

The French Radioactive Waste Disposal System: Which Discussions for Which Decisions? - 8013

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ABSTRACT

Over the last 20 years or so, radioactive-waste management has undergone remarkable developments in France. The *Law of 30 December 1991* prescribed that Parliament would convene once again at the end of a 15-year research period. In 2005, the government asked the National Commission on Public Debate to organise a public debate on radioactive-waste management. Hence, for the first time, such an event was held in accordance with a national policy and not on a specific project. The debate took place between 12 September 2005 and 13 January 2006. Although the debate remained mostly a discussion among experts and opposed most frequently pro-nuclear and anti-nuclear activists, it still provided an opportunity to define and clarify challenges.

Following the public debate and in the light of the assessment of investigation results, Parliament adopted on 28 June 2006 a new *Planning Act on the Management of Radioactive Waste*, which applies to all radioactive residues, irrespective of their activity level, and prescribes specific procedures and deadlines, such as the commissioning of a disposal facility for radium-bearing and graphite waste by 2013 and of a deep geological repository for high-level and intermediate-level long-lived waste by 2025.

In the latter case, the *Planning Act* renews the assessment system for Andra's studies and investigations by a committee of experts and by the OPECST over and above the review of the future licence application by the Nuclear Safety Authority. In addition, a new law will set up the reversibility conditions of the repository before the government may grant any authorisation. At the local level, the act reinforces the prerogatives of the Local Information and Oversight Committee, which is responsible for public information and consultation issues; furthermore, it prescribes that a public debate and a public inquiry be held as a prerequisite to the delivery of any authorisation.

Hence, Andra is taking all necessary means in order to meet deadlines by involving communities as early as possible in the development process of the repository project. In its activities, the Agency relies on the CLIS and local elected officials, and particularly on mayors. It benefits from some experience in the field, since it has already commissioned two disposal facilities, both located in the Aube District, one in 1992 for low-level and intermediate-level short-lived waste (CSFMA), and the other in 2003 for very-low-level waste (CSTFA). Beyond statutory institutional deadlines, frequent information meetings in relevant local town halls have provided all the more opportunities to explain at length what the projects involved as they advanced. People need precise information in order to be reassured and to share it with their families and friends. It also appeared desirable to create as rapidly as possible the Local Information Committee (CLI) in order to organise a sound dialogue with local populations.

Lastly, disposal facilities and disposal-facility projects are not independent from each other. The quality of the implementation and operation of disposal structures in surface facilities, such as the CSFMA and the CSTFA, represents an outstanding showcase for Andra's know-how and aims at reinforcing confidence in more ambitious projects, such as the deep geological repository.

BACKGROUND

Radioactive-waste management in France starts in 1969 with the creation of the *Centre de stockage de la Manche* (CSM), the first disposal facility for low-level and intermediate-level short-lived waste (Figure 1).



Fig.1. Aerial view of the *Centre de la Manche* Disposal Facility, here during final cover operations, closed down in 1994 and currently in its post-closure monitoring phase.

The first waste packages mainly generated from research activities and from the first power generating facilities were placed in open-ground trenches on the site. In 1974, along with the development of the NPPs fleet in France, the operations were rationalised with the installation of the first disposal structures. Those structures were designed to provide performance requirements that are consistent with the new 1973 nuclear regulations. The significance attributed to the disposal of radioactive-waste packages was confirmed in 1979 by the creation of ANDRA, the French National Radioactive Waste Management Agency (*Agence pour la gestion des déchets radioactifs*) within the CEA (French Atomic Energy Commission-*Commissariat à l'énergie atomique*), shortly after came into effect the London Convention prohibiting all radioactive waste from being dumped into the sea. That turning point led the facility to adopt an industrial scope, which was also required by the perspective of commissioning the new NPPs. The search for a new site was launched, while anticipating the quantity of waste to be generated over the next decades by the new NPPs fleet. A site, located at Soulaines, in the Aube District, was selected for its well-suited geological and hydrogeological properties for safe disposal. The *Centre de l'Aube* Disposal Facility (CSA) was built on the site and commissioned in 1992 (figure 2). It is designed to accommodate 1 million cubic metres of waste, which is almost twice the capacity of the CSM, and should remain in operation for about 60 years.



