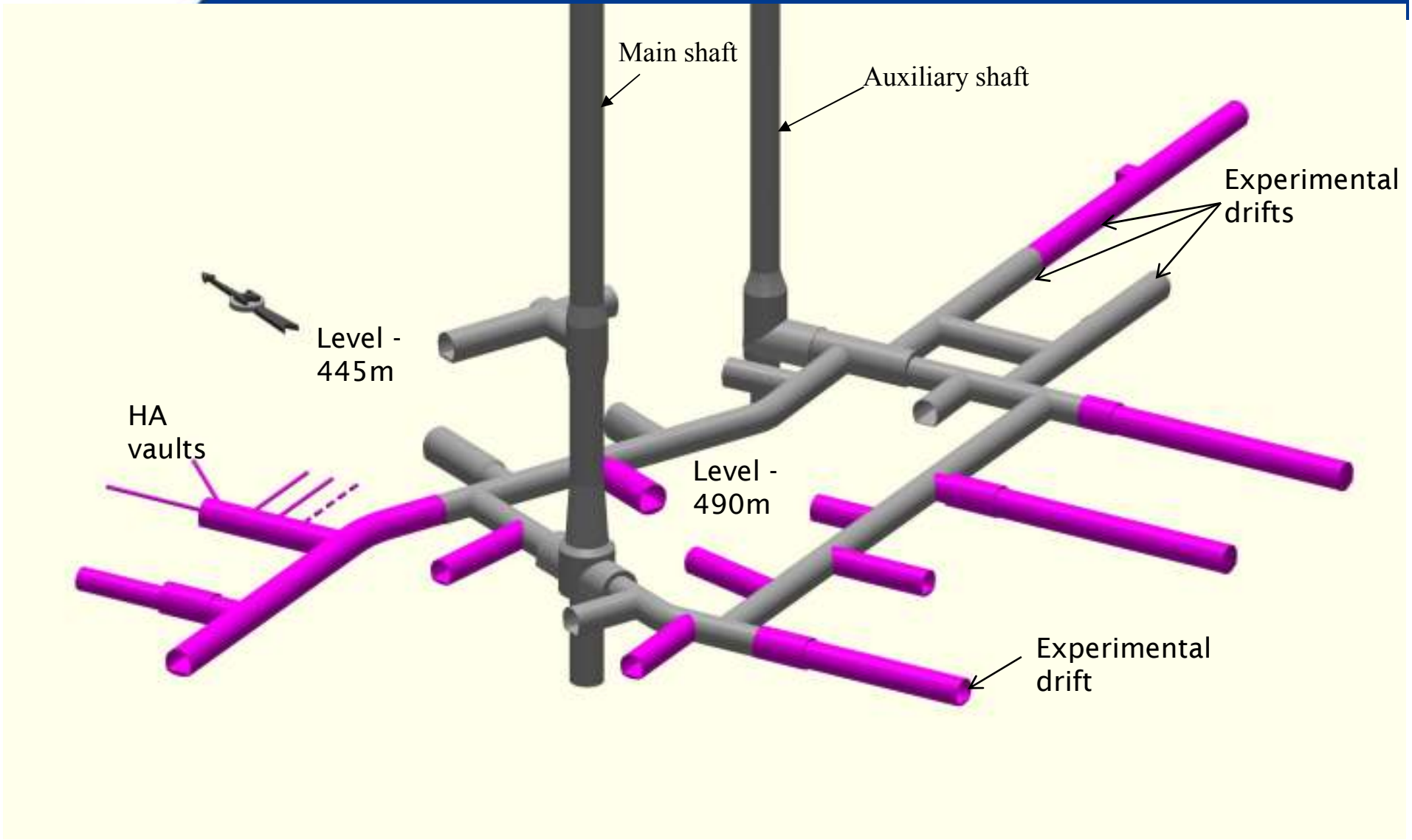
- **Consolidate data acquired over the period 2002-2005 and conduct long term experiments in the drifts**

