

## Decommissioning and Disposal



Decommissioning and disposal is a theme where the Birmingham Centre for Nuclear Education and Research is currently investing significantly in additional expertise to complement its existing capability.

New nuclear plants should be designed with decommissioning in mind and with a whole systems approach; however, our past infrastructure provides us with a number of challenges that require a deep understanding of:

- Engineering, corrosion, mechanics of materials and optimisation
- Waste characterisation and radiochemistry
- Intelligent systems, remote sensing and robotics

- Risk assessment and safety
- Social, policy and environmental assessment

Managing the disposal of by-products produced by nuclear energy production requires understanding of, and capability in:

- Geological characterisation and modelling
- Sub-surface engineering, geotechnics, storage and risk and performance
- Geochemistry, biochemistry, hydrogeology and transport modelling
- Waste treatment design, performance and monitoring

Experts from within the Centre have a wealth of experience in many aspects of decommissioning and disposal and have collaborated with stakeholders across the globe including the UK, US and Switzerland, often employing novel and advanced techniques to solve specific challenges related to corrosion, materials performance, ion-exchange and sub-surface remediation and monitoring.

Examples include :

- Materials synthesis - improving selectivity, rate of uptake and irreversibility of exchange for specific radionuclides; exploring new routes of production such as biomineralisation.
- Materials characterisation - determining how structures change with temperature, pressure and radiation damage; use of synchrotron X-ray and neutron facilities such as Diamond, ISIS, APS (Chicago, USA).
- Environmental impact - exploring how exchanged materials can be made into better (more dense, less leachable) wasteforms for storage/burial.
- Corrosion - reviewing corrosion issues relating to canisters for disposal of spent fuel and high level waste in clay, and research on the reaction kinetics of pitting of stainless steels for intermediate level waste storage. Dr Alison Davenport leads the work of the centre in the area of corrosion.
- Infrastructure - remote performance monitoring of underground structures and tunnels and the development of micro electrical mechanical sensors for smart infrastructure.

