The Cires Facility in Morvilliers: from a VLL Waste Disposal Facility to the Development of Industrial Activities - 15252

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ABSTRACT

The disposal facility of CIRES for very low level wastes was designed to provide safe and cost effective services to waste generators, in particular for decommissioning works. The facility could significantly increase waste annual deliveries to meet waste generators' needs and accommodate large disused components as PWR steam generators after decontamination. However an anticipated saturation of its capacity is foreseen as needs for disposal has doubled since its start-up. The geometry of the cells was optimized and the technical capacity of the repository is presently by 40% above its licensed capacity. Saturation has been delayed; however a new facility will be necessary by 2030 and other waste management options are to be considered as recycling of metallic wastes or crushed concrete rubble.

CIRES facility also became Andra's industrial platform for the management of institutional wastes. A grouping and a storage facility have been built and a new processing facility should start up in 2016.

INTRODUCTION

The "industrial facility for grouping, storage and disposal" (called Cires in French) is located in the Eastern part of France, in the village of Morvilleirs in the Aube prefecture. Its area is approximatively 45 ha. The facility was initially licensed as a disposal facility for very low level waste by a prefectural order in June 2003. Disposal operations were licensed for a period of 30 years and up to a capacity of 650,000 m^3. This order was modified in February 2012 to authorize grouping and storage of waste from small producers (institutional waste from hospitals, laboratories, research centers…).

Figure 1: general view of CIRES

Figure 2: very low level waste

THE DISPOSAL FACILITY FOR VLL WASTE

The objective of the disposal facility was to provide a safe and cost effective solution to manage the very low-level radioactive wastes generated by French facilities. These wastes are mainly very low contaminated earths, rubble, scrap metal, etc., generated by the decommissioning or operation of nuclear facilities or by conventional industries using naturally

radioactive materials. VLL waste can also be generated by the clean-up and remediation of legacy sites polluted by radioactivity, for which Andra is responsible for the remediation as a part of its public service role.

The level of radioactivity is in the range of 10 Bq/g. However the specific regulation in France does not authorize clearance in nuclear facility but request the implementation of a waste zoning; therefore a part of these wastes are just potentially radioactive. According to the National Inventory of Radioactive Materials and Waste that was issued by Andra, the amount of VLL waste in 2010 (360,000 m^3) was about 27% of the total volume of radioactive wastes generated in France but should be in 2030 about half of the whole generated volume (1.3 of 2.7 million of m^3). In terms of activity it is less than 0.01% of the total radioactivity of French radioactive waste.

Design and Operation of the Disposal Cells: Securing the Availability of Disposal Cells

VLL wastes are disposed of in cells excavated in a layer of clay with a thickness of more than twenty meters. Emplacement of wastes is protected from rainwater by a mobile roof to prevent leaching. In case of infiltration a sand layer above an HDPE membrane can collect water to monitoring wells. Leachates can be pumped from these wells. This mobile roof is also used for the protection of the construction of the cells.

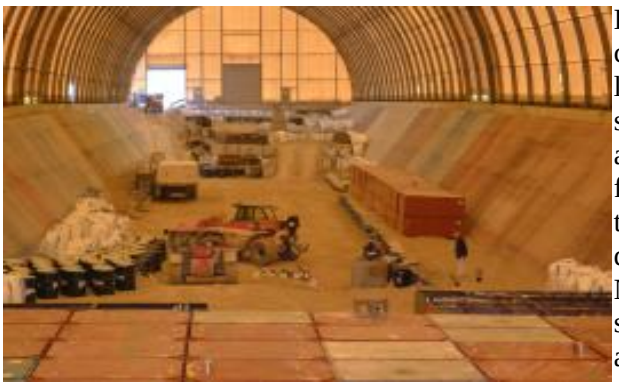

Figure 3: disposal operation

Disposal operations are performed by standard cranes. Wastes are piled up by layers and in each layer voids between waste packages are filled with sand. Initially the estimated annual deliveries were around 22 000 m^3, based on the waste producers' forecast. However, very soon after the start-up of the industrial operations, the waste producers annual disposal needs have increased up to 35 000 m^3. Nevertheless, due to the very low activity, no specific protection is required to protect the workers as the radioactive labile content of wastes is contained inside the containers (big bags, drums…). Indeed the maximum dose to workers resulting from disposal operations is less than 15 µSv/year, with a collective dose less than 100 man.µSv.

The availability of cells is an important issue. Any external event that can delay may jeopardize operation. In particular the move of the mobile roof from one cell to another can be disturbed by bad weather conditions. Therefore the design of the roof was changed so that handling of the sections of the roof with cranes will be no more necessary and it will be possible using rails for transfers.

