

Nuclear Decommissioning Programme at the Joint Research Centre

10 years of progress



Ispra, Italy



Karlsruhe, Germany



Petten, Netherlands



Geel, Belgium

The role of the European Commission's **Joint Research Centre (JRC)** is to provide scientific and technical support to the European Union policies. The JRC was originally established under the Euratom Treaty in 1957. Euratom's mission is to promote nuclear safety and security in Europe and the JRC has been contributing to this aim with its research activities.

Over the years the JRC has expanded to embrace other fields important for policy making, such as life sciences, energy, security and consumer protection. The JRC was transformed from a pure nuclear research organisation to a broader, research-based policy-support organisation. Nuclear activities today represent roughly 30% of the JRC's overall portfolio.

The **JRC decommissioning programme** started in 1999 with the goal of dismantling former, obsolete EURATOM nuclear installations (historical liabilities) and of integrating the long-term dismantling planning of installations which are still in use (future liabilities). The programme also addresses the treatment of waste accumulated in the past and waste arising from the dismantling operations.

Because of the scale of the programme, the European Commission reports regularly to the Council and European Parliament on the progress.

The JRC Decommissioning Plans

Depending on the site, the decommissioning programme aims at several of the following objectives:

- ▶ the construction or renewal of **facilities** in order to characterise, treat, condition and temporarily store waste arising from the dismantling operations;
- ▶ the retrieval, characterisation, treatment and conditioning of existing **waste**;
- ▶ the removal, treatment and disposal of unused **nuclear materials** (nuclear fuel and experimental nuclear materials);
- ▶ the **clean-up and dismantling** of installations allowing unrestricted use of the buildings or even the “green field” option, which involves the demolishing of buildings and the restoration of the land in its initial state;
- ▶ the **transfer of waste** to a national site for disposal.

Due to the status of the facilities (obsolete or in operation) and to the respective environment, the Ispra site is engaged in all above objectives. At the three other sites (Karlsruhe, Geel and Petten) most facilities are operational. These sites are currently engaged in fewer decommissioning activities, mainly the removal of obsolete nuclear materials and equipment and the elaboration of detailed decommissioning plans.

The JRC decommissioning projects rely where possible on experience acquired elsewhere in Europe. A major part of the expertise is provided by European contractor companies.

Planning of decommissioning projects, Ispra

Real scale test of the excavation and transport of a historical waste pit (Ispra)

Decommissioning at the different JRC sites



Clean-up within a HOT CELL requires specific protective equipment



Preparation of a GLOVE BOX for dismantling



Placement of a waste package in a gamma measurement station and evaluation of the measurement results



The Karlsruhe site

The Institute for Transuranium elements (JRC-ITU) in Karlsruhe is fully dedicated to research projects in the nuclear field. The current decommissioning projects are related to disused installations, obsolete nuclear materials and waste. The projects are run in parallel with the operation of the research facilities.



The radioactive waste is transferred to the installations of WAK-HDB on the same site, where it is conditioned and temporarily stored, awaiting the future disposal in the German repositories.

Over the last years, the programme covered:

- ▶ as an on-going activity, the decommissioning of old disused installations: about 230 glove boxes were dismantled and several hot cells were cleaned up;
- ▶ the dismantling of several larger installations (e.g. plutonium sintering oven);
- ▶ the installation, qualification and processing of equipment for the characterisation of historical radioactive waste.

Decommissioning at the different JRC sites

The Ispra site

At the Ispra site, most of the nuclear research activities have been stopped, except the cyclotron accelerator and a few nuclear laboratories dedicated to research and training on nuclear safety and security. Six major nuclear installations are currently in the state of 'safe conservation', in view of their future dismantling.



As there is currently no service provider in Italy for the treatment or reception of radioactive waste, JRC builds installations for the waste characterisation, treatment, conditioning and interim storage at its own site, in view of final disposal in an Italian facility. Most of these activities are carried out in a dedicated nuclear area ('area 40').

Over the last years, the emphasis of the programme was put on:

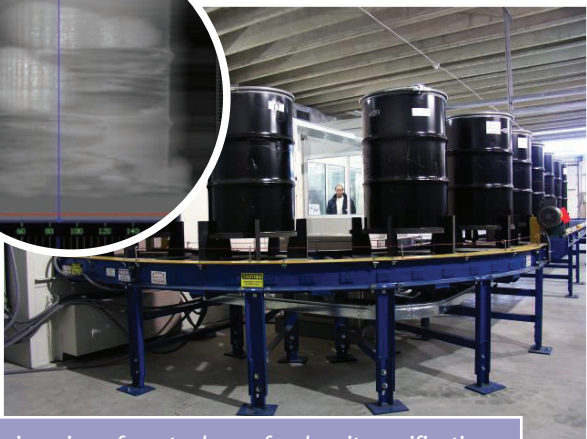
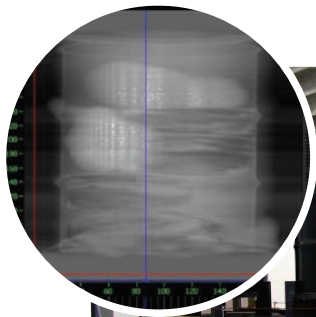
- ▶ the construction and commissioning of facilities to characterise and treat the radioactive waste (e.g. material clearance systems, waste measurement systems, decontamination equipment, a liquid effluent treatment and storage stations, a radio analytical laboratory);
- ▶ the transfer off site of a major part of the obsolete but recyclable nuclear materials to the U.S. and France and the evacuation of disused radiological sources;
- ▶ the radiological characterisation of the nuclear installations that have to be decommissioned and the clearance of disused equipment and work areas.



