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Low-Background Counting at Homestake ISELEY MARSHALL, University of South Dakota — Background characterization at Homestake is an ongoing project crucial to the experiments located there. From neutrino physics to WIMP detection, low-background materials and their screening require highly sensitive detectors. Naturally, shielding is needed to lower "noise" in these detectors. Because of its vast depth, Homestake will be effective in shielding against cosmic-ray radiation. This means little, however, if radiation from materials used still interferes. Specifically, our group is working on designing the first low-background counting facility at the Homestake mine. Using a high-purity germanium crystal detector from ORTEC, measurements will be taken within a shield that is made to specifically account for radiation underground and fits the detector. Currently, in the design, there is a layer of copper surrounded by an intricate stainless steel casing, which will be manufactured air tight to accommodate for nitrogen purging. Lead will surround the stainless steel shell to further absorb gamma rays. A mobile lift system has been designed for easy access to the detector. In the future, this project will include multiple testing stations located in the famous Davis Cavern where future experiments will have the ability to use the site as an efficient and accurate counting facility for their needs (such as measuring radioactive isotopes in materials). Overall, this detector (and its shield system) is the beginning of a central testing facility that will serve Homestake's scientific community.

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