Fig.2. Aerial view of the Centre de l'Aube disposal facility for intermediate and low level short lived waste

Throughout the same period as the CSA was being designed at the end of the 80s, a question was raised concerning the disposal of waste resulting from processing of the spent fuel. Those residues consist mostly in glass matrices containing non-recoverable high-level long-lived materials. Due to safety reasons, their specific radioactive and thermal characteristics do not allow for their disposal of in surface facilities over the long term. Studies were necessary in order to locate suitable formations for deep geological disposal. With that objective in mind various survey campaigns started in 1989 in four different geological media: clay, salt, granite and schist, with the prospect to further investigations in underground laboratories. Activities were rapidly met with opposition, sometimes

violent, and came to an abrupt end. The Prime Minister announced a moratorium that led to the adoption of the *Law of 30 December 1991*. The aim of this new Law was to offer a framework and structure research activities regarding the management of high-level and intermediate-level long-lived waste. The Law also granted Andra the status of an independent body from radioactive-waste producers. Over the following 15 years, the Agency pursued not only its research programmes, but also its industrial mission relating to the design, construction and operation of radioactive-waste disposal facilities. During the summer of 2003, a disposal facility for very-low-level waste (CSTFA) was commissioned at Morvilliers, close to the CSA (figure 3).



Fig.3. Aerial view of the Centre de Stockage Tres Faible Activite in Morvilliers

THE LAW OF 1991

The crisis that the first attempts to implement research sites for the disposal of high-level and intermediate-level long-lived waste generated in 1989 marked a major turning point in France. Until then, only technicians and scientists working in the nuclear sector had been dealing with radioactive-waste management, when it suddenly became a societal issue. With the mission entrusted upon the Parliamentary Office for Scientific and Technological Options (*Office parlementaire pour l'évaluation des choix scientifiques et technologiques* – OPECST), followed by the adoption of the Law of 30 December 1991, radioactive-waste management gained a national scope under the supervision of Parliament. Roles, missions and responsibilities of every stakeholder were clarified and a formal structure was given to research and investigations on radioactive waste with a strict framework and clear deadlines.

Within that context, Andra became a public Agency, as a structure allowing the State to manage radioactive waste, as well as to design and to carry out research programmes. Consequently, the Agency lost its reporting relationship with the CEA and became independent from waste producers. Through its creative financing, it constitutes an original structure, since it operates without any contribution from the State Budget, except for the mission dealing with the preparation of the National Radioactive Waste Inventory. Indeed, all industrial and research activities are financed through agreements with waste producers in accordance with the “polluter-pays” principle.

Decision-making process

Governance in matters relating to radioactive-waste management also evolved and new intervention modes were developed. First and foremost, by being removed from the jurisdiction of the CEA, the leadership for research regarding the disposal of radioactive waste promoted the mobilisation of the overall scientific community around the different issues raised by the management of such waste. Programmes and results are placed under the control of a National Review Board that reports directly to the government and Parliament. The new mechanism also involves a high level of transparency as a driving force for the intensification of research programmes and especially for the quality of methodological developments and scientific knowledge. Throughout the events that followed, it was clear that mobilising various skills proved to be one of the richness and success factors of the research programme.

Secondly, the Law of 30 December 1991 was also innovative with respect to the decision-making process. It set up an open and progressive process with a 15-year research phase at the end of which a new deadline was prescribed to hold a national discussion with a view to determining future steps. In the light of the results achieved with the different alternative solutions under consideration (partitioning and transmutation, long-term storage), the decision was taken that the implementation of a repository for high-level and intermediate-level long-lived waste was feasible.

Andra's missions were clarified and focus on:

- industrial activities: design, construction and operation of radioactive-waste disposal facilities, closure and post-closure monitoring;
- information activities: especially the preparation and publication of the National Radioactive Waste Inventory, listing all radioactive waste in France and their location;
- research activities, with the view to further implement a deep geological repository for high-level and intermediate-level long-lived waste.

A 15 YEARS RESEARCH PROGRAMME

The search for sites

Following the adoption of the *Law of 30 December 1991* and the publication of the implementing Order, the government entrusted upon Mr Christian Bataille, Member of the French Parliament, a consultation mission aimed at searching for suitable sites for the construction of underground laboratories where investigations could be carried out on the deep geological disposal of high-level and intermediate-level long-lived waste. In 1993, four candidate sites were selected among approximately 30 volunteer communities:

- a granitic formation located in the Vienne District, under a sedimentary cover,;
- a deep marls formation located in the Gard District, near the Rhône River;
- two sites located in Callovo-Oxfordian argillites, in the Meuse and Haute-Marne Districts respectively; due to their proximity and similarities, both sites were quickly combined to form the Meuse/Haute-Marne Site.

