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Shielding Design for the LBNE Decay Pipe

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The Long Baseline Neutrino Experiment (LBNE) is being designed to deliver a high intensity neutrino beam from Fermilab to a detector 1300 km away in South Dakota. The neutrino beam will be produced from the decays of pions and kaons generated from a 120 GeV proton beam incident on a 95 cm long graphite target. The pions and kaons will decay in flight in a 200 m decay pipe downstream of two magnetic focusing horns.

The operation of this proposed beamline will generate radionuclides in the soil surrounding the beamline complex which may leach into the groundwater resources. Sufficient shielding will therefore be required to maintain acceptable radionuclide concentrations in the ground water. Presented is an estimate of the minimum decay pipe shielding using MARS. The shielding should have enough thickness to maintain the radionuclide concentrations in the ground water below the regulator limits over a 30 year operation period of the LBNE beamline at 2.3 MW beam power.

Primary author: REITZNER, Diane (FNAL)

Presenter: REITZNER, Diane (FNAL)

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