

Clean-up and dismantling of nuclear facilities



At the end of their service life, nuclear facilities undergo clean-up operations which lead to decommissioning after dismantling operations.

Clean-up consists in eliminating :

- dangerous substances: radioactive materials, chemical products ;
- radioactivity in certain parts or equipment items of the facility ;
- if necessary, light equipment: laboratory furniture, small glove boxes, analysis instruments, etc.

Dismantling consists in :

- disassembling and removing large-scale process equipment ;
- eliminating traces of radioactivity in all facility enclosures.

Radioactive waste resulting from these operations are transported to the final disposal facilities of ANDRA (French National Agency for Radioactive Waste Management), in particular the surface disposal facilities in the department of Aube in eastern France. Waste to be disposed in the future deep geological repository are temporarily stored on sites.

Radioactive materials differ according to the type of facility :

- from a gaseous diffusion uranium enrichment plant: traces of uranium at varying degrees of enrichment are found in the thousands of diffusers and in the kilometres of pipeline, spread over a very large surface area ;
- from a nuclear reactor: radioactivity is mainly contained in the fuel elements and, to a lesser degree, in the structures near the core that undergo neutron activation ;
- from a nuclear fuel reprocessing plant: radioactivity is present in the dozens or even hundreds of kilometres of pipeline and in the multiple tanks.

Depending on the facility in question, clean-up and dismantling require different techniques.

Until the early 2000s, the IAEA dismantling recommendations called for an approach structured around three final levels that could be reached successively. The new 2000 IAEA approach no longer sets forth general rules, but instead simply defines the notions of immediate dismantling and deferred dismantling.



For each dismantling programme, the operator submits an application to the safety authority that specifies :

- the dismantling stages, their progression and the associated safety reports ;
- the final state of the facility and site after dismantling ;
- the methods for controlling the risks and environmental impact of the operations, as well as how the resulting waste will be managed.

Following an in-depth technical review, the safety authority grants the operator permission to proceed with clean-up and dismantling.

Implementation of CEA's dismantling projects is based on the following principles :

- immediately perform radioactive clean-up work as an extension of facility operation, in order to leverage the experience of operating teams that are still needed at this stage ;
- immediately begin dismantling if no advantage can be gained from radioactive decay ;
- postpone dismantling if the facility contains only short-lived radioelements and if the radioactivity can be effectively contained (radioactive decay will reduce doses and waste) ;
- depending on the fate of the buildings and sites, dismantling of structures and civil engineering works may be considered.

These principles are linked to the aim of minimising the doses received by workers, to strict control of the environmental impact and to rigorous compliance with nuclear safety requirements, as regulated by the safety authority.

Waste from clean-up and dismantling are sent to existing or future disposal facilities. One of the two disposal sites currently in operation in Aube handles very low-level waste; the other handles low- and intermediate-level waste.

The law issued 28th June 2006 makes compulsory creation of a graphite waste repository (planned for 2019), and a deep geological disposal facility in 2025. All waste classes will then have an outlet. Safe storage facilities have been set up until waste can be sent to these future repositories.