Liquid waste treatment facility



Radiological clearance measurements

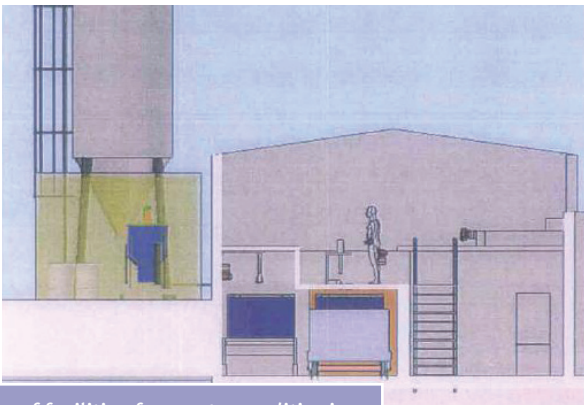
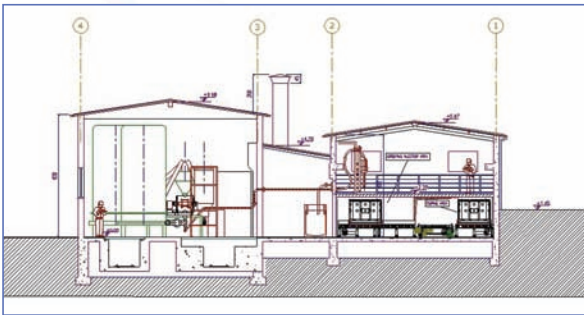


X-ray imaging of waste drums for density verification



Preparation of a transport of radioactive sources

Decommissioning at the different JRC sites



Design of facilities for waste conditioning

Future of the JRC-Ispra Programme

The decommissioning and release from radiological control of a first building (the “Radiochemistry Laboratory” building) has been completed. The building is now being used for non-nuclear research projects.

In the coming years, the focus will be given on:

- ▶ the construction of facilities for the conditioning and the interim storage of the wastes;
- ▶ the retrieval and re-conditioning of historical waste that was stored or buried in area 40;
- ▶ the preparation of decommissioning plans for the installations.

The effective decommissioning of the major nuclear installations will gradually start from 2012 onwards.

Agreement with the Italian Government

In November 2009, Euratom represented by the JRC signed an agreement with the Italian Government represented by the Ministry for Economical Development, concerning the Italian liabilities on the Ispra site. The agreement also addressed other long-standing issues like the waste acceptance criteria and the transfer of the waste to the future Italian National Repository.

According to this agreement, the ‘ownership’ of the Ispra-1 reactor (and the related liabilities) was taken over by the Italian State. The agreement clarifies the situation of the liabilities and improves the certainty in planning and budgeting the long term programme.



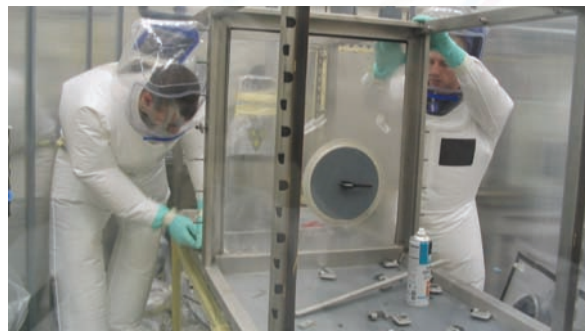
Ispra-1 reactor

Decommissioning at the different JRC sites

The Geel site

The JRC-IRMM in Geel has decommissioned two major installations in 1999-2001:

- ▶ one of the two “Van de Graaff” accelerators was fully dismantled;
- ▶ a chemical laboratory building was released from radiological control and refurbished as non-nuclear building.



GLOVE BOX clean-up and dismantling

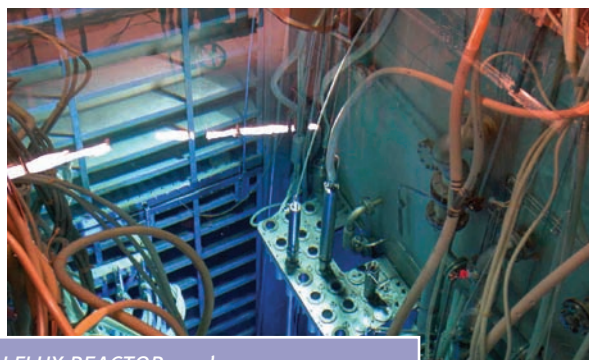
Since then, the focus is more on limited clean-up projects and on the transfer of obsolete nuclear materials to other utilities for re-use.

