

Low and Intermediate Level Short Lived Waste Disposal in France: Improving Confidence - 15254

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ABSTRACT

Thanks to the significant reduction of waste production and according to forecasts derived from the French National Inventory of Radioactive Materials and Waste issued by Andra, Centre de l'Aube disposal facility should be able to accommodate low and intermediate level short lived waste generated by all presently operated or decided nuclear facilities in France. The facility could then be operated till 2050-2060. Andra has to maintain the facility up to date and to adapt it to meet waste generators needs, in particular needs related to decommissioning works. Its safety is assessed by periodical safety review and confirmed by an environmental monitoring program. Safety also relies on an acceptance process that takes benefit from 20 years of experience and must now be adapted to the management of decommissioning waste. Confidence by local communities is maintained through a permanent dialogue.

INTRODUCTION

Centre de l'Aube disposal facility is dedicated to low and intermediate short lived waste. It started up in 1992 and has now been operated for more than 20 years. Initially planned for 30 years of operation, its operational time scale considerably increased thanks to efforts performed by waste generators to reduce waste production (by a factor of 2 in comparison with the design flow). Indeed at the end of 2013, the already disposed volume is 280,000 m³ of waste packages for a capacity of 1,000,000 m³. According to forecasts derived from the French National Inventory of Radioactive Materials and Waste issued by Andra, this capacity should be sufficient to accommodate operational and decommissioning waste generated by all presently operated or decided nuclear facilities. The facility could then be operated till 2050-2060.

Such duration implies continuous efforts to keep the facility up to date and to maintain confidence on its ability to provide the expected services. The confidence has to be brought to the customers of the facility, the waste generators, to take into a consideration evolving needs. It has to be brought to the regulatory bodies by demonstrating the level of safety provided as well during operation and in the long term. It has also to be brought to the public who wants to see evidence of the absence of impact of the repository.

KEEPING THE FACILITY UP TO DATE

A stringent maintenance program and refurbishment of some equipment

As for any facility the expansion of the duration of operation from 30 years to 60 years needs the implementation of a strategy to keep a good level of availability for equipment. This strategy deals with a stringent maintenance program to be coordinated with the operation program. It also deals with the renewal of



Figure 1: general view of centre de l'Aube disposal facility

some ageing equipment when its maintenance does not become relevant, for instance because spare pieces are too difficult to be provided.

The handling tools are major components of the facility. The robustness of their design enables to maintain them as they are “first of a kind equipment” and still complies with the industrial needs of the facility. In contrast the supervising system of the control room, which had a design of the end of the eighties, was refurbished in order to provide better ergonomics to the operators, even if the computers feeding the system have been maintained because of a high level of reliability.

Preserving disposal space



Figure 2: changes in the design of disposal vaults. In the background first generation separate vaults, in the foreground grouped vaults on a single bottom slab

To maintain the capacity of 1,000,000 m³, Andra constantly has been keeping care of saving as much as possible the disposal space. The design of the disposal vaults was indeed changed from separate vaults to grouped vaults on a single slab in order to densify disposal.

A cautious management of forecast of deliveries is also performed to optimize filling of the disposal vaults, due to the variety of waste packages shapes (more than 10) that are accommodated. This is performed to the procedures that could have been practised now for more than 20 years to plan deliveries on an annual

basis and on monthly basis in order, not only to optimize the use of disposal space, but also to comply with safety requirements related to the distribution of the radioactive content of waste packages in the disposal vaults.

Fitting with customers ‘needs

Frequent meetings involving Andra and waste generators are organized. Their purpose is to achieve an overall optimization in waste management, to find a good balance between operation and investments to be performed on the generator’s site or on the disposal site. For instance modifications of equipment and operating modes were done to increase the standard specified maximum dose rate for some packages in order to avoid the construction of a new storage facility for these waste packages in the generator’s site.



Figure 3 : disposal operations

Thanks to the flexibility of the facility, new disposal services have been proposed to Andra’s customers for large disused components. This opportunity also enables an overall optimization in the selection of

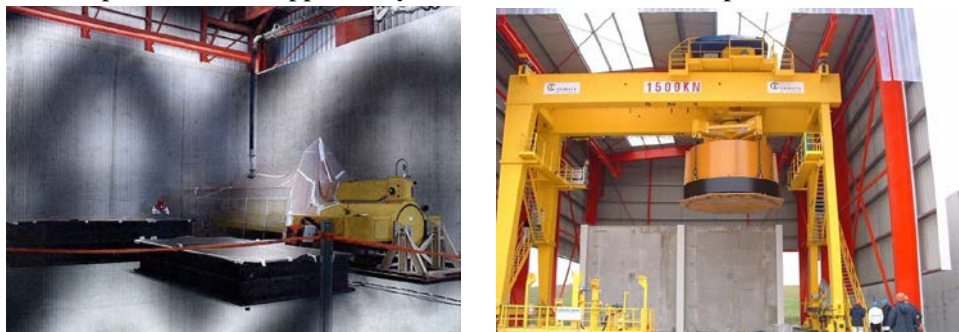


Figure 4: disposal of a large disused components: a remote handling system from a pilot reprocessing plant, vessel head of PWR reactor

decommissioning modes, of conditioning processes, of transportation and disposal modes.

A continuous improvement of the acceptance system

The safe management of waste packages relies also on an acceptance process that has improved since the start-up of the facility. The acceptance process is based by a qualification of waste forms and conditioning processes by Andra to assess conditions of compliance with waste acceptance criteria. QA/QC system implemented by the waste generator must ensure then that the industrial process will produce waste packages similar to the qualified package. Confidence is obtained on the capacity to produce waste packages that can be accepted at Centre de l'Aube.

