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Induced radioactivity in accelerator materials and soil-shield samples

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Several samples of materials used for accelerator components and shielding structures were irradiated in the high-energy stray radiation field of the H4IRRAD facility, one of the secondary beam lines (H4) from the SPS at CERN. After irradiation, the induced radioactivity of the samples was measured by gamma spectrometry at various cooling times up to 2 years, allowing identification of isotopes with a wide range of half-lives. The activation of soil-shield samples was also studied in detail. In particular, the mechanism and probability that the radioactivity produced in soil and ground water may transfer from the site of activation to the environment was investigated. Two techniques were used to quantify the amount of radioactivity leaching in the groundwater. Furthermore, the activation experiment was simulated in detail with the FLUKA Monte Carlo code. The isotope production and their specific activities measured in the samples are in good agreement with the FLUKA predictions.

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