Professor Hyatt’s research in radioactive waste management and advanced nuclear materials has gained international recognition. The strategic collaboration provided further opportunity for him to share this expertise and support the NDA’s task of decommissioning nuclear sites in the UK.

THE IMPACT OF RESEARCH
The NDA was set up to oversee the process of decommissioning and cleaning up UK sites that have been used for generating civil nuclear energy. It is a non-departmental public body that reports to the Department for Business, Energy and Industrial Strategy. The NDA is responsible for developing the estate-wide strategy, and decommissioning activities are delivered by Site Licence Companies (SLCs) and subsidiaries.

The NDA has overall responsibility for the mission, and has to ensure that the work is underpinned by sufficient and appropriate research and development (R&D). Needs, opportunistic and risk-driven R&D is carried out by the SLCs and their supply chains, who develop and deploy technologies that are specific to their particular sites.
The DRA carries out technical oversight of this R&D to mitigate overlap or duplication, and to maximise potential for application elsewhere on the estate. The DRA also maintains a Directly-funded Research Portfolio to carry out research that is relevant to multiple sites or development of strategic options and it was through this portfolio that Professor Hyatt was appointed as Research Chair.

The Research Chairs scheme provided an opportunity for the DRA to increase its research capacity. “Our mission will take several decades to complete and over that time we need to ensure that we can maintain the skills and capabilities required to carry it out,” explains Dr Rick Short, DRA Research Manager. “Academic institutions are key providers of future subject matter experts and technical leads for the DRA Estate and its supply chain. Collaborations with academia can ensure that relevant academic capabilities are available in the UK to nurture researchers to the highest levels appropriate fields.”

**MEASURING THE IMPACT**

Professor Hyatt’s work on radioactive waste immobilisation, management and disposal made a timely contribution to the DRA’s research strategy. “A primary benefit of the collaboration was to maintain fundamental academic capability in immobilisation science which is, and will continue to be, a core strategic area of expertise for DRA,” Dr Short explains.

“During the fellowship, Professor Hyatt maintained several parallel research streams in a variety of immobilisation techniques relevant to multiple waste streams on the DRA Estate. Transferring learning across streams (and from other non-UK nuclear waste research projects) helped with maximising efficiency compared to having individual institutions performing stream-specific research.”

Professor Hyatt’s research on the thermal treatment of intermediate level waste is helping to develop alternative radioactive waste management strategies. “The conventional approach of cement encapsulation is not compatible with all wastes and, through dilution, increases the volume of packaged wastes by a factor of five or more,” Professor Hyatt explains. “In contrast, high temperature treatment of such wastes may produce a passively safe glass product, achieving a significant reduction in final packaged volume”. To help the UK to develop new concepts for disposal that include vitrified wastes, Professor Hyatt’s research also aims to increase understanding of their long-term evolution in a deep geological disposal facility.

**FUTURE PLANS**

Several opportunities have been created for the partnership to continue since funding for the award ended. These include successful applications for funding through the DRA PhD bursary scheme.

Professor Hyatt also leads a joint DRA-EPSC Innovation, Impact and Knowledge Exchange project that addresses the immobilisation of separated plutonium in the UK. Not all of the UK’s plutonium will be suitable for reuse as MOX fuel and his research will be a key component in underpinning an appropriate immobilisation route for the unsuitable material. “Our approach is to convert this material into a safe, proliferation resistant ceramic,” Professor Hyatt explains. “This involves working with real plutonium, in collaboration with the National Nuclear Laboratory and the Australian Nuclear Science and Technology Organisation, which is experimentally very challenging.”

**RESEARCH CHAIRS AND SENIOR RESEARCH FELLOWSHIPS SCHEME**

The Research Chairs and Senior Research Fellowships scheme aims to strengthen the links between industry and academia by supporting exceptional academics in UK universities to undertake user-inspired research that meets the needs of industrial partners. Awards are co-funded by the Royal Academy of Engineering and the industry partner and last for five years.

**NDA and the Royal Academy of Engineering.**

Professor Neil Hyatt is the Nuclear Decommissioning Authority/Royal Academy of Engineering Research Chair in Radioactive Waste Management and Professor of Nuclear Material Chemistry at the University of Sheffield. He is also the director of the immobilisation Science Laboratory and co-director of the Nuclear First and Next Generation Nuclear Doctoral training centres.

As a Research Chair, Professor Hyatt has supported the development of processes for safe and efficient clean-up of radioactive waste at various nuclear sites across the UK.

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1 For more information about research at DRA, visit: www.gov.uk/government/organisations/nuclear-decommissioning-authority/about/research

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**Main image:** The rippling effect of nuclear fuel – an atomic force microscopy image of the grain boundaries and dislocations of uranium dioxide (nuclear fuel). Image taken by Dr Claire Corkhill.