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Calibration of the first Low-Background Counting Facility for SURF MITCHELL WAGNER, DONGMING MEI, JASON GOON, D'ANN BARKER, University of South Dakota, CUBED COLLABORATION — Material assay, screening, and low background counting capabilities are critical to the success of the planned SURF experiments. For the next generation low-background experiments, the contamination level of the materials in the detector need to be many orders of magnitude lower than the current generation of detectors. Measuring such low activities is a challenging task that will be best accomplished by using large, high-purity germanium (HPGe) detectors, which have become commercially available in large detector volumes. Because of their extremely high purity, outstanding energy resolution and sound detection efficiency, the low-background HPGe detectors can provide the screening measurements with desired sensitivity in an underground setting. To effectively assay material at this level of sensitivity requires that the assay detector, itself, be exceptionally low in radioactivity and be deployed in a well-shielded and low background environment. We propose a phase-approached method to build the capacity that will meet the requirement for the planned SURF experiments. Phase 1 is a generic low background counter located at Davis Cavern with a sensitivity of 0.1 parts per billion for both U and Th. Phase 2 will utilize a large volume intrinsic, N-type Ge detector aiming a sensitivity of 10 parts per trillion for both U and Th. Phase 3 proposes using a GeMPI type detector that has a target sensitivity of 1 part per trillion for both U and Th. The calibration results will be discussed for the phase 1 detector will be the first low-background counting facility at SURF.

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