Detailed investigations were conducted from the surface to verify the quality of each site. Borehole-drilling operations and geophysical-measurement campaigns were launched as early as 1994 and lasted for 2 years. A 400-m-thick formation in the subsoil of the Gard District, near the Rhône River, was also discovered during those investigations.

Local Information and Oversight Committees (Commission Locale d'Information et de Suivi – CLIS) together with incentive funds were implemented on every site during that period. Following the studies it conducted, Andra submitted in 1996 three applications to authorise the implementation of an underground laboratory, in the Vienne, Gard and Meuse/Haute-Marne Districts. Those applications took stock of all existing knowledge concerning the three sites, described the work programmes involved with the implementation of underground laboratories, as well as the research and experimentation programmes intended to complement the body of required data in order to meet the 2006 deadline, as prescribed by the Law of 1991.

In 1997, the applications were the subject of public inquiries. All candidate communities confirmed their willingness to host an underground laboratory and therefore agreed to its construction (figure 4).

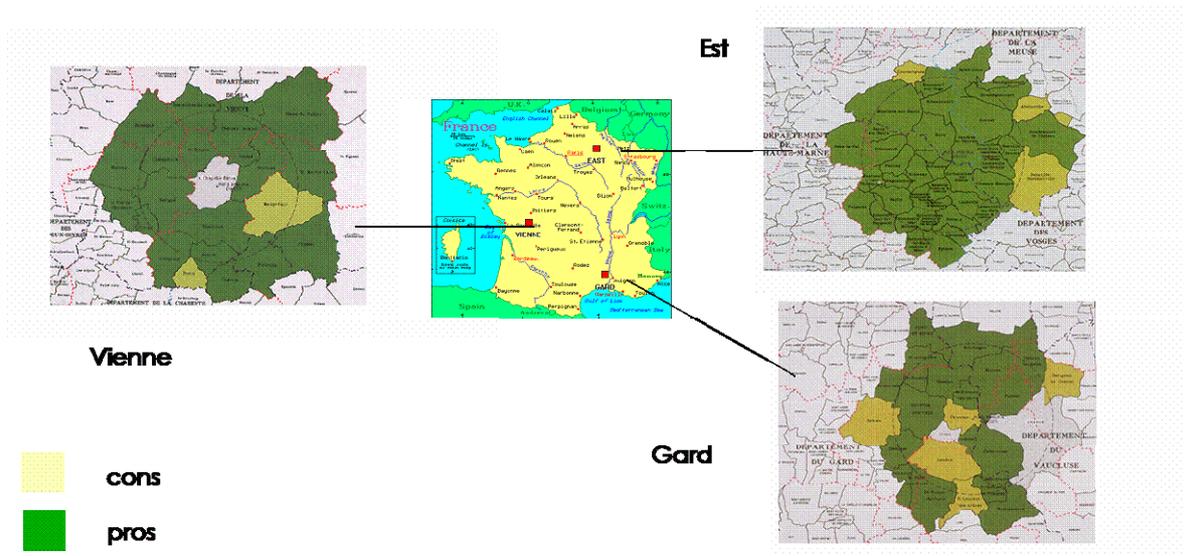


Fig.4. Votes of the communities in 1997 for the construction of an underground laboratory at the 3 sites for which an application was submitted in 1996

The decision concerning the underground laboratory

Once the applications were reviewed by relevant services, the government decided to continue work activities on the Meuse/Haute-Marne Site by implementing an underground laboratory at Bure. On the other hand, both the Gard and Vienne Sites were abandoned. In the latter case, the National Review Board had reservations because the sedimentary series covering the granitic block contains water resources that are used for agricultural purposes. As regards the clay formation, the Callovo-Oxfordian formation on the Meuse/Haute-Marne Site is better known and its geometry is more suitable than the Gard Site. In parallel, the government instituted a research mission to seek a new granite site. However, the mission did not meet local support and was confronted with a large number of demonstrations, so much so that it folded in 1999. In the meantime, preparatory activities were undertaken for the construction of the Meuse/Haute-Marne Underground Research Laboratory. The construction and the first experiments took place between 2001 and 2006; they are described in the Dossier 2005 Argile [1], which was submitted to the government in mid-2005 (Figure 5).



