

# Structural solution for the management of highly radioactive residues

SCK•CEN and the National Institute for Radioelements (IRE) reach out to each other. The research centre offers a structural solution for the management of highly radioactive residues originating from the production of medical radioisotopes, which are currently stored at the IRE site in Fleurus. This project, called RECUMO, therefore contributes to the security of supply of medical radioisotopes.

*“Thanks to the partnership, Belgium can anchor its nuclear knowledge.”*

Belgium is one of the five global actors in the production and distribution of medical radioisotopes. “Our research reactor BR2 is responsible for the first production phase of medical radioisotopes: irradiating targets. Then, the National Institute for Radioelements (IRE) processes these targets using a chemical process in order to produce medical radioisotopes and administer them to patients”, explains Eric van Walle, director-general at SCK•CEN. This production leaves highly radioactive waste (i.e. highly contaminated uranium residues). The highly radioactive residues are stored on the IRE site in Fleurus, but in 2010, the Federal Agency for Nuclear Control (FANC) announced that the store was close to the acceptable storage threshold.

“When the storage limit is reached, production and therefore security of supply cannot be guaranteed anymore. That could have a major impact on the medical sector. Indeed, almost 7 million patients worldwide rely on the Belgian production of molybdenum-99 for their medical examinations. Medical radioisotopes are indispensable in the fight against cancer”, explains Eric van Walle (SCK•CEN). As a result, the IRE started looking for a structural solution. Several options were assessed, but late last year, the die was cast: SCK•CEN will purify the highly radioactive waste and the uranium it contains. “We will process both current and future residues that will be generated during production until 2038”, says Eric about the private-public partnership between both parties.



**Erich Kollegger**, CEO of IRE, and **Eric van Walle**, SCK•CEN Director-General

The project, called RECUMO, reinforces the excellent relations SCK•CEN and IRE have been enjoying for many years. “Not only that”, insists Erich Kollegger, director-general at IRE. “Thanks to this partnership, Belgium can firmly establish its extensive nuclear knowledge. We keep the necessary knowhow for the safe management of this nuclear heritage and reinforce our position as leader in the production of medical radioisotopes.” Moreover, the project strengthens global non-proliferation. “In Mol, we will upgrade the residues and convert it into low-enriched uranium”, adds Eric van Walle (SCK•CEN).

### State-of-the-art technology

For the purification process, RECUMO implements state-of-the-art technology in radiochemistry. “It is not the first time that SCK•CEN implements this technique. In 1988, the technique had already been applied at lab scale. Very successfully! Now, we have refined, optimised and developed the technique so it can be implemented on a semi-industrial scale”, explains Eric van Walle (SCK•CEN). To achieve this and turn the partnership into a success story, advanced infrastructures will be built on the site in Mol. The project creates jobs – both during the construction phase and for the running of the infrastructure.

## STRONG TOGETHER

On 27 December 2018, SCK•CEN and IRE entered into a public-private partnership – one of the first in Belgium. “SCK•CEN and IRE are complementary in the story of medical radioisotopes. I am excited that we found each other again, because together, we stand strong. Joining forces is necessary to boost the fight against cancer”, concludes Eric van Walle, director-general at SCK•CEN.



### Watchful eye

The RECUMO project is run in close cooperation with the Directorate-General Energy of the Federal Public Service Economy, SME, Middle Classes and Energy, under the supervision of the Federal Agency for Nuclear Control (FANC), Euratom and the United States. Eric: “They impose nuclear safety and security standards and monitor strict observance of these.”

### Meteoric developments

The RECUMO project set the tone. Indeed, both institutes do not exclude further cooperation. “The world of medical radioisotopes evolves at lightning speed and the importance of therapeutic radioisotopes is rising. Take lutetium-177 for example. That radioisotope is about to receive marketing authorisation by the European Union for the treatment of prostate cancer, the second most common form of cancer in men. We see demand growing exponentially, by a factor of ten. In the story of medical radioisotopes, SCK•CEN and IRE are complementary, and we therefore represent an added value for each other”, says Eric van Walle (SCK•CEN). Erich Kollegger concurs: “Why wouldn’t we join forces? RECUMO proves that it is possible. The information we gather from this project provides knowledge for both parties. We will therefore get more and more entangled.”

### Cement recipe

At the same time, SCK•CEN – in cooperation with NIRAS – is working on a cement formula to condition the liquid waste flow after the upgrade process. “On the basis of desk research and our unique expertise, we were able to draw up a list of possible cement formulations and identify best candidates. Now, we examine the liquid waste, its stability and possible variations. This gives us a list of technical and chemical requirements. The cement will have to be suitable for all variations in this list”, explains Eric van Walle (SCK•CEN). In a next step, the liquid waste will be mixed with the cement preparation and subjected to a series of tests. Eric van Walle: “Pressure tests, tensile tests, chemical test,... You name it. We must be sure that the cement is compatible with its environment.”

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