The Domestic Nuclear Detection Office under the Department of Homeland Security is continuing to sponsor research for replacement portal monitor detectors. Replacement technologies need to be able to discriminate between neutrons and gammas. Once of the replacement technologies being considered is thin polymeric scintillating films. Understanding the energy deposition mechanics from photon interactions and neutron reaction products can enhance the ability to preform discrimination. GEANT4, a Monte Carlo toolkit, is being employed to calculate the energy deposition in these films. Validation of the calculation was preformed by simulating the energy deposition of photons in water, reproducing the work of Tuner et al (1982). Monotonic photons where shot into water, with the energy deposition being governed by a micro dose physics model, G4DNAPhysics. The energy loss of the first collision was then calculated. This allows for the probability that a given collision will result in an energy loss to be plotted versus energy. Comparison to the work of Turner yields a similar structure, with the G4DNAPhysics model providing finer energy resolution allowing for the discrete binding energies of the electrons in the material to be visible.