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Radiation protection and radiation safety issues for HIE-ISOLDE. FLUKA calculations.

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The production of radioactive ion beams (RIB) is worldwide a scientific topic of great interest. Continuous and significant improvements of the particle accelerator and targets technologies opens new potentialities for the production of RIBs and their use for fundamental and applied science, with increasing intensities and new types of beams available to perform measurements.

The High Intensity and Energy ISOLDE (HIE-ISOLDE) project is an upgrade of the existing ISOLDE facility, art CERN. The foreseen higher nominal intensity and power of the primary beam is expected to increase the energy and the intensity of the produced RIBs. The ISOLDE facility uses the proton beam from the PSB with an energy of 1.4 GeV and an intensity up to 2 μA. After upgrade (final stage) the HIE-ISOLDE facility is supposed to run at energy up to 2 GeV and an intensity up to 4 μA. The upgrade imposes constrains to the existing experimental and supply areas. Taking in to account the new beam power and beam intensities a new assessment of the existing radioprotection and radiation safety issues. Special attention must be devoted to the shielding of the beam dump and experimental areas. The diversification of the types of targets which can be used for irradiation dictates the need to pay special attention to the shielding issues in case of heavy targets due to high-energy secondary particles produced during irradiation.
On this work the FLUKA particle transport code was used to perform the simulation of the dose distribution, of the energy deposition and particle fluxes on the facility taking in to account the variation of the primary beam power and intensity, and to assess the shielding configuration of the new facility.

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