AiNT

in cooperation with framatome Fraunhofer INT

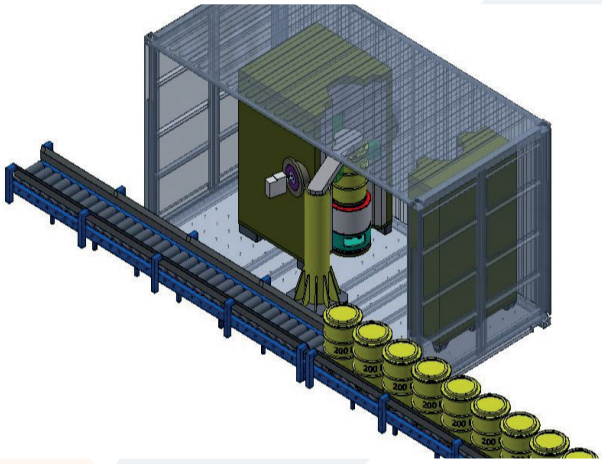
RESEARCH PROJECT QUANTOM

QUANTITATIVE ANALYSIS OF TOXIC AND NON-TOXIC MATERIALS

PROJECT PERIOD:
SEPTEMBER 2018 - AUGUST 2021

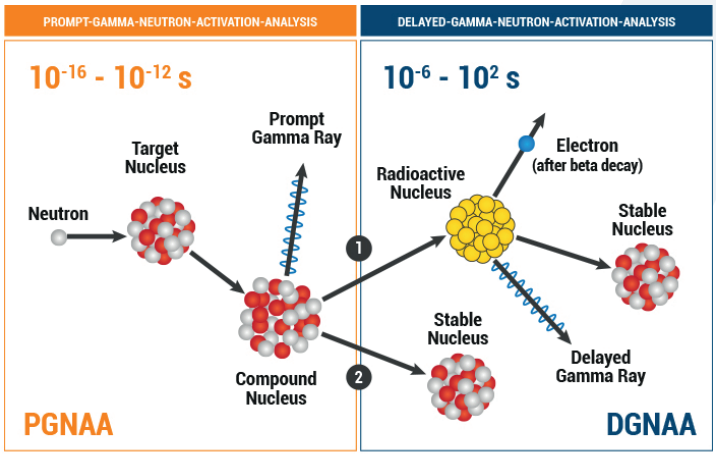
OBJECTIVE

The QUANTOM® project is related to the research field "non-destructive declaration/analysis of (legacy) waste" of the program for research on the decommissioning of nuclear installations funded by the German Federal Ministry of Education and Research. Framatome GmbH, the Aachen Institute for Nuclear Training GmbH and the Fraunhofer Institute for Scientific Technological Trend Analysis are cooperating to develop an innovative drum inspection system for non-destructive analysis, to enable the material description and plausibility checking of radioactive waste conditioned in 200-litre steel drums. The aim of the project is to develop, construct and test the inspection system.



BACKGROUND

Due to the hazard it poses, radioactive waste must be properly conditioned and characterized for final disposal in the KONRAD facility, the German final repository. The risk posed by the waste is the potential biological damage caused by the ionizing radiation emitted by the radionuclides, as well as the chemical toxicity of water-polluting substances contained in the waste. Therefore, a radiological and material characterization of radioactive waste is mandatory for the waste producer. Especially in the case of legacy waste, inadequate and inconsistent waste declarations obstruct qualification and storage for final disposal. To date, a review of legacy waste for the complete characterization of radioactive waste for final disposal usually involves opening of the drums. The opening of drums for visual inspection or sampling leads to the waste being considered as new waste, which in contrast to legacy waste, is subject to much more stringent requirements. Furthermore, destructive testing methods make it necessary to repackage the waste, which consequently results in an increase in the volume of waste.



1 $^{27}Al(n,\gamma)^{28}Al$; E_γ=1778.9 keV; $T_{1/2}$=2.246 minutes

2 $^{1}H(n,\gamma)^{2}H$; E_γ=2223.3 keV

RESEARCH & DEVELOPMENT

The purpose of the research project is to develop a non-destructive analysis method using the prompt and delayed gamma neutron activation analysis (P&DGNAA) for material characterization.
The primary goal is to develop an innovative drum inspection system. The inspection system enables the waste producers to verify or, if necessary, complete the material description of the radioactive waste. The random or full-scope inspection of drums in a batch allows the plausibility checking of the declared substances for the inspection lot. The possibility of analyzing waste drums non-destructively and without repackaging greatly reduces the radiation exposure of the operating personnel and avoids increasing the volume of waste. QUANTOM® is being developed as a mobile system integrated into a standard container. This allows the use of the system directly at the storage or conditioning sites of legacy waste to make it available for waste producers.

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The responsibility for the content of this publication lies with the project partners.