



Contribution ID: 78

Type: **Oral**

Advances in Nuclear Forensics Analysis at CEA/DIF: Radiochronology Studies

Wednesday 9 July 2014 11:30 (20 minutes)

Analytical laboratories at CEA/DIF are part of the NWAL (Network of Analytical Laboratories in support of IAEA's nuclear safeguards) for the analysis of environmental samples since 2001 for both bulk and particle analysis.

Part of the expertise inherited from environmental analysis is now used to develop capabilities in nuclear forensics analysis. Two projects of analytical developments are currently under progress at CEA/DIF: age dating of uranium materials and the geolocation of uranium-ore concentrates. For the first one, we have established two procedures to date small quantities of uranium (from 1 μg up to 100 μg) with two radioactive couples ($^{234}\text{U}/^{230}\text{Th}$ and $^{235}\text{U}/^{231}\text{Pa}$). As our equipments are dedicated to trace analysis, only micro-quantities of nuclear materials can be handled in the laboratory in order to avoid contamination. We have then used micro-columns of chromatographic resins to separate thorium or protactinium from uranium. Measurements are performed on ICP-MS for Th and Pa and TIMS for U. The detection limit (DL) for ^{230}Th and ^{231}Pa determination is close to 1 fg. If this DL is extrapolated to particle matter, we would theoretically be able to date a 15 year-old natural uranium particle (UO_2) for which diameter is 40 μm , and a 15 year-old highly enriched (93%) uranium particle of UO_2 for which diameter is 8 μm .

Author: Dr HUBERT, A. (CEA, France)

Co-authors: Mr POINTURIER, F. (CEA, France); Dr MENDES, M. (CEA, France)

Presenter: Dr HUBERT, A. (CEA, France)

Session Classification: Technical Session 3D