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## **HA-AWCC Instrumental Test Prior Hot Commissioning for Characterisation of U-residue from <sup>99</sup>Mo Production Process in the Republic of South Africa.**

HA-AWCC Instrumental Test Prior Hot Commissioning for Characterisation of U-residue from <sup>99</sup>Mo Production Process in the Republic of South Africa.

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### Abstract

<sup>99</sup>Mo is produced by the irradiation of high and low-enriched uranium (HEU and LEU) resulting in uranium residues accumulation as waste from <sup>99</sup>Mo production process. These residues are highly radioactive with surface exposure rates of up to 100 R/h and is stored in stainless steel canisters. The <sup>235</sup>U content of these uranium residues must be characterized or quantified for State and International Atomic Energy Agency (IAEA) Safeguards purposes. Conventional neutron counting techniques such as Active Well Coincidence Counting (AWCC) are incapable of quantifying the <sup>235</sup>U content of the U-residue due to high level of radiation emitted and moisture that might be present. In 2010 the High Activity-Active Well Coincidence Counter (HA-AWCC) was designed and developed by Non-Destructive Assay experts from Oak Ridge National Laboratory (ORNL, USA), The South African Nuclear Energy Corporation SOC Limited (NECSA, RSA) and IAEA with the purpose of quantifying the <sup>235</sup>U content in the U-residue. In this work, the set-up of the HA-AWCC instrument as well as its behavior during the hot commissioning pre-test activities will be discussed. The HA-AWCC tests included background measurements, neutron counting measurements with californium (<sup>252</sup>Cf) sources of activities 11.5 and 30  $\mu$ CI, high voltage plateau measurements as well as a cold canister run. This work will provide a critical role in the characterization and quantification of safeguarded U-residue material by the State Safeguards Authority.

Key Words: HA-AWCC, U-residue, <sup>235</sup>U content, pre-test activities

### **Which "Key Question" does your Abstract address?**

TEC1.1

### **Topics**

TEC1

### **Which alternative "Key Question" does your Abstract address? (if any)**

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