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Calculations of Material Activation by Disruption Generated Run-Away Electrons in ITER[1] H.K. CHIU, General Atomics — In tokamak disruptions, electrons can be accelerated to high energies by the large electric field. In ITER runaway electrons of Energy >20 MeV are possible. These electrons interact with wall materials via atomic collisions, inverse Compton scattering, and bremsstrahlung. Bremsstrahlung can result in X–rays up to > 100 MeV, dependent on the incident electron energy, and these photons can activate the structural components of the machine via (γ,n) and (γ,p) reactions. In the commissioning phase of ITER with hydrogen plasmas, these photo-nuclear reactions, and the resulting activated materials are a radiation concern. The activated species are also a material degradation concern, as the decay daughters will affect resistivity, ductility, and thermal conductivity of the component materials. A set of coupled electron-photon-neutron transport calculations examining the activation generated by energetic run-away electrons in ITER was performed with the MCNP4A Monte-Carlo particle transport package. The results and implications for personnel dose and degradation in material properties are presented.

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