Determination of NORM Vector According to Laboratory Analysis of Soil Samples in the Area of NPP A1 in Slovakia

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Abstract. Environmental radioactive materials are measured to determine background levels of radiation or to assess the level of contamination because of human activity. The study in this paper focuses on the determination of the natural radionuclide vector of soil in the area of A1 NPP in Jaslovské Bohunice, which is under the decommissioning process shutdown after the accident. To achieve this goal, soil samples were taken and evaluated by semiconductor HPGe gamma-ray spectrometry under laboratory conditions. Hard-to-measure radionuclides were calculated based on radioactive equilibrium. Radioactive equilibrium was confirmed by measuring samples that were in secular equilibrium. The mass activity of radionuclides from thorium, uranium, and actinium series was determined for gamma-ray photon energies higher than 50 keV with an intensity higher than 0.1 % to ensure all relevant contributions to the background gamma spectrum. Based on the obtained radionuclide vector, the background spectrum can be reconstructed by calculation in order to determine the background level for essentially any measurement geometry. The motivation for this study was to determine the background spectrum when measuring soil around A1 NPP for the purposes of future use of scanning measurement as a support in site characterization (characterization survey and final-status survey) during the decommissioning process.