

Dismantling, Decontamination and Waste

Context

The expert group Dismantling, Decontamination and Waste is responsible for the decontamination and decommissioning of the obsolete nuclear installations of SCK•CEN, the efficient management of its nuclear waste and technical liabilities.

In 1989 SCK•CEN launched its program on site remediation which is financed by two funds. The fund financed by the Government covers the back-end of nuclear material and the decommissioning of the installations existing before 1989. An SCK•CEN internal fund secures financial support for the management of nuclear materials and the decommissioning of installations in service from 1989 on.

The clean-up programme mainly concerns the dismantling of Belgian Reactor 3 (BR3) and four laboratories. Management of nuclear material and in particular irradiated fuel of research reactors is also part of our program.

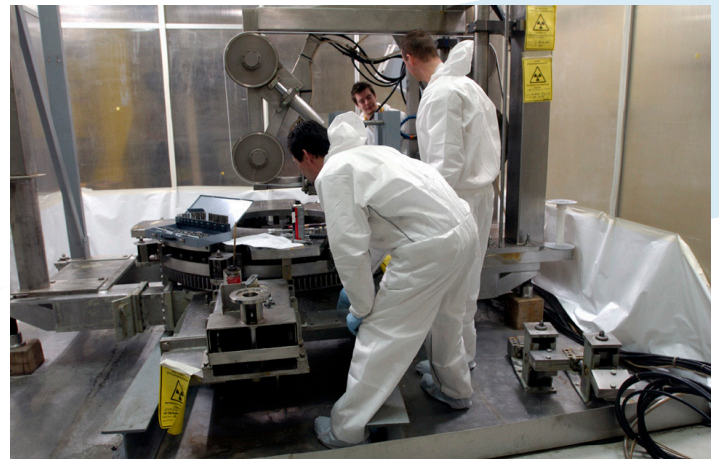
The expert group has also developed, at pilot and laboratory scale, various processes to treat wastewater, tritium (H³) containing waste and contaminated Na/NaK as to recover boron from the cooling water of PWR power reactors. It was recently tasked with the clean-up of non-nuclear experiments and installations containing toxic or hazardous materials.



Dismantling of Belgian Reactor 3 (BR3) in a ventilated booth.

Objectives

The main objective of our decommissioning and waste management programme is to ensure, as safe and as cost-effective as possible, a clean and safe environment to future generations. To achieve this goal, we develop tools, technologies, processes and procedures for dismantling, decontamination, characterization and waste reduction. We pay particular attention to the prevention and reduction of waste during the entire lifetime of nuclear facilities, i.e. from their design through their decommissioning. We valorise our expertise in decommissioning and waste management by making it available for other nuclear industries. We also organize training and workshops.



Cutting parts of BR3 with a saw.

Main activities

Integrated management of radioactive waste assumes a management that starts well before the production of waste, and ends by its transfer to the Belgian Agency for Radioactive Waste and Enriched Fissile Materials (ONDRAF/NIRAS). This implies the development of a policy of prevention and minimization of waste production, a detailed inventory and a thorough characterization. Data regarding waste streams, estimated production and quantities already removed is saved in a software tool that we call DRAB (Database Radioactive Waste Management).

Management of nuclear materials is subject to a strict framework of accounting and reporting to the authorities. To fulfil its legal obligations, SCK•CEN has developed a specific application for this purpose called NMA (Nuclear Material Accountancy).

Along with the management of nuclear materials and radioactive waste, the expert group is responsible for the clean-up of old installations of SCK•CEN and the site itself. This requires the drawing up of a decommissioning plan, the establishment of a safety programme and a study of the impact on the environment and on Europe, a declaration as meant under article 37 of the Euratom treaty. Software was developed to calculate the decommissioning costs of an installation. This tool is based on multiple databases.

The BR3 decommissioning project started in 1989 with a full system decontamination of the primary loop and of associated circuits followed by the dismantling of the internals and the reactor vessel. The dismantling of all components of the primary circuit and the reactor is completed.



Outside view of Belgian Reactor 3 (BR3).

Currently, the infrastructure is decontaminated. Decontamination techniques and processes are required for the protection of workers, the population and environment. To realize this, we invested in sandblasting techniques and chemical decontamination of metal parts (MEDOC). Our expertise in decontamination is not limited to the decontamination of metals, it also covers the decontamination of concrete. In the past, four laboratory buildings of the SCK•CEN were fully decontaminated and cleaned before being transferred to a non-nuclear institute for unrestricted reuse. In addition, we daily run decommissioning activities in other SCK•CEN facilities. This means essentially dismantling of hot cells, glove boxes or old experiments to make room for new R&D projects.

Radioactive waste minimization, recycling and reuse of materials generated by decommissioning activities require characterization tools coupled with modelling of physical phenomena. This is particularly the case for characterization, decontamination, and release of infrastructure materials (e.g. concrete).

Recently, our clean-up activities were extended to the dismantling of experiments and non-nuclear equipment containing toxic or dangerous products.



Chemical decontamination of metal parts (MEDOC).

Services

We put our know-how, computerized tools and developed technologies at the service of the nuclear industry. Our tool for nuclear material accounting is being applied by the JRC's (Joint Research Centre) and Belgonucleaire. We participate in unloading the THETIS reactor at the Institute for Nuclear Sciences (Ghent University) and its decommissioning and also in the decommissioning of the Belgonucleaire MOX factory. We have performed an ALARA study for an intervention in the HFR reactor in Petten (NL) and an intervention to characterize the effluents tanks for the National Institute for Radioelements (IRE, Fleurus, Belgium).

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