

# Determination of the Minimum Detectable Activity for Scanning Measurement During Characterization and Final Status Survey

úterý 20. září 2022 14:23 (3 minuty)

Characterization and final status survey are crucial parts during any phase of nuclear powerplant life cycle, especially in the decommissioning process. Nowadays, many procedures with different measurement instruments are used and well known. Scanning measurements are becoming more and more popular due to their effectiveness and need in decommissioning projects around the world. The paper presents a step-by-step procedure to determination of the scan minimum detectable activity for selected geometry arrangement during scanning measurements of soil around A1 and V1 nuclear powerplants in Slovakia. The paper details the uncertainty analysis for major parameters such as efficiency, soil density, soil composition, detector model accuracy, etc., and deals with the determination of the scan minimum detectable activity. The selected measuring device is a 2x2 inch scintillation detector 10 cm above the surface of the soil. The measurement efficiency for scanning was determined based on the detector model in MCNP6. To design the methodology for the scanning measurement of the soil, it was necessary to perform the following procedures - creation of a 2x2 NaI(Tl) detector model and its verification, determination of the radionuclide vector of the soil in the vicinity of the A1 and V1 nuclear power plants in Slovakia, reconstruction of the soil background spectrum, determination of the contribution to the background spectrum from cosmic radiation, uncertainty analysis, and finally determination of the scan minimum detectable activity for the selected measurement geometry. The achieved scan minimum detectable activity for gamma photon energy 662 keV (Cs-137), while the scanning process is performed 10 cm above the ground at a speed of 0.6 m/s, is 30 Bq/kg. The obtained result is sufficiently satisfactory, and the methodology will be further verified for the needs of practice in the decommissioning of nuclear facilities in Slovakia.

**Hlavní autor:** BEDNÁR, Dávid (VUJE, a.s.)

**Spoluautoři:** LIŠTJAK, Martin (VUJE, a.s.); SLANINKA, Alojz; NEČAS, Vladimír (Slovak University of Technology Bratislava)

**Přednášející:** BEDNÁR, Dávid (VUJE, a.s.)

**Zařazení sekce:** Metrológia, meranie a prístrojová technika

**Tematická klasifikace:** Metrológia, meranie a prístrojová technika