Two accelerators and three nuclear research laboratories are in operation. For these installations, a future detailed decommissioning plan has been established, as required by the Belgian Regulation.

The radioactive waste is taken over by the Belgian National Institute for radioactive waste (NIRAS).



Inauguration of the de-nuclearised building



HIGH FLUX REACTOR pool



Waste transport

The Petten site



At the Petten site (Institute for Energy, JRC-IE) the nuclear activities are concentrated on the High Flux Reactor (HFR) and ancillary installations. The operation and license of the HFR is under the responsibility of the Dutch company NRG (Nuclear Research and Consultancy Group). However, the HFR is owned by the European Commission, which is liable for its decommissioning. Waste is taken over by the Dutch National Institute for radioactive waste (COVRA).

The refurbishment of the HFR as well as the continuous improvement of the operational practices allow the reactor to operate still for several years.

Over the last years the decommissioning activities were focussed on the evacuation of nuclear fuel to the U.S. and the transfer of historical waste. The shipment of spent fuel was triggered by the non proliferation policy of phasing out high enriched uranium and the commitment to convert the reactor core to a lower enrichment.

The JRC has integrated the future dismantling of the HFR in its overall programme.

Coordination at JRC Corporate level

Steering Committee

The technical and financial progress of the JRC decommissioning programme is monitored by a dedicated JRC Steering Committee, which meets three times a year. Strategic decisions related to the major projects, the overall budget and the policy with regard to contractors and stakeholders are discussed and endorsed by the JRC Steering Committee.



Expert Group

An Expert Group has been set up to provide an external advice on technical and organisational matters related to the decommissioning projects. The Expert Group meets twice a year. The members are nominated by the Board of Governors or the JRC for their expertise in the field of decommissioning. They all belong to European Member States with a nuclear industry.

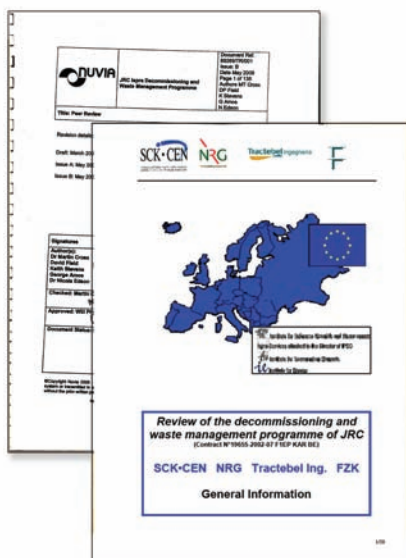


IAEA Convention

The European Commission has adhered to the IAEA 'Joint Convention on Safety of Spent Fuel and Safety of Radioactive Waste Management'. The aim of this Convention is to commit the 'nuclear countries' to progress on decommissioning and waste management. The JRC presents at periodic intervals (every three years) the status of its decommissioning activities.

Periodic Review

In preparation of the communication to the European Parliament, the decommissioning programme has been submitted in 2003 and 2007 to an exhaustive and systematic review. The two reviews were each performed by an external institution, which was selected on the basis of a procurement published in the Official Journal of the EU.





Key figures

Duration of the programme	1999 - 2028
Number of main nuclear installations	11
Overall budget	1,2 billion euro
JRC staff involved	approx. 80 persons
Number of on-going projects	30

Financing of the Programme

The overall budget plan covers the period 1999-2028. The programme is financed through a dedicated line in the budget of the European Commission which currently runs from 2007 to 2013, and not from the research budget.

The budget is annually confirmed by financing decision, based on a detailed planning of the procurements for the year to come.

The evolution of the financial commitments and payments are further controlled on a quarterly basis.

Achievements and Prospects

Significant progress has been made in the execution of the programme over the last ten years. The removal of nuclear materials, the bringing into operation of several waste treatment and characterisation facilities and the characterisation of the large installations to be decommissioned are some of the key advances.

It is known that the JRC had to face challenges due to the complexity or specificity of some projects and the strict internal and external boundary conditions which influence the planning. However, the JRC strategy for improving the overall coordination and mitigating the risks has proven to be effective. It gives reason to be confident for the achievement of the long term goals. The JRC is particularly proud of the excellent track record of safety for its staff and the population concerned, in line with its principles for the programme.

The realisations would not have been possible without the dedication of JRC staff and the contributions from contractors and external experts.

Acknowledgement

The JRC Decommissioning and Waste Management staff dedicates this brochure to the vision, leadership and personal effort of Roland Schenkel, Director General and Chairman of the Steering Committee which he initiated.



David Wilkinson
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and Waste Management Steering Committee
Joint Research Centre



Roland Schenkel
Director General of the Joint Research Centre
(2005-2010)
Chairman of the JRC's Nuclear Decommissioning
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