

AN INTEGRATED APPROACH TO RADIOACTIVE WASTE MANAGEMENT

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Our generation must be responsible for managing the radioactive waste already generated or arising during its lifetime in an effort to protect both human health and the environment. This demands an integrated approach allowing for all parties involved to assume their responsibilities and for the related negotiations on acceptable risks to take place.

It is essential to ensure that all radioactive waste is managed and accounted for irrespective of its activity level. Therefore, an accountable and predictive reference inventory is currently being developed. Its purpose is to allow all stakeholders to have access not only to the physical characteristics and status of the various types of waste, but also to an estimation of the waste produced by existing industrial plants (“committed waste”).

The French waste classification relies on two parameters: a 30-year half-life threshold (to distinguish between short lived and long lived waste) and a four-tier activity level (very low, low, intermediate and high).

Short lived **low and intermediate level waste** represent 90% of all radioactive waste generated in France. The first disposal facility was commissioned in 1969 and remained operational until 1994. Today, a second disposal facility, the *Centre de l’Aube*, is capable of accommodating one million cubic metres of waste.

Very low level waste consists mostly of rubble and metal scrap resulting from the dismantling of facilities. ANDRA is currently engaged in negotiations for the construction of a repository near the *Centre de l’Aube* for a further capacity of one million cubic metres.

The case of **long lived low level waste** is important, but is not as far advanced. This waste consists of contaminated soil, residues from the rare-earth processing industry or from various radium-bearing items, and graphites produced by previous nuclear power plants. The total volume may be estimated at approximately 300 000 m³. A subsurface design in clay is being considered.

The case of **long lived high level waste** is more specific. In France, the existence of a significant reprocessing system means that several product types have to be taken into account: unprocessed spent fuels (including MOX fuels - approximately 3000 t), packages of vitrified fission products (5000 m³) and various types of technological waste (50 000 m³).

Three research areas were prescribed by a law passed in 1991 which defined the main research paths for radioactive waste management: (1) partitioning and transmutation, (2) disposal in geological formations, particularly through the implementation of underground laboratories, and (3) packaging and storage processes.

Those three areas are complementary both technically and chronologically. Current advances concerning partitioning and transmutation open up the way to safer specific packaging types and repositories, storage proves useful prior to geological disposal and package quality is the prime focus of any safety demonstration. Research on the reversible-disposal option selected by the French Government is proceeding together with investigations on monitoring devices required for storage.

The law is subject to parliamentary review by 2006.

Following consultations conducted by the Member of Parliament, Christian Bataille, the French Government asked ANDRA in 1994 to investigate three potential sites. In December 1998, the Bure site straddling the Meuse and Haute-Marne *départements* was selected for the implementation of the first French site-qualification laboratory in a clay formation. Construction is under way and experiments should start in 2002. ANDRA hopes that many foreign scientists will participate in the work to be conducted in that laboratory.

In December 1998, the Government decided to pursue investigations for a site in a granitic formation. New consultations were started at the end of 1999, but were interrupted owing to the strong opposition encountered at most sites being investigated.

The Government “reiterated its firm resolution to pursue all research areas on the back-end of the fuel cycle in accordance with the areas prescribed by the law of 1991 and, particularly, on investigations concerning reversible disposal in deep formations on two different geological sites”.

Following the problems encountered during the granite investigations, the Government stated that “conditions for the continuation of research work on granite will be examined taking due account of the proposals contained in the report submitted by the three mission members”. It also stated that “a more general reflection will be undertaken concerning the terms and conditions for both public consultation and information on the back-end of the nuclear fuel cycle”.

The objective is to define, through negotiation, what kind of residual risk we are ready to accept collectively and what corresponding burdens we are ready to accept for ourselves and future generations. The political dimension of the issue is quite obvious and may not be reduced to a mere business transaction. The debate must therefore be carried out in a difficult context taking into account the extreme sensitivity of the public on all matters relating to nuclear energy and to the pending confusion generated by the issues at stake on the future of nuclear energy.

It is a problem not only at the national level at which specifications must be negotiated for the selection of a site, but also at the local level due to the considerations involved in land use and development. It requires close interaction between both levels.

The management of radioactive waste is currently being conducted under exceptional social control and may therefore provide a model for managing industrial risks in modern society.