- **Carry out integrated tests of a technological scope**

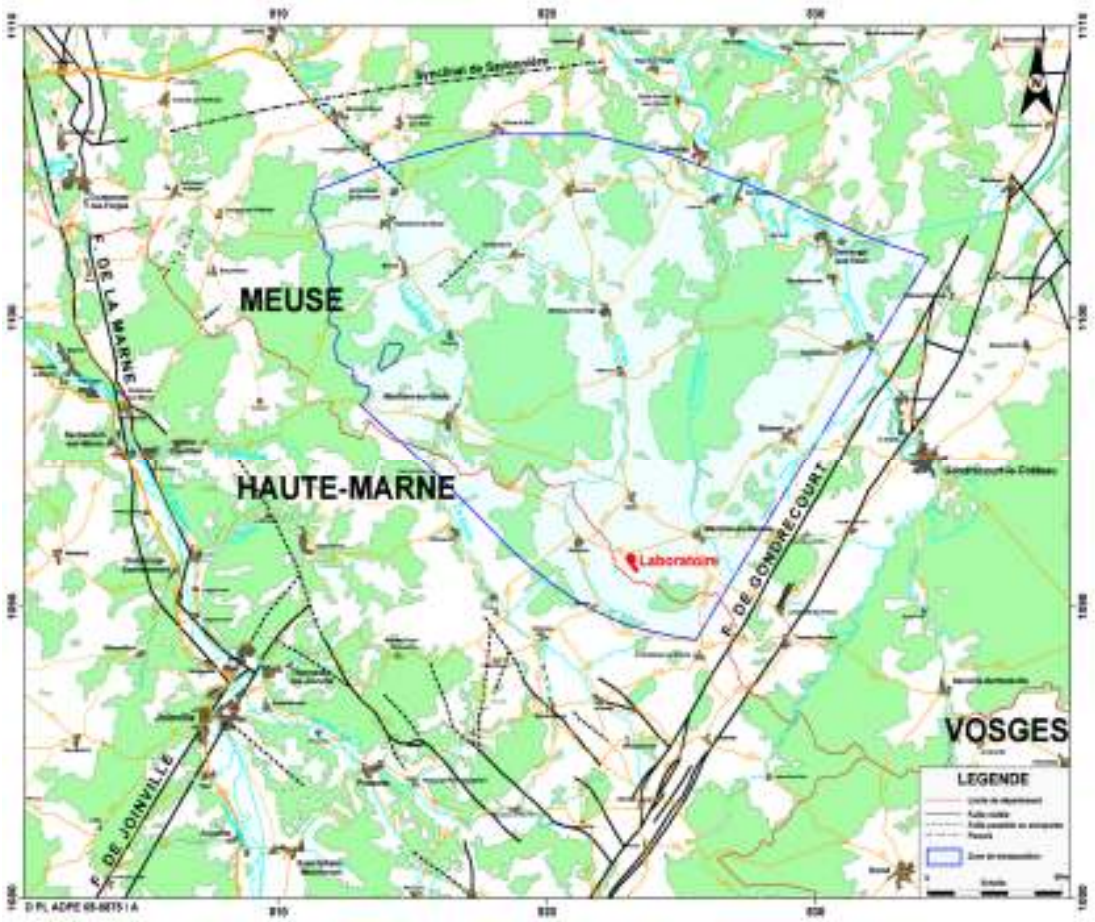
- **Carry out a survey of the transposition zone in the surroundings of the underground Laboratory in order to determine more precisely implantation site**