Fig.5. Aerial view of the Meuse/Haute-Marne Underground Laboratory.

During the same period, a Dossier 2005 Granite was also prepared on the basis of the overall information gathered on that type of geological formation by integrating the experience acquired through foreign underground laboratories and programmes in Canada, Switzerland, Sweden and Finland.

The Dossiers presented to the government contain a compilation of the overall information and knowledge acquired on the geological formations, waste packages and potential means for the implementation of a deep geological repository. Analyses demonstrate the feasibility of a repository within the Callovo-Oxfordian formation; its reversibility may be guaranteed beyond a century. Safety functions consisting in retarding radionuclide migration are satisfactory. Safety calculations show that the radioactivity level likely to be released into the human environment is several orders of magnitude lower than the regulatory limit, with a peak at a few hundreds of thousands of years.

DECISION-MAKING STEPS

During the preparation of the Dossier 2005, Andra called upon various personalities among the French scientific community and representatives of foreign counterpart agencies in order to carry out a critical review of the main documents. In 2005, the Dossier 2005 Argile was the subject of a triple assessment at the request of public authorities:

- a scientific and technical assessment conducted by the National Review Board, as prescribed by law;
- a safety assessment performed by the Nuclear Safety Authority, as part of its prerogatives;
- a peer review carried out at the request of Andra's supervisory ministries by a group of international experts under the aegis of the OECD Nuclear Energy Agency in order to verify the soundness of approaches and results in relationship to international standards.

The National Review Board continued to monitor the advance of the research programme on a continuous basis and submitted its final assessment report to the government on 30 January 2006. It addressed the three research areas prescribed by law. More specifically, it recommended that disposal be selected as the reference solution. It also considered that the work conducted on that theme met "the best international standards". The National review Board also felt that investigations had shown that the Callovo-Oxfordian formation constitutes a "*remarkable achievement, both in quality and quantity*"; the work also demonstrated that, from such a standpoint, the rock of the Meuse/Haute-Marne Site was very homogeneous and free of water-conducting faults.

At the request of the ASN, the Institute for Radiation Protection and Nuclear Safety also reviewed the Dossier 2005 Argile, and published an assessment report that was in turn submitted to the Standing Waste Group whose final opinion was transmitted to Andra as follows:

"The Standing Group emphasises that the Dossier 2005 Argile contains a thorough and high-quality presentation, constituting a significant advance. [It] issues a favourable opinion concerning Andra's assessment and considers that a radioactive-waste repository within a clay formation for which ongoing investigations are taking place in the Bure Underground Laboratory, is feasible. [...] the Standing Group also considers that there is no safety-related obstacle to the search for a repository site within the perimeter of Andra's delineated transposition zone".

In the opinion it presented to the government on 1 February 2006, the ASN mentioned that "a deep geological waste repository is a final management solution that appears to be unavoidable".

The peer review of the Dossier 2005 Argile carried out by the International Review Team (IRT) set in place by the OECD/NEA concluded especially that the programme met fully the best international practices and was leading in several fields. Andra's reversibility approach is considered as innovating without compromising the safety of the repository [2].

At the government's request, a national debate was also held on the long-term management of radioactive waste under the auspices of the National Commission on Public Debate (CNDP) with six months of preparation and 13 meetings between September 2005 and January 2006. The CNDP is an independent body, non specialized in any field, except public debate. As early as February 2005, the Government committed the National Commission to organize the debate. Following a first series of exchanges with the various stakeholders and with ANDRA, the National Commission accepted in March 2005, and decided to implement a Specific Commission on Public Debate, especially dedicated

to the radioactive waste management. It was the first time that a Commission was launched not for a great public infrastructure like roads, dams, or other public equipment, but for a debate on general options in the field of management of high level radioactive waste. The six month preparation was used to write clear notices and documents to the attention of the stakeholders and of the general public. A detailed file was published and given to each of the participants to the public debate. This file could also be downloaded [3] prior to the meetings in order to give the public time enough to read the documents and prepare their questions.

