



## Radioactive waste disposal

Safe and final disposal of radioactive waste is an ongoing concern for various stakeholders, including the general public. With worldwide several (near-) surface disposal facilities in operation and at the threshold of the first licensed deep geological repositories for spent nuclear fuel, there is a high need for adequate competences in this area.

Based on more than 40 years of in-house experience in R&D on waste disposal and safety and performance assessment calculations, the SCK•CEN Academy offers various training courses related to radioactive waste disposal. A technical visit to the unique underground research infrastructure HADES complements the theoretical classes and exercises. HADES is located 225 m below surface in a plastic clay formation and is managed by the economic partnership EIG EURIDICE together with ONDRAF/NIRAS.

We offer basic theoretical modules complemented by hands-on exercises and a technical visit to the HADES underground research laboratory, as well as advanced training courses dedicated to safety and performance assessment and the latest advancements in reactive transport modeling.

### Available modules

#### Basic science modules

- Conditioning, characterization and long-term stability of radioactive waste
- Characterization of argillaceous formations: from the pore scale to the regional scale
- THM behavior of clay formations and the Engineered Barrier System (EBS)
- Long-term effects in the cementitious EBS
- Radionuclide dispersion in the geosphere
- Uptake and transfer of radionuclides in the biosphere

#### Regulation and safety concepts

- National and international regulations regarding radioactive waste disposal
- Safety principles and strategies
- Disposal concepts of radioactive waste
- Safeguards aspects and monitoring of a repository
- Public participation approaches

#### Safety and Performance Assessment

- From RD&D to safety case development
- Performance, scoping and screening calculations
- Assessing the long-term safety of a surface or geological disposal facility for radioactive waste
- Environmental risk assessment, the ERICA tool and mixture toxicity

# Visit us at [academy.sckcen.be](https://academy.sckcen.be) for more information



## Advanced training courses, related to geochemical and reactive transport modeling

- HYDRUS-1D for water flow and solute transport
- PHREEQC geochemical modelling
- The YANTRA code coupling chemistry & transport at pore scale based on Lattice Boltzmann formalism and PHREEQC
- Reactive transport modelling for variably-saturated flow and contaminant transport problems
- Simulating water movement and reactive transport using HP1 and HPx
- The use of saturated/unsaturated flow and contaminant transport codes and pathway-to-man models for use in performance assessment

## Target audience

Our courses are targeted towards regulators, plant managers, technical support organizations, nuclear waste management organizations, research entities, and all other stakeholders interested in or working in areas related to waste disposal.

## Lecturers

Courses are given by top-level SCK•CEN scientists and engineers with solid expertise in their research domain. Furthermore, they have followed learning facilitator training sessions and can thus transfer their theoretical knowledge and practical experience to the course participants efficiently and effectively. For some modules, we collaborate with experts from the Belgian Waste Management Organization ONDRAF/NIRAS and the Regulating Authority FANC/AFCN.

## Methodology

All courses are tailored to the needs of the customer:

- The program consists of one or more of the available modules;
- Topics that are not listed above but that are SCK•CEN RD&D subjects can also be offered;
- The level is adapted to the target audience;
- Courses are given in English and Dutch;
- Courses are given preferably at SCK•CEN's premises in Mol (Belgium) because of the availability of the specialized laboratories. Alternatively, if only theoretical classes are involved courses can also be given at the customer's premises.