A close link between scientific and technological activities

Planned activities : 2008-2012 phase

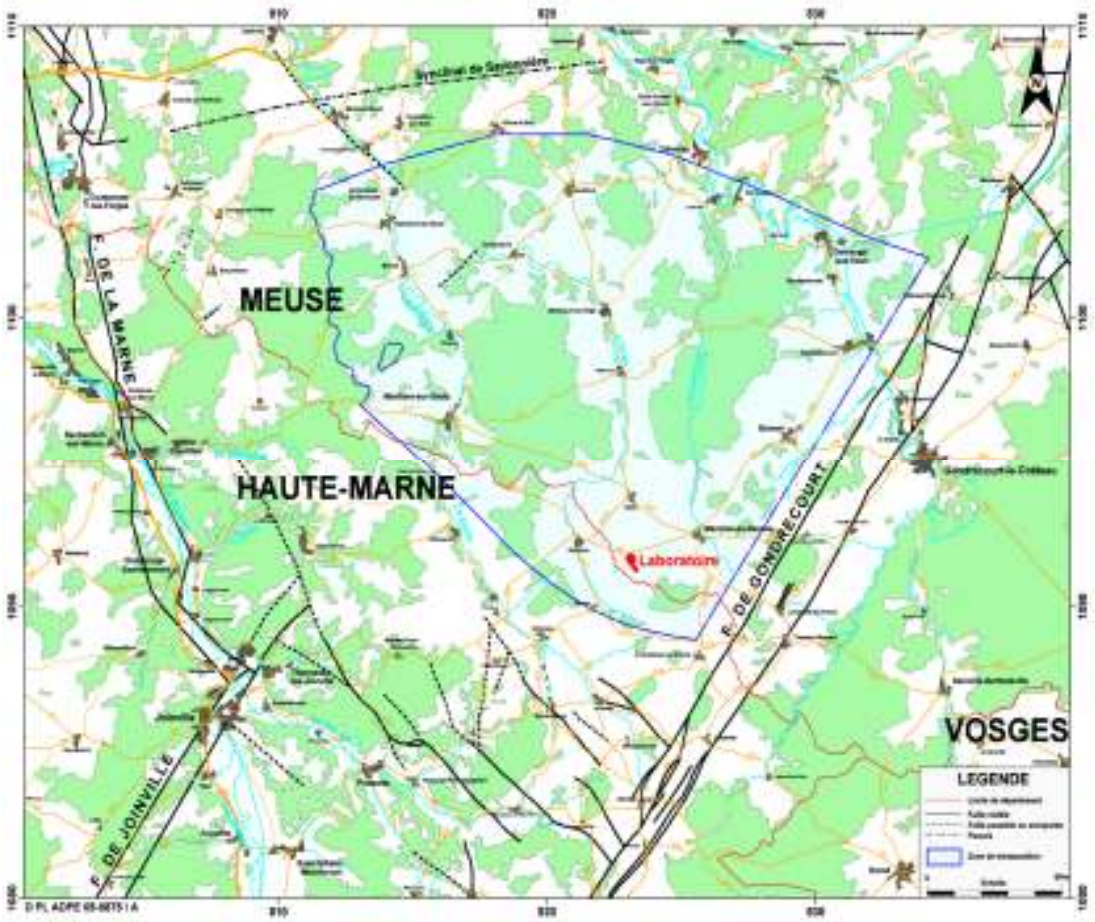


Transposition zone 2007-2015



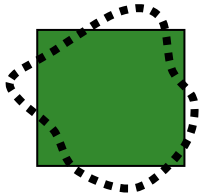
2007-2008 : geological survey in the TZ

Transposition zone 2007-2015



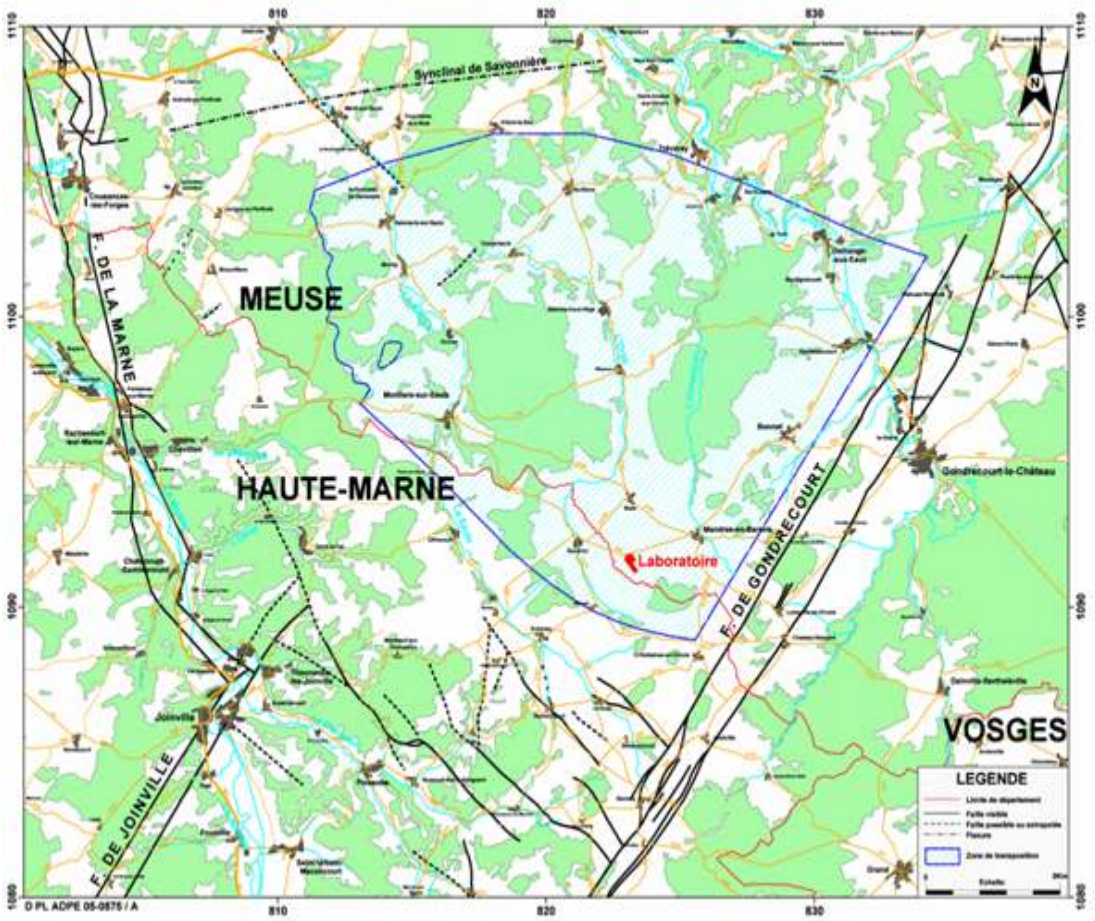