The meetings were held in different towns. A real interest from the public was noticed close to the Underground Research Laboratory site, in the Meuse and Haute-Marne administrative Departments. Several hundred people attended those meetings, as well as the one held in Paris. However, going away from the site, also the potential region for the implementation of a deep geological disposal, the interest of the public was very low, almost nil. The public was in that case mainly represented by people working for the nuclear power industry. However, dealing with the most important meetings, with the public from the site, very interesting questions were addressed. More than 500 questions were prepared during the presentations. The questions were then shown on the screen, and each was answered by the representatives of the state, by ANDRA and by all invited specialists, either from research institutes, from the industry, from international organizations (IAEA, OECD/NEA for example) or from foreign agencies. A total of 60 hours public meetings was held, with a cumulated 3000 attendees. The cost for preparation and organization of the public debate was 2.5 million euros. Almost 400 press citations were identified. Linked to the public debate meeting in Paris, an exhibition on radioactive waste management was also held in the La Vilette Science & Technology museum. 54000 visitors visited this exhibition.

Scientific and technical issues, as well as management and governance strategies, were discussed at length. Almost all topics have been discussed, including all technical and scientific ones, as well as all social and political related questions. A lot of questions were addressed on the results of the 15 years research, the achievements of the partitioning and transmutation investigations, the possibilities for long term interim storage, and the results of investigations in the Bure region. For the first research way, it has been recognized that partitioning and transmutation could not be considered out of the power generation plants. Otherwise, it would be energy consuming, with the risk of generating additional waste or damages to the environment, depending on the source of energy used. However it is also acknowledged that it would be environmentally safe to minimize radioactive waste generation in the case of new nuclear power reactors. The solution of long-term interim storage is definitely and clearly considered as technically and socially unpredictable for the very long-term requirement for the high level and long-lived radioactive waste management. Finally, deep geological disposal has proven to be feasible in the Callovo-Oxfordian formation as studied in the region of Bure. However, recommendations were also made for future development of a deep geological repository project:

- pursuing three priority subjects in the underground laboratory:
 - radionuclide migration within the rock: long-term diffusion experiments and representation at the different scales;
 - management of corrosion gases within the repository;
 - long-term evolution of the excavation damaged zone around the galleries;
- building of equipment and plug demonstrators in order to verify their feasibility and reversibility;
- verifying the existence of faultness sites in the transposition zone;
- integrating social and economic issues in order to insert the repository project within its host territory.

In its final report based on the report from the Specific Commission, the National Commission also underlined the general view that all radioactive waste be taken into account by the new act, within a complete and consistent way for all types of materials and waste. One of the major outcomes was the need to improve governance with regard to radioactive-waste management, the benefits of a stepwise decision-making process and the need for a concrete territorial project for the districts in which a potential waste repository may be implemented.

Lastly, the OPECST report, published in March 2005 by Messrs Birraux and Bataille, analyses investigation results from the standpoint of management strategies and confirms the complementarities of the three research areas examined pursuant to the Law of 30 December 1991: partitioning and transmutation, deep geological disposal and long-term storage.

A NEW PLANNING ACT

The Planning Act of 28 June 2006 [4] extends the scope of the Law of 1991 by prescribing specific deadlines for the different management solutions to come into force. For partitioning and transmutation, for instance, the industrial prospects associated with investigations in the framework of the fourth generation of reactors must be assessed by 2012. With regard to the implementation of a reversible waste repository within a deep geological formation, the prescribed schedule requires all relevant elements for the review of the licence application to implement such facility to be ready by 2015 at the latest. The commissioning date of the repository is set in 2025, a date that is compatible with the production estimates for high-level and intermediate-level long-lived waste generated by the French nuclear power cycle.

The Act also provides two essential elements in fields that were not covered by the Law of 1991. First of all, in response to the wish expressed during the public debate, it proposes a concrete national management plan not only for radioactive waste, but also for radioactive materials, whether recoverable or not, by creating the National Radioactive Waste Management Plan. The Act prescribes strict deadlines for high-level and intermediate-level long-lived waste, as well as for the commissioning in 2013 of a disposal facility for graphite and radium-bearing waste, consisting of low-level short-lived waste. Hence, within a few years from now, all categories of radioactive waste will have found an adequate outlet.

Furthermore, the Act provides a legislative framework for the dismantling of nuclear facilities and particularly for an amount of 68 billion euros, currently considered appropriate, to be constituted by operators and made available. Parliament will participate in the control of those financial provisions and in their specific appropriation in the companies' accounts.

