This presentation will focus on the development of novel approaches to solve issues throughout the DOE complex in the areas of microwave chemistry, D&D and radiation shielding. We first explore the dissolution of spinels in a glassy matrix using microwave chemistry. This process helps with the formation of glass repositories for nuclear waste storage. Secondly, deactivation and decommissioning in nuclear facilities is an issue that needs a considerable amount of research invested. The current governing documents indicating tools, techniques, and technologies date back as far as 30 years in some cases. SRNL is leading the development of safer technologies and practices with the development of various materials and technologies including VR and augmented reality training systems, radiation resistant polymers, radiation shielding foams, and fixatives that create a safer operating environment.