2007-2008 : geological survey in the TZ

2010-2011 : defining of a restricted area of about 30 km²



30 (+ ou – 10) km²

Transposition zone 2007-2015



2007-2008 : geological survey in the TZ

2010-2011 : defining of a restricted area of about 30 km²

2012-2013 : public debate

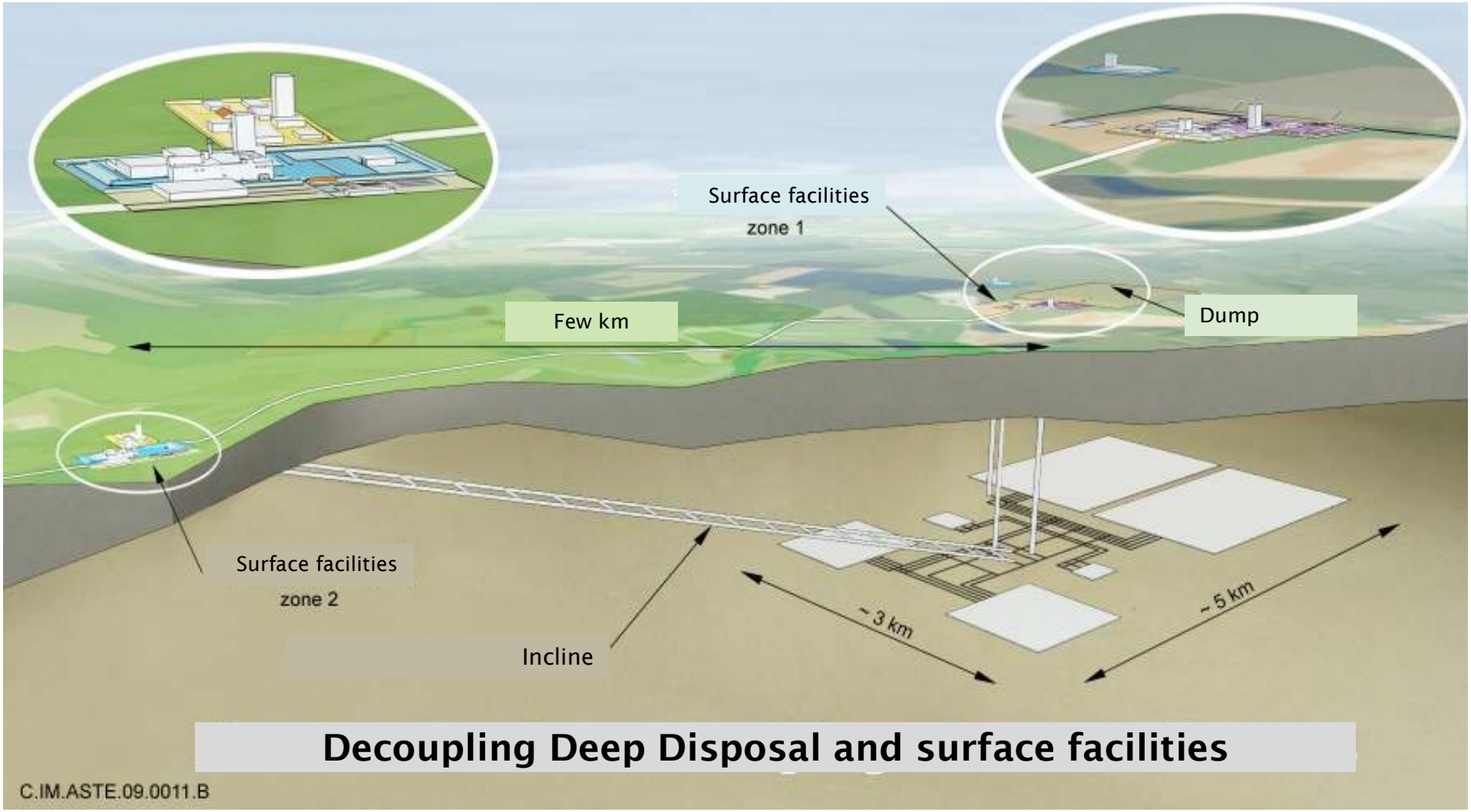
TZ : 250 km²

