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Double-Beta Decay of ^{150}Nd to Excited Final States M.F. KIDD, J.H. ESTERLINE, W. TORNOW, TUNL and Duke University — An experimental study of the two-neutrino double-beta ($2\nu\beta\beta$) decay of ^{150}Nd to various excited final states of ^{150}Sm was performed at Triangle Universities Nuclear Laboratory (TUNL). Such data provide important checks for theoretical models used to predict $0\nu\beta\beta$ decay half lives. The measurement was performed at the recently established Kimballton Underground Research Facility (KURF) using the TUNL-ITEP $\beta\beta$ decay setup. In this setup, two high-purity germanium detectors were operated in coincidence to detect the deexcitation gamma rays of the daughter nucleus. This coincidence technique, along with the location underground, provides a considerable reduction in background in the regions of interest. This study yields the first results from KURF and the first detection of the coincidence gamma rays from the 0_1^+ excited state of ^{150}Sm. These gamma rays have energies of 334.0 keV and 406.5 keV, and are emitted in coincidence through a $0_1^+ \rightarrow 2_1^+ \rightarrow 0_{gs}^+$ transition. An enriched Nd_2O_3 sample obtained from Oak Ridge National Laboratory was used. After counting for 391 days, 29 raw events in the region of interest were observed. This count rate gives a half life of $T_{1/2} = (0.72^{+0.36}_{-0.18} \pm 0.04(syst.)) \times 10^{20}$ years, which agrees within error with another recent measurement, in which no coincidence was employed. An updated result will be given.

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