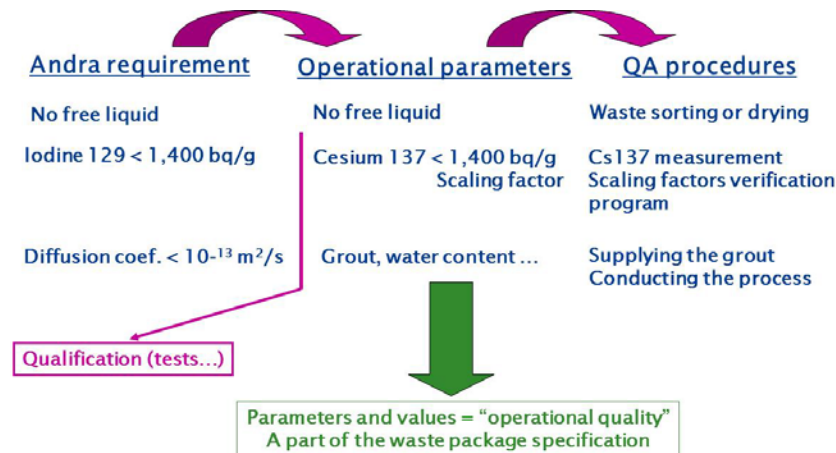


Figure 5: the acceptance process

Confidence is maintained through periodical inspections by Andra in the waste generator's facilities as by destructive and non-destructive tests on sampled packages at delivery. According to a continuous improvement process results of these tests and inspections are periodically disclosed to waste generators, and also to the regulatory body.

This methodology is easily implemented for operational waste as they result from repeated processes. It is being adjusted to meet the needs of reactivity for decommissioning works.

To improve the flexibility of destructive tests of waste packages that are presently subcontracted, Andra is constructing a new workshop in Centre de l'Aube to perform on site these tests. Start up is planned in 2016.

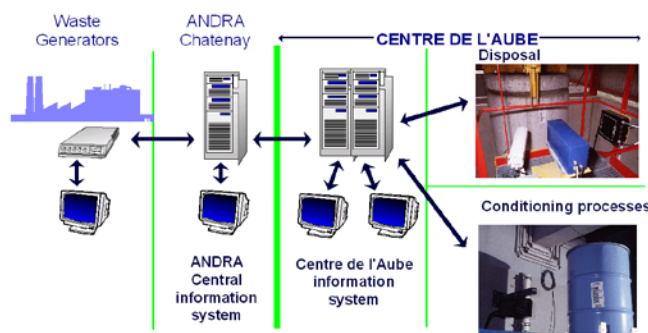


Figure 6 : waste packages tracking system

According to its safety concept, the facility should not lead to any significant hazard due to its radioactive content after a few hundred years (300 years with respect to the French applicable regulation), it has to comply with limitations related the long lived radioactive content of waste packages. This issue is dealt through the acceptance process of waste packages. It is also managed by a stringent follow up of the radioactive inventory of disposed waste by a waste tracking system.

Furthermore a cautious management has to be performed for radionuclides as tritium that are difficult to be contained in packages and vaults that use concrete as a barrier. For tritiated waste generated by the ITER facility, a decay storage facility will be implemented.

PREPARING THE CLOSURE OF THE DISPOSAL FACILITY



Figure 7: test model of the capping system

Even if the closure of the facility is postponed, Andra takes benefit of the new expected planning to collect information for the construction of the capping system that will ensure the safety of the repository during the institutional control period. A scale model of the capping system had been implemented in 1995 in the facility. Tests are currently performed to assess the behaviour of the materials (clay in the case of Centre de l'Aube). This scale model can be located inside a shelter where it is possible to simulate climatological changes (sequences of rainy and dry periods). These studies are feeding the design and qualification of the capping system and enable further optimization.

ENSURING THE SAFETY OF THE FACILITY

Periodical reassessments

The safety of Centre de l'Aube disposal facility requires a stringent management of waste packages that can be accepted in the facility. This relies first on the development of waste acceptance criteria that have to take into account new needs by waste generators (new waste forms or conditioning modes) and the results of the periodical safety reviews performed by the regulatory body (2 formal complete safety reviews (1996, 2006) and a planned review in 2016). These safety reviews integrate lessons learned on the behaviour of the components of the disposal facility, in particular waste packages. A continuous program of R&D is carried on.

Monitoring the impact of the facility

The efficiency of containment is confirmed by a significant environmental monitoring. A comprehensive program has been implemented and results are submitted to the regulatory body. The present potential impact for a theoretical critical group is about 10^{-3} $\mu\text{Sv}/\text{year}$ including gas discharges from conditioning workshops. Results are published on the internet site of Andra.

LOCAL INTEGRATION

Andra also currently presents these results at meetings of the Local Information Commission of Centre de l'Aube. Local communication is indeed considered by Andra as a key point for the operation of a disposal facility and transparency must be achieved.

The Local Information Commission subcontracted independent environment measurements inside and outside the facility in 2009 and 2013. They confirmed data provided by Andra.



Figure 8 : « open gates » day

In addition the public can visit Centre de l'Aube during the operating days; once a year an "open gates" day is organized when the public can freely visit the different areas of the facility and get explanations by the workers of the facility. Visitors can so get information about the processes of the facility to ensure short and long term safety.

CONCLUSION

After 20 years operation, Centre de l'Aube disposal facility is managed by Andra as a scarce resource. It has to be maintained with a high level of safety and continuously kept up to date in order to meet the needs of LIL-SL waste management generated by the operation and decommissioning of existing or already decided nuclear facilities in France. For duration of operation of about 60 years Andra has also to pay attention to evolution of concerns of the society at large and evolution of perception related to radioactive waste management.