30 (+ ou – 10) km²

1000 ha

250 ha

Layout of a Deep Disposal Facility

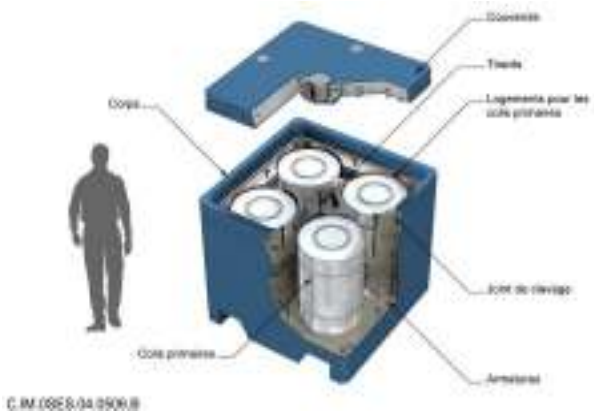


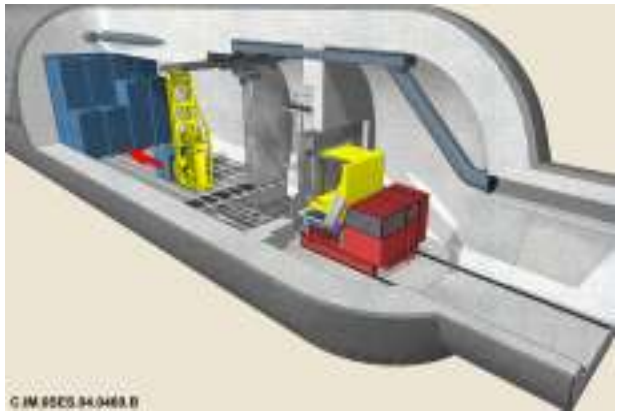
IL waste packages and cells

• **Disposal packages** contain 1-4 primary packages

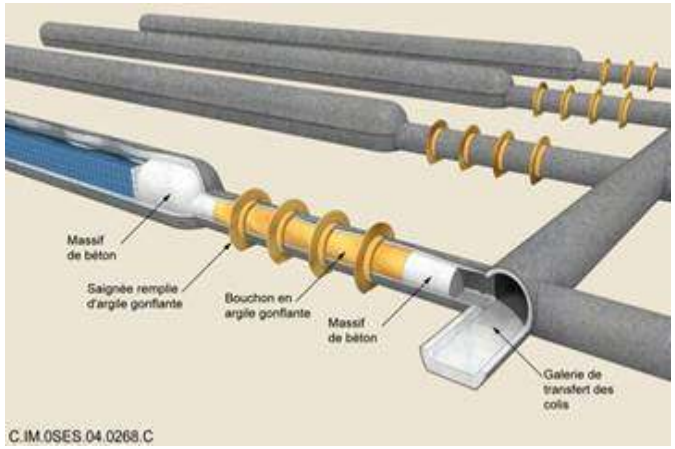
· Disposal **cells**: $\Phi \leq$ **10-12 m tunnels**

