

Radiological characterization of hot cells and glove boxes as a preliminary research for the future dismantling

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Introduction

- Best Medical Belgium S.A.
 - Production of radionuclides:

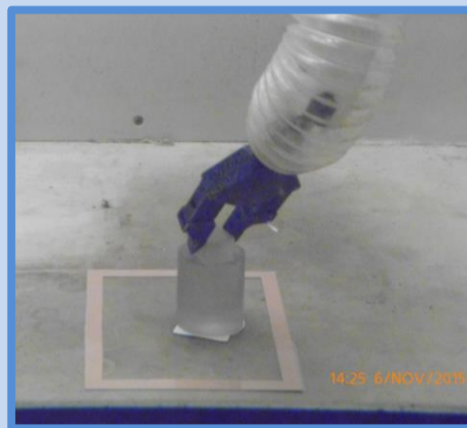
Radionuclide
Co-57
Tl-201
I-123
Ge-68

- With 2 cyclotrons
- Purification in the chemical zone
- Contamination of the installations
- Bankruptcy in 2012 → dismantling
 - Need for radiological characterisation
 - Evaluation of future dismantling strategies

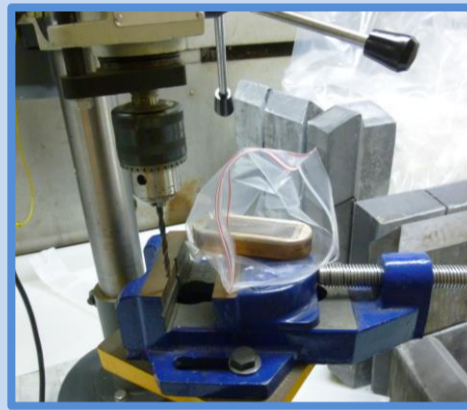
Methods

Representative sampling

- Contamination:
 - Swipe samples



- Activated materials:
 - Drill campaign



Measurements

- 75 samples:
 - 59 swipe samples
 - 16 drill samples
- Gamma spectroscopy
 - HPGe-detector
 - Apex gamma software
- Energy & efficiency calibration



Preliminary research

- Disposal options
 - Unconditional release
 - Melting
 - Cat. A waste
- Decontamination options of hot cells and glove boxes:
 - In consultation with experts



Objectives

- Representative sampling of:
 - Contaminated materials
 - Activated materials
- Measurement of the samples
- Identification of the radionuclides
 - Quantitative
 - Semi-quantitative
- Find the origin of the nuclides
 - Link back to the production process
- Preliminary research of either:
 - Disposal options or
 - Decontamination approach

Results

- 13 identified radionuclides

Radionuclide	
Co-60	Zn-65
Ge-68/Ga-68	Ag-108m
Tl-202	Ag-110m
Tl-204	Cd-109
Na-22	Mn-54
Co-57	Bi-207

- Contamination activity range:
 - From $(5 \pm 2)E-02$ Bq/cm² to $(1.23 \pm 0.06)E+04$ Bq/cm²
- Activation activity range:
 - From $(3.9 \pm 0.5)E-02$ to $(4.5 \pm 0.2)E+04$ Bq/g

Conclusion

- 13 radionuclides were found and linked to the original production process
- Hot cells will be decontaminated with:
 - Chemical decontamination
 - Abrasive blasting
- Glove boxes will be dismantled with:
 - Glove tent
- Future of activated components and materials in the hot cells:
 - Category A radioactive wastes

Promotoren / Copromotoren: drs. ing. Niels Vandevenne (Hasselt University), dr. Philippe Damhaut (ONDRAF/NIRAS)