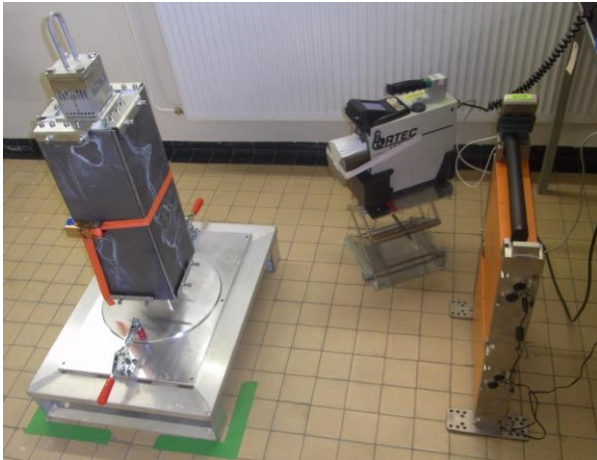


## WG6 IPNDV Experimental Technology Data Sheet

November 2019, AWE, UK

<b>Name of Experimental Campaign:</b> Belgium exercise to investigate performance of measurement methods
<b>Technology Name: High Purity Germanium (Detective EX-100 and Transpec 100T)</b>
<b>Physical Principle/Methodology of Technology:</b> HPGe detector
<b>What Does the Method Determine/Measure (e.g., presence of nuclear material, isotopics, mass):</b> Determines identity of present radioactive isotopes; determines isotopic ratios and mass.
<b>What Is the Applicability to IPNDV:</b> The collection of high-quality gamma data on fissile material with varying amounts of shielding.
<b>Type of Data Collected by the Technology:</b> Gamma energy spectrum
<b>Constraints (e.g., time to install the equipment, measurement times including distance from object, dose rate required, required Cd shielding to limit the count rate):</b> Required shielding on the detector to limit the count rate. The time to measure the object was set to allow enough measurements in a day (30-minute measurement minimum). Distance from the detector was 56–57 cm from the center of the source.
<b>Physical Description/Diagram/Photos of the Experimental Setup/Layout:</b> HPGe at a set distance from the fuel. This was measured before each data set. Detector was raised in order to better align with the center of the fuel. 
<i>Equipment in place; the ND2 can be seen next to it, being used for 1m efficiency measurements.</i>

## WG6 IPNDV Experimental Technology Data Sheet

November 2019, AWE, UK

**Name of Experimental Campaign:**

Belgium exercise to investigate performance of measurement methods

**Technology Name: High Purity Germanium (Detective EX-100 and Transpec 100T)**

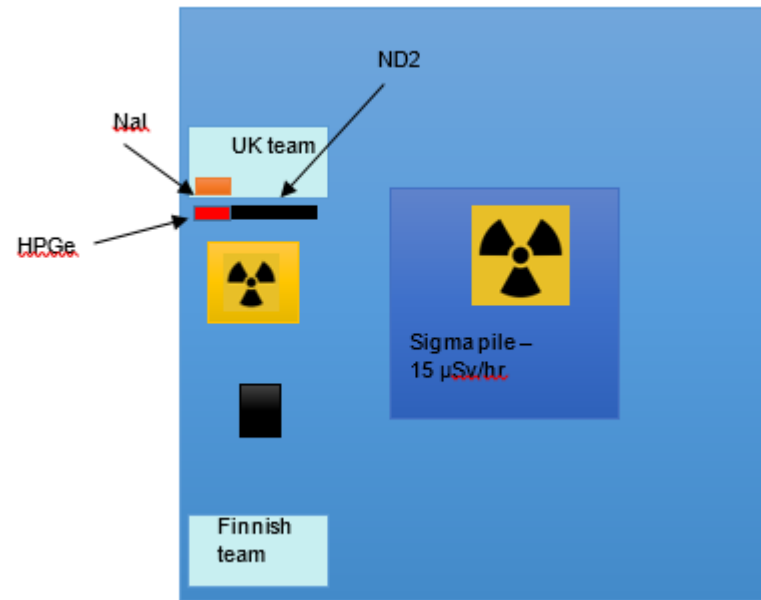


Diagram of layout.

**Specific Objects Measured (which of the experimental objects were measured; if not described elsewhere, describe experimental objects here):**

MOX fuel of two different isotopics were measured, with two different types of shielding in addition to bare. This makes six measurements made in total, using all our equipment. Nineteen pins were measured for both isotopic compositions.

76%	96%
Bare	Bare
Cadmium	Cadmium
Lead and Poly	Lead and Poly

**Process Required to Analyze the Data (include any software used):**

Data are saved in .spc format. Requires processing with any gamma spectroscopy software such as Gamma Vision or Maestro. Isotopic analysis software such as FRAM can also be used.

Mass determination can be done manually using differential attenuation.

## WG6 IPNDV Experimental Technology Data Sheet

November 2019, AWE, UK

**Name of Experimental Campaign:**

Belgium exercise to investigate performance of measurement methods

**Technology Name: High Purity Germanium (Detective EX-100 and Transpec 100T)****Preliminary Results (qualitative, not quantitative; e.g., did the method perform as expected, if not how was it different):**

The Transpec was damaged en route to SCK•CEN and could not be used.

The method performed mostly as expected, giving results that compared to our prior modeling. There was a strange shape to the peak in the Detective read-out. Afterward it was determined this detector had in fact suffered damage on the outward segment of the trip, similar to the Transpec.

**Final Results (if available; if not, estimate of when final results will be available):**

Raw data available, final results not yet available.

**Lesson Learned (e.g., what went well, what went wrong or not as expected, do the results confirm what we said in the technology tables?):**

The damage to the detector will make analyzing this data difficult.