



Cemented waste package in the solid waste storage workshop (EDS: *Entreposage des déchets solides*) at the Areva NC (Cogema) plant, at La Hague (Manche département).

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I. THE GROUNDWORK OF CURRENT SOLUTIONS

Today, the groundwork laid down by research has made processes available for the durable treatment and conditioning of all types of radioactive waste. The case of France, a leader in terms of practice as in the field of research, as regards the management of nuclear materials, is particularly significant in this respect. While there is an overall inventory of one million cubic meters of radioactive waste, some 95% of that volume is low-level, or even very-low-level, waste. Indeed, no less than 99.9% of total radioactivity is concentrated in the remaining 5% of waste, coming, as a whole, from the reprocessing of spent fuel from EDF power plants, this yielding some two thirds of the waste from the entire nuclear power industry. Management of this dominant stream goes hand in hand with that of older, legacy waste, some of which is markedly different in composition, owing to a large number of experimental reactors, and reactors from the first generation of pathways that were explored in the early days of the nuclear age. To which should be added management of waste from other installations, be they civilian or related to defense work, since practices are identical in both sectors. Generated by the operation, decontamination, and then decommissioning of such installations, this waste comes on top of that from other radioactive waste-generating sectors, mainly industry and medicine.

Spent fuel reprocessing, in effect, yields most of the long-lived, high-level waste. Conditioning of such waste has been optimized, resulting in considerable reductions in the volume of solid waste produced at La Hague, and leading to standardization of the durable radioactive waste packages fabricated, precluding any dispersion of their radioactive content, and facilitating long-term management, when this is deployed. From the outset, in France, nuclear power has been associated to optimization of radioactive waste management, taking the form of the characterization, sorting, and recycling of recoverable, energy-rich materials, together with the reduction, conditioning, and storage or disposal of ultimate waste.

Such management has been carried out in a context of constant advances, to which CEA's contribution was decisive, in a process marked, in particular, by the curbing of waste volumes, as illustrated by the French national inventory of radioactive waste and recoverable material.

In every one of these management processes, one component recurs: the package. This word is misleading: a radioactive waste package is no mere "packing case," rather it is a high-tech object, with the remit of playing an essential part in the confinement of radioactivity. Active radionuclide content only accounts for 15%, on average, of its mass, the remainder – mainly comprising the appropriate matrix for the waste in question, together with a container – accounting for some 85%.

This confinement function is carried out by the package, solely at first, after fabrication of the waste, and jointly, thereafter, with further barriers, during storage and, as and when applicable, disposal.