Lastly, the Act reinforces socio-economic incentives in the territories concerned by a potential waste repository. Hence, it strengthens the existing public interest groups promoting local development in the Meuse and Haute-Marne Districts. It also aims at encouraging nuclear industrialists to participate in local industrial projects and confirms the statute of the CLIS.

Beyond its industrial mission to manage radioactive waste, its research mission and its information mission to disseminate knowledge, the major evolutions in Andra's mandate concern:

- the leadership of investigations relating to storage;
- the assessment of accruing costs to the implementation of long-term management solutions for radioactive waste, which will serve as the basis for calculating the producers' provisions;
- the conditioning of waste for which Andra is authorised to provide an opinion;
- the take-over of radioactive waste and polluted orphan sites (public-service mission).

THE NEW CHALLENGES OF GEOLOGICAL DISPOSAL

The Planning Act of 28 June 2006 details the framework and the objectives relating to radioactive-waste management for the years ahead. The first edition of the National Radioactive Waste Management Plan was published at the beginning of 2007 [5] and was subject to a first assessment. The major next step for high-level and intermediate-level long-lived waste will consist in preparing in time for 2015 the licence application for the implementation of a deep geological repository.

The licence application involves the identification of a specific site as well as the definition of a satisfactory repository concept and architecture with respect to safety and reversibility requirements. Over the next decade, efforts will be dedicated to gathering all relevant information in order to build a

convincing case. Those efforts will require the mobilisation of all stakeholders in order to provide technical, social and political responses.

In search of a site

The identification of a suitable site requires not only that geological characteristics be consistent with the requirements imposed by the repository, but also that local populations accept its implementation. In the framework of the Dossier 2005 Argile was delineated a 250-km² transposition zone corresponding to the area within which geological properties are similar to those found on the Meuse/Haute-Marne Site, as confirmed mainly from the Bure Underground Laboratory. The ASN has recommended that a suitable area be drawn within that perimeter for the implementation of a waste repository. It will be Andra's task to continue finer and finer survey activities throughout the transposition zone, notably on the basis of 2-D seismic profiles and later at a more restricted scale on 3-D seismic measurements; new probe boreholes will also be used in order to enhance the geological data of the zone.

As regards the territorial policy, the prospect of implementing a waste repository is only possible within the framework of a joint project with community, government and industry representatives providing, among other measures, for the economic development of the site being considered. Incentives for the regional development are provided for in the *Law of 28 June 2006*. The eligible proximity zone for economic incentives was also determined by order and encompasses more than 300 villages and towns around the transposition zone (Figure 6).