· Packages and cells **designed to last** for several centuries





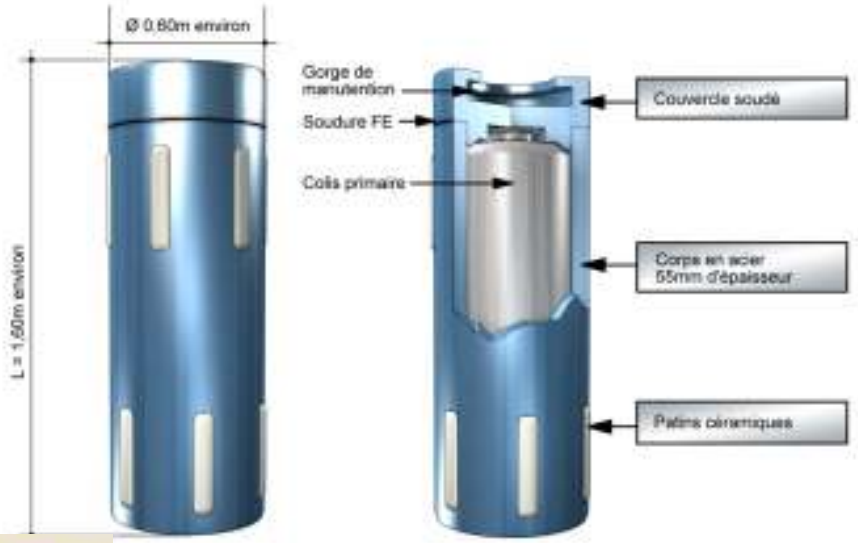
Stacking packages

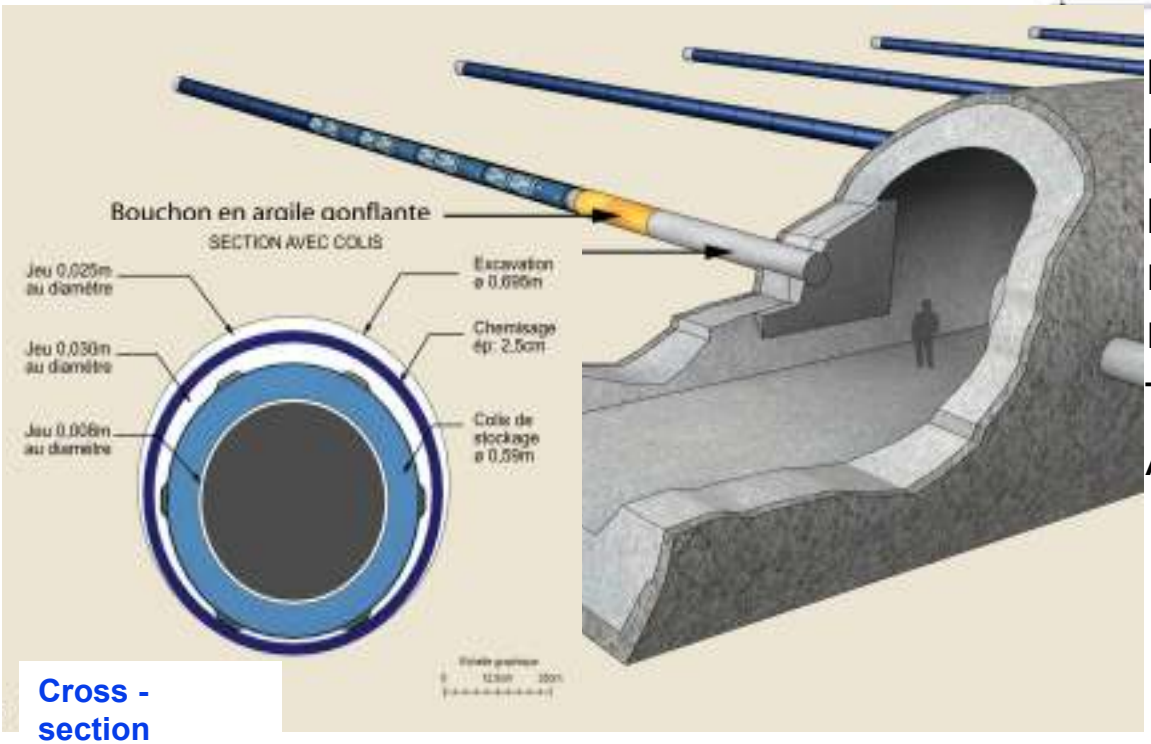


Closed cells

HL waste packages and cells

Each primary package is placed in a sealed unalloyed steel overpack, with a thickness of 55 mm





Cross - section

Dead-end tunnel 40m long.

