Environmental Radioactivity Network: Activities and Future Plans

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The UK has a substantial legacy of radioactively contaminated land and nuclear wastes. Current UK government policy is to dispose of this radioactive waste in a Geological Disposal Facility (GDF), and decommission legacy nuclear sites over the next decades. Coupled to this, issues concerning the accidental or illicit release of nuclear materials into the environment are at the forefront of UK governmental concern. These tasks are some of the most demanding managerial, technical, and environmental challenges facing the UK in the next century, and are estimated to cost ~£100 billion. Overcoming these challenges will require a considerable amount of fundamental research concerning radionuclide behavior in natural and engineered environments. This includes understanding processes at the atomic and nanoscale, and scaling up to complex systems at the field and regional scale. This type of bottom-up approach, where fundamental science is used to underpin our understanding of the environment, is essential to successfully complete these national-level nuclear projects.

The Environmental Radioactivity Network (Env-Rad-Net) is an STFC-funded global challenge network aimed at engaging the UK scientific research community to develop the underpinning science required to meet the challenges associated with nuclear decommissioning, radioactive waste disposal, and accidental or illicit release of radioactive materials. We aim to do this by developing the use of STFC facilities, in particular, synchrotron, neutron, laser, and computing techniques. This includes the development and support of research projects, training and the development of protocols for the analysis of radioactive samples.

The networks activities have focused on overcoming key challenges associated with environmental radioactivity research. Firstly, analysis of radionuclides associated with heterogeneous natural materials (e.g. soils). For example, research led by the BGS has investigated the distribution and speciation of uranium associated with plant roots which have concentrated the radionuclide *via* natural processes. Secondly, analysis of radionuclide speciation at low concentrations. For example, detailed studies of radionuclide sorption to natural (e.g. minerals) and anthropogenic materials (e.g. cement phases). Finally, the analysis of radioactive samples containing higher activity radionuclides. For example, analysis of samples containing transuranic elements (e.g. Np).

An overview of the research supported by the network, and other network activities will be presented.

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