

THE USE OF SEM-EDX FOR THE IDENTIFICATION OF URANIUM COMPOUNDS IN SWIPE SAMPLES FOR NUCLEAR SAFEGUARDS

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Environmental swipe sampling for safeguards purposes has been used by International Atomic Energy Agency since 1996 and is a powerful tool to detect undeclared materials and activities in States under safeguards agreements. The Secondary Electron Microscope with Energy-Dispersive X-Ray analyzing system (SEM-EDX) can be particularly useful in the initial identification of uranium in swipe samples and might be appropriate to identify and characterize uranium particles. This work describes the use of SEM-EDX, as an initial screening technique, in real-life swipe samples for identifying and characterizing uranium particles. The swipe samples were collected in a conversion plant at the Nuclear and Energy Research Institute – IPEN/CNEN, São Paulo, Brazil

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RARE EARTH ELEMENTS IN URANIUM COMPOUNDS AND IMPORTANT EVIDENCES FOR NUCLEAR FORENSIC PURPOSES

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At the beginning of the 1990's, the first incidents involving nuclear or other radioactive material were reported mainly in Europe, with the breakdown of the Soviet Union. At that period, the International Atomic Energy Agency (IAEA) recorded more than 800 cases of illicit trafficking of nuclear or radioactive materials. Since then, related cases have become known worldwide, as the contamination by radioactive source elapsed from a theft in 1987 in Goiânia, Brazil, and the death of Alexander Litvinenko in 2006 poisoned with the radioactive isotope Polonium-210. As a result of these and other events, nuclear and radioactive materials have been targeted for forensic investigations, creating from there the concept of nuclear forensics. Nuclear forensics mainly focuses on the nuclear or radioactive material and aims to providing indication on the intended use, the history and even the origin of the material. Uranium compounds have isotopic or chemical characteristics that provide unambiguous information concerning their origin and production process. Rare Earth Elements (REE) are a set of sixteen chemical elements in the periodic table, specifically the fourteen Lanthanides in addition Scandium and Yttrium. A large amount of uranium