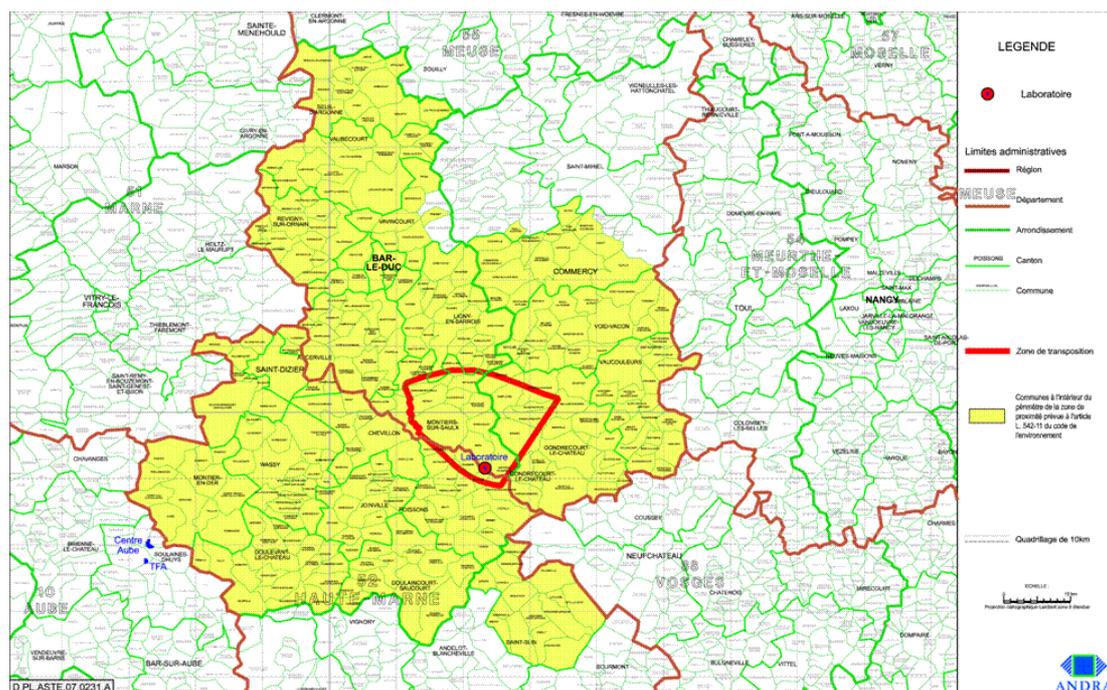


Fig. 6. Map of the proximity zone with the transposition zone (in red).

Year 2007 was marked by intense regional-exchange and project-development activities with a view not only to promoting local business activities, but also the social values that encourage local citizens to accept the implementation of a waste repository. The nuclear-power sector is mobilising itself in order to stimulate development in the areas located near the Meuse/Haute-Marne Site with various local job-creation prospects being announced. Local and regional installations and infrastructures also experience a new boost due to the impulse of the public-interest group created specifically for that purpose and funded through an additional tax paid by operators of basic nuclear facilities. In 2007, the budget amounts to approximately 20 million euros for each of the two districts concerned.

Among the social values that would be able to support the local implementation of the repository, the high scientific and technological level of a deep geological repository provides an excellent

opportunity for developing an international showcase. A broad series of initiatives designed to promote the proximity of the underground laboratory and later of the waste repository may be contemplated by the various stakeholders: industrial tours, information centre, museums of science and technology, training pole or very large scientific equipment. They all have the potential to contribute to the social promotion of the populations by reinforcing the sense of pride in belonging to a recognised community for its state-of-the-art expertise. They may also improve the reputation of the region and the development of its economy.

All those arguments support community dialogue throughout the site-selection process. However, a certain number of guarantees must be provided to the populations in order to build confidence. The most important guarantee will be the safety of the repository and is addressed under various aspects that are taken into account in the repository concept and architecture themselves, and in its operating modalities.

The repository project

The architecture of the repository, which is still at the feasibility stage, is contemplated according to a horizontal development in the core of the Callovo-Oxfordian formation, at approximately 500 m in depth. It is designed to dispose of the various categories of high-level and intermediate-level long-lived waste within structures adapted especially to the thermal characteristics of each of those categories. The distribution of shafts and access drifts, of disposal cells or cavities, their size and the choice of building materials were guided by safety criteria with a view to retarding as long as possible any release of the radionuclides contained within the waste and to retaining them as effectively as possible within the disposal structures and the Callovo-Oxfordian formation.

Disposal structures were designed to ensure reversibility (i.e., allowing for waste removal) in accordance with the government's request in 1998. It was demonstrated that such possibility was feasible for more than 100 years without altering long-term safety conditions. A progressive approach for closing down the structures was developed with a concern to allow society to make decisions step by step and the operator to revert back to a previous state. Hence, in case of anomaly or significant gap in the behaviour of the repository compared to the expected evolution, it would be possible to remove waste packages or to adapt structures accordingly.

The finest knowledge possible of the different physico-chemical phenomena that may affect the evolution of the repository has been undergoing continuous improvement for many years in order to assess the safety at different timescales. That knowledge lies at the basis of the study on suitable means to observe and to monitor the repository; it constitutes the technical foundation for any decision to be made concerning the shutdown of the repository and reversibility.

The repository design and the information-acquisition process follow an iterative procedure and are consistent with the safety of the repository, the demonstration of which remains the essential element for building confidence. Complementary guarantees are provided to local populations and communities by monitoring the repository's evolution and reversibility. However, those technical guarantees are only meaningful if they are also supported by the national community, whose role will have proven determining in any decision made concerning the implementation of the repository. The process described by the Planning Act of 28 June 2006 provides for a political intervention to take place through a public debate and decisions relating to reversibility and the closure of the repository by Parliament.

Holding a public debate prior to the submission of the licence application to authorise the implementation of a deep geological repository provides an additional opportunity for all stakeholders to express their views in the light of the entire body of knowledge made available by Andra. The purpose is to ensure collectively that current and future generations, even over the very long term (hundreds of thousands of years), will benefit from suitable conditions in order to manage the repository both safely and efficiently. The current investigation programme includes a public debate to be held between the end of 2012 and the beginning of 2013.