Diameter 0.7m

Reversible emplacement in metal sleeve using a pushing robot

Temperature < 90° C in Argillite

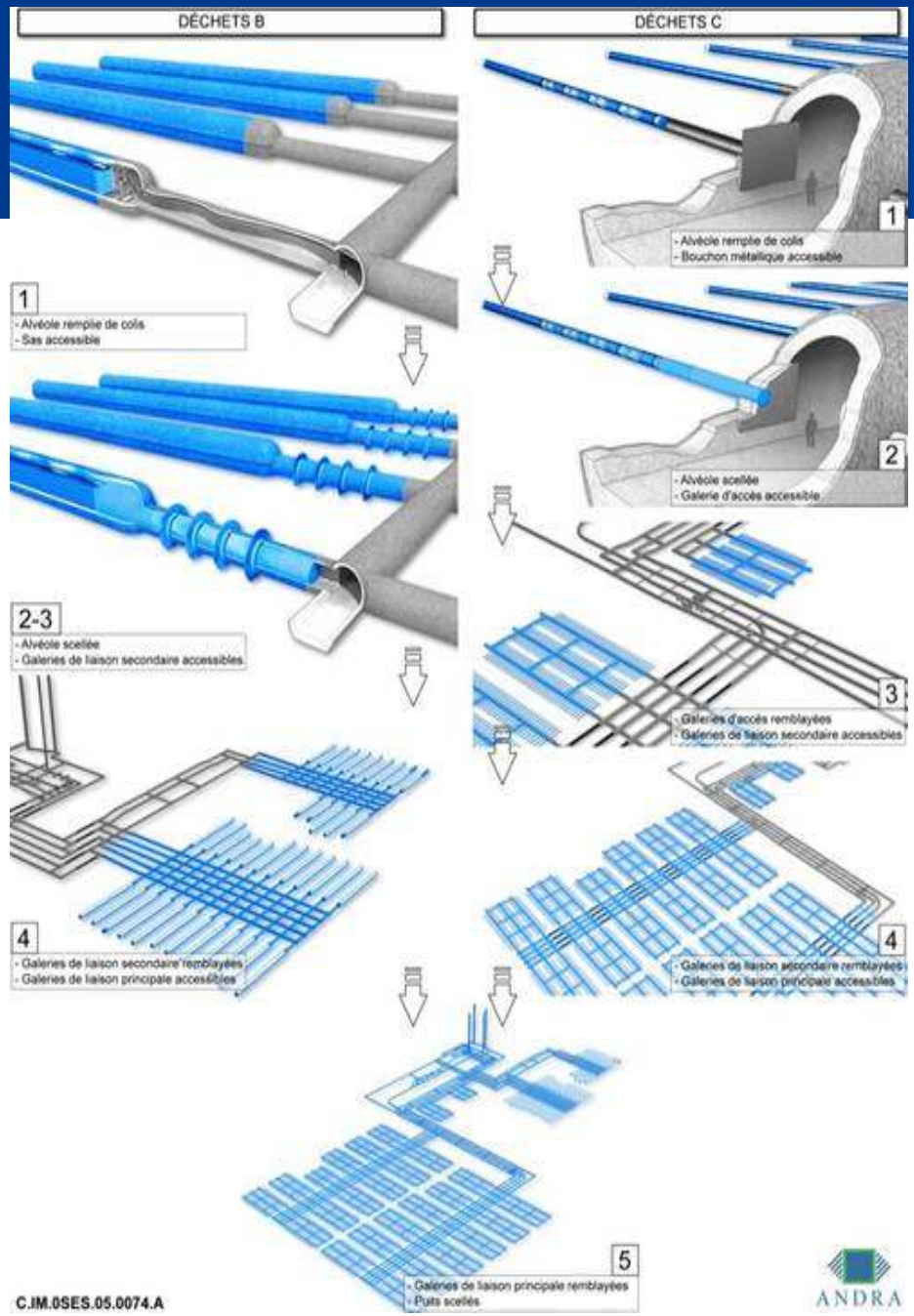
Reversibility

- Different motives: freedom for future generations to make alternative management choices, progressiveness in implementing choices, intellectual modesty regarding scientific knowledge and available techniques and the possible unknown factors.

- Reversible disposal = may play a interim storage role and evolve towards a facility that does not need human intervention, while offering additional long-term safety guarantees.

- Stepwise management of the disposal process, keeping open the possibilities of choice at each stage that lend themselves to flexible management.

Reversibility : stepwise management

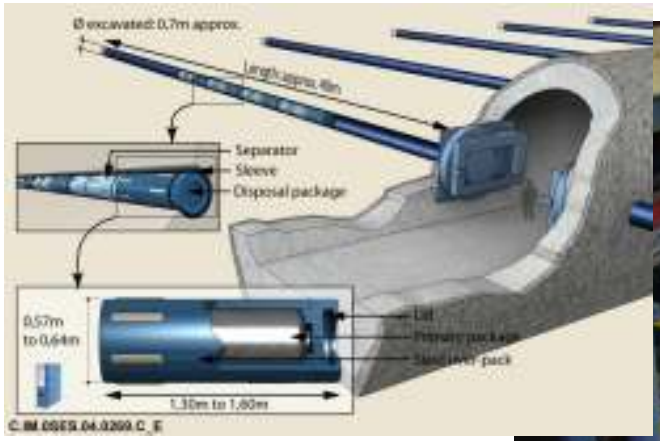


Technological exhibition facility

Examples of static demonstrators

Examples of dynamic demonstrators

Technological Demonstrators



A number of steps in progress: 2009-2012

Development of an long term environmental monitoring on a large zone (900km^2 – water, air, soil, wildlife…),

Evaluation of environmental impacts and constraints,

Evaluation of socio-economical needs and impacts,

Evaluation of flux (transport, energy, workers,…),

Evaluation of needs for infrastructures and territorial development,

Elaboration and data analysis for authorization and administrative procedures,

Consultation and exchanges with local players (public, associations, administrations, industrial and professional corporations…),

Conclusion

The main steps for 2009-2012 are related to:

- Continuation of geological characterization and scientific investigations,

-Technical feasibility of the underground facilities (assessment of excavation processes and impact),

- Development and testing of the technological demonstrators for the handling of disposal containers,

- Selection of locations for the underground and the surface facilities,

- Environmental monitoring over a large regional area and a long period,

- Participation of the territorial players in order to take into account the territory's specificities, its needs and constraints as well as its ability for development,

- Preparation of the authorization and administrative procedures.

General Schedule Deep Geological Disposal – steps ahead (2013-2025)

- **2013:** public debate on the project for the reversible deep geological disposal facility

- **2015:** filing of the licence application for the reversible deep geological disposal facility

- **2016:** voting of a law laying down the conditions of reversibility applicable to this disposal facility

- **2025:** commissioning of the reversible deep geological disposal facility

Thank you for your attention