Figure 4: the move of mobile roof is presently performed using cranes (on the left). Rails will be used for the move of sections of the new mobile roofs (on the right, Premorail®)

Cells are encapsulated in the HDPE membrane but the long term protection against rainwater is provided by a layer of compacted clay, which is emplaced above the disposal cells. The implementation of the final capping system is performed by campaigns and follows the development of operation on the site.

Figure 5: implementation of the capping system

The CIRES facility can also provide conditioning services for some wastes:

- compaction of metallic wastes or of non-metallic wastes,
- stabilization of hazardous wastes,
- solidification of sludge.

About 35,000 packages are delivered to the CIRES for disposal each year. An acceptance process is implemented to check that waste packages comply with the repository requirements. Regular controls of dose rate and contamination are performed before disposal. Furthermore a control unit was constructed to check on a randomly basis some delivered packages. This control unit was commissioned in 2011. It is divided in two areas:

- the first one is dedicated to the non-destructive testing: weighing, dimensional controls, visual controls, endoscopic controls and radiological check by dose rate or by spectrometry gamma
- the second one is used for “destructive tests”: waste packages are opened and an inventory is performed and compared to waste generator statements.

New Disposal Tools for Decommissioning Wastes

Optimization for the management of large disused components is an important issue. Present disposal techniques enable disposal of large pieces at CIRES, as transportation casks, concrete blocks. This option may avoid cutting costs or dose rate to workers. Recently 4 steam generators from the decommissioning of Chooz PWR power plants have been decontaminated to achieve a very low activity and have been disposed in the present standard cells.

However, such operations are more and more difficult to be performed due to the increasing flow of waste packages. Considering the amount of large disused components to be disposed of, Andra decided to build a dedicated cell with specific equipment and handling tools. This dedicated cell should be commissioned in 2016.

Figure 6 : disposal of steam generators

Facing Increasing Needs

VLL waste generation forecasts nearly doubled since the start-up of the facility. Present disposal needs for 2030 are 1,300,000 m^3 according to the National Inventory of Radioactive Materials and Wastes issued by Andra in 2012. The saturation of the capacity of the facility is anticipated. Since 2007, a significant effort has been done by Andra in order not only to increase deliveries but also to improve the use of the disposal area. Changes of the geometry of the cells could be licensed:

- length of cells was doubled and the volume of one access ramp could be used for disposal,
- the depth of cells was increased,
- the slopes were made steeper.

As a result, the technical capacity of the repository is considered now by 40% higher than its licensed capacity. It provides an opportunity to delay the saturation of the facility. However a new disposal facility will be needed and some alternative options to disposal have to be considered in the framework on the French regulation as recycling of metallic waste in the nuclear industry or reuse of crushed concrete rubble as backfilling materials in the disposal cells.

NEW INDUSTRIAL ACTIVITIES IN THE CIRES FACILITY

Since 2012, the CIRES facility has become an industrial platform which includes new activities dedicated to small producers (institutional wastes):

- grouping of collected wastes from small producers. Andra is currently collecting about 80 tons of rough wastes (solid wastes, liquids, laboratory animals…) in 3 000 packages from 1300 customers (most of them from health services or health research centers). Packages are grouped in a specific facility at CIRES before being dispatched to the relevant conditioning routes (incineration, compaction…) or to storage.
- Storage of waste for small producers if these wastes do not have presently a disposal solution. This is the case for long lived low level wastes or for long lived intermediate level wastes, in particular for old medical items using radium, smoke detectors, lightning rods…

Andra plans to start-up in 2016 a new facility to process collected rough wastes: grinding of scintillation vials, dismantling lightning rods, conditioning spent sealed sources… The public inquiry will take place in early 2015.

Figure 7: storage facility for institutional wastes

Figure 8: grouping facility on the right and planned processing facility on the left

CONCLUSION

The disposal facility of CIRES for very low level wastes was designed to provide safe and cost effective services to waste generators, in particular for decommissioning works. The facility could significantly increase annual waste deliveries to meet waste generators needs. It could accommodate large disused components as PWR steam generators after decontamination. However an anticipated saturation of its capacity is foreseen, as needs for disposal has doubled since its start-up. The geometry of the cells was optimized and the technical capacity of the repository is presently by 40% above its licensed capacity. Saturation has been delayed; however a new facility will be needed by 2030 and other waste management options are to be considered as recycling of metallic wastes or crushed concrete rubble.

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