By adopting a stepwise approach, Parliament wished to be consulted once again before the government makes any licensing decision. Two control points have been established. The first prescribes that the reversibility conditions of the repository be determined before any authorisation to implement a repository is granted. According to the schedule set by the Planning Act of 28 June 2006,

a corresponding law should be adopted after the submission of the licence application, in other words, in 2016. Later, once operations will have come to an end after several decades, only a new law may formalise the final closure of the facility. By observing and monitoring the behaviour of the disposal structures and of waste packages throughout those decades will provide technical information on which will be based that decision.

CONCLUSIONS

Besides high-level and intermediate-level long-lived residues, which form Andra's most visible challenge with regard to radioactive-waste management, the Agency keeps receiving very-low-level waste at its Morvilliers facility as well as low-level and intermediate-level waste at the Centre de l'Aube Disposal Facility. Operating procedures are consistent with a continuous-improvement policy in accordance with Andra's quality processes. A large number of studies are carried out in parallel to the operation of the disposal facilities in order to assess acceptance conditions regarding non-standard waste packages that were not taken into account during the design stage. Over recent years, that was notably the case for reactor-vessel covers from EDF nuclear power plants. Safety models are also constantly updated on the basis of the collected data concerning not only incoming and disposed packages, but also the monitoring of facilities and of their environments.

The Centre de la Manche Disposal Facility, has been shut down for 10 years and is closely monitored by Andra. Monitoring activities do not only cover the environment, but also the covering structures whose purpose is to limit as much as possible any seepage of surface waters through the repository structure. Periodical re-assessments are also carried out on the site.

The next disposal facility to be commissioned will be dedicated to radium-bearing and graphite waste. The search for a suitable site, together with the design and construction of the facility, must be completed in time for the first waste packages to be processed in 2013.

The quality in the implementation and operation of surface structures represents an essential showcase for Andra in order to reinforce confidence in its more ambitious projects relating to deep geological disposal. Information and communication, being one of the Agency's explicit missions besides its industrial and research missions, has always been an integral part of all Andra projects. Their varying scientific, technical, social and political scopes require that they be introduced, explained, discussed both at the local scale around every site and at the national scale where decisions are taken concerning every citizen who consumes electricity or services involving radioactive substances. The efforts dedicated to communication, training and the dissemination of the scientific and technological culture pertaining to radioactive-waste management, and to the promotion of Andra's know-how abroad are also prescribed in the *Planning Act of 28 June 2006*. Those constitute essential conditions for the success of the new projects thanks to the sharing and enactment of Andra's approaches by all stakeholders who, at one point or another, are likely to express their views.

Since the *Planning Act of 28 June 2006* has been published, it has been presented and explained to the public and all stakeholders. In the same time, ANDRA has detailed its research programmes and published it [6]. Those detailed programmes have been submitted to the authorities, at the national as well as at the local level. The new drilling jobs and seismic survey in the Bure region have started without any opposition, since the objectives of the campaigns were explained to the stakeholders and to the public. A real contribution to confidence building has been the publication of the first edition of the National Radioactive Waste Management Plan was published at the beginning of 2007 [5]. This had shown that request from the public during the first Public Debate were taken into account and was followed by concrete, transparent and clear production.

On the side of the integration of the project to the territory, a High level committee was installed and started its work. Major industrialists from nuclear activities have initiated the implementation of new activities in the region. AREVA has built and operates a new documentation and archives centre in the Bure region. EDF is also working on a similar project and also plans to install an important workshop and storage for spare parts of the nuclear power plants. A regional initiative was also introduced to support the public saving energy and developing use of renewable sources. The French Atomic

Commission is willing to install a pilot plant to produce biofuels with a new process based on agricultural waste locally generated.

Next step is now to introduce the new information and consultation programme. It has been finalized with the advice of a dedicated committee for which specialists involved in local projects development have been appointed, from France and from foreign experiences. It was submitted to the National Review Board and will now be submitted to the local information committee in the Bure region. The first step of this programme will be to consult the public on the proposed consultation scheme. Once agreed with the stakeholders and the public, discussion can take place on clear technical, scientific, political and social grounds, with the aim of reaching the next National Public Debate end of 2012, this time for a construction project of the deep geological repository.

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