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## A long-term solution for Belgian category A waste

# SCK•CEN provides scientific input for the surface disposal facility in Dessel

Short-lived low and intermediate level radioactive waste is generated in nuclear energy production, in industry, medicine and research. This 'category A' waste can be disposed safely on the surface without risks to human health – either today or in the distant future. In Dessel ONDRAF/NIRAS, the Belgian Agency for Radioactive Waste and Enriched Fissile Materials, is preparing for the construction of a surface disposal facility: a long-term solution for Belgian category A waste. SCK•CEN is intensively involved in the scientific basis for the security dossier for this installation.

In 2006, ONDRAF/NIRAS commenced the implementation of the cAt project: the integrated project for the surface disposal of short-lived low and intermediate level radioactive waste in Dessel. In order to be able to commence the construction and operation of the disposal site, ONDRAF/NIRAS has to first apply for a nuclear licence from the FANC. ONDRAF/NIRAS is preparing a safety dossier in connection with this licence application, which will be submitted in 2011.

### Safety studies

Several leading domestic and foreign research institutions, engineering and consulting firms are contributing to the formulation of the technical and scientific basis for this dossier. These safety studies investigate different aspects of safety up to the smallest detail. They must show that the disposal installation offers a sufficiently durable and safe long-term solution for the disposal of category A waste.

The SCK•CEN studies focus on the behaviour, the possible release and distribution of radioisotopes. The possible release of trace amounts of radioisotopes from the storage location to the soil, into the groundwater and the biosphere (man and environment) over a period of several hundreds or even thousands of years, will be calculated using models.

### Groundwater

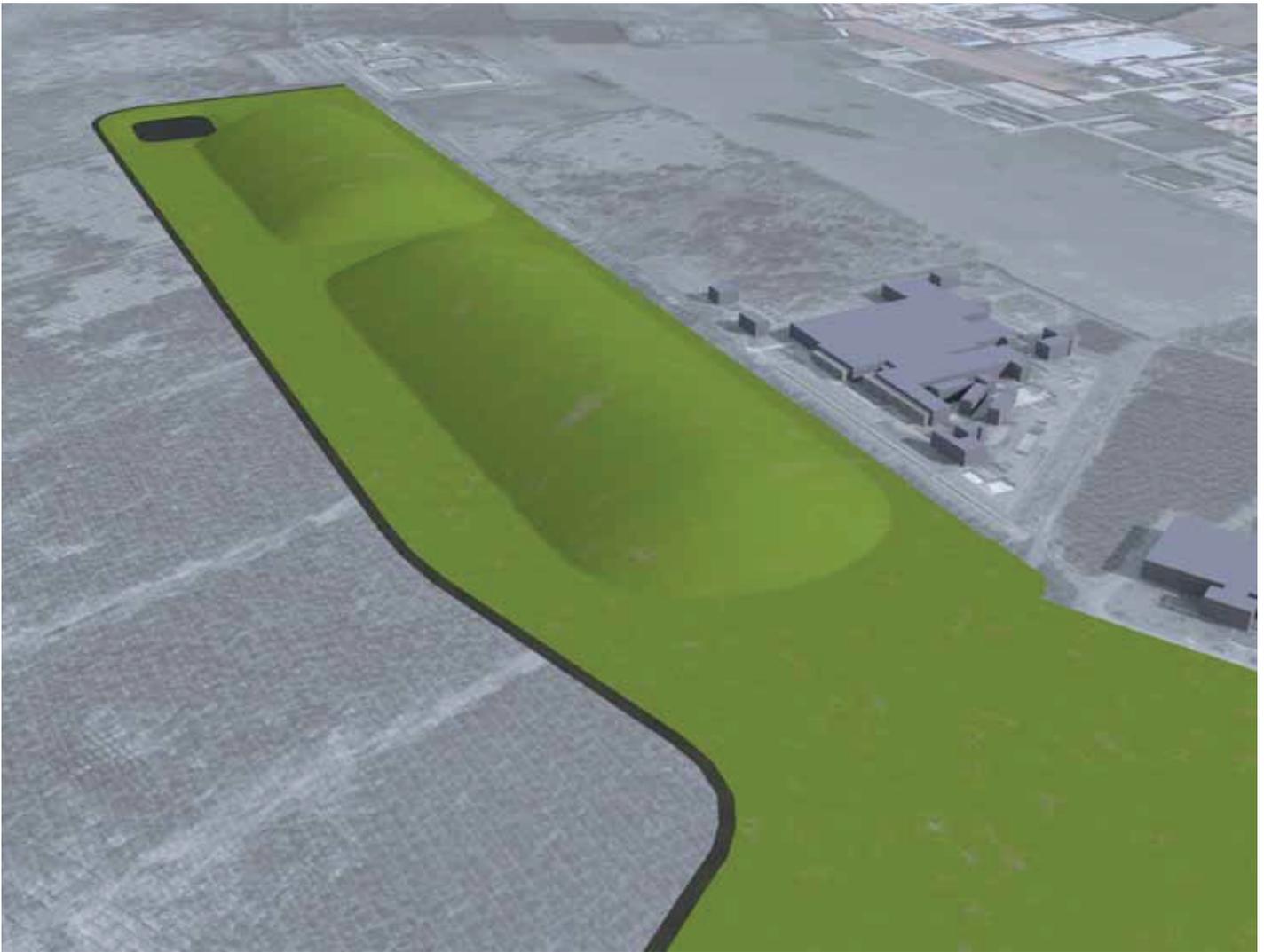
The subsoil in Dessel was surveyed up to many tens of metres depth and has been meticulously stored in hydrogeological models of groundwater movement and isotope transport. The models for groundwater movement can be calibrated by measuring the groundwater in the Mol-Dessel region and far beyond, for more than twenty years. The calibrated models form the basis for calculations of isotope transport in groundwater. These are a vital link for biosphere studies.

With biosphere studies, SCK•CEN surveyed the impact of radiation on living organisms. These studies must demonstrate that humans and the ecosystem are well-protected during the use of the disposal site and thereafter as well.

### Concrete as a key material

The principle of surface disposal is that the radioactive waste is contained and isolated until its harmfulness has decreased to an acceptable level. This ensures that the waste does not constitute a risk to humans or the environment, even in the long term. Concrete plays an important role in this concept.

SCK•CEN is involved in studies to investigate the ability of concrete to remain watertight for long periods. Concrete is also a suitable containment material because it is well adapted to adsorbing radioisotopes. With the help of various international experts, SCK•CEN has determined the absorption of a large number of radioisotopes



↑ *The surface disposal modules confine the category A waste until its harmfulness has decreased to an acceptable level.*

in concrete. Since this material undergoes both physical and chemical changes in the course of time, a model that simulates the absorption of concrete as a dynamic process, was developed.

### The test cover

ONDRAF/NIRAS sets up testing arrangements to confirm the design choices and model calculations for the disposal. SCK•CEN contributed to the design of the test cover, which will imitate the behaviour of the various natural layers in the final cover. Researchers will monitor the materials and processes in the test cover in the long term. These measurements will provide essential data to further refine and validate SCK•CEN's computer models.

“Several leading domestic and foreign research institutions and engineering and consultancy firms are working on the technical and scientific basis for this safety dossier. We are investigating the behaviour and distribution of radioisotopes from the disposal installation into the soil, the groundwater, the food chain and the ecosystem.”

**Dirk Mallants**