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UK Irradiated Materials Archive: Progress

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Background

- There is a wide range of irradiated material across the UK, at Sellafield, power stations and other sites, and material irradiated overseas (eg Halden)
- UKAEA, NNL and the University of Bristol were awarded EPSRC NNUF funding to do a detailed options study, November 2019 to March 2021
- The Irradiated Materials Archive Group initiated the concept of an archive
- During Stage 1 IMAG advised the project, with its revised membership including members from the main stakeholders (NNUF, EPSRC, NIRO, NDA, NNL, UKAEA, RR, MoD, EDF, ONR) plus Grace Burke, Keith Hallam, James Marrow and David Parfitt representing the university sector
- We have reported regularly to this meeting

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Main functions of the archive

- Where there is a risk of disposal, provide a repository for storage of irreplaceable n-irradiated materials that are relevant to the UK's future nuclear ambitions, potentially including material from the UK's fast-reactor programme
 - It is important to have equivalent non-irradiated material
- Provide researchers with cost-efficient and timely access to n-irradiated materials supporting UK fission and fusion nuclear industry, enabling the UK to maintain world leading expertise in radiation damage, develop predictive models and support SMR, AMR and fusion aspirations
- Participate on an international stage, strengthening collaborations with the US and other countries

Benefits

- Material performance is key for existing power stations and new more-innovative, safe and cost-efficient fission and fusion systems
- Some archive samples, eg from fast reactor R&D, would be directly relevant to new systems, while others would be used to establish generic understanding, underpin design of systems, support 60-year operation, etc
- Provide resource for future nuclear UK research, allowing realisation of the potential of the other NNUF facilities and training of young researchers using neutron-irradiated material

NNUF funding via EPSRC: Progress

- Completed
 - Stage 1: Established need and options
 - Report to EPSRC March 2021
- Future
 - Stage 2: Implement recommendation
 - Complete March 2023
 - Stage 3: Operation
 - At least ten years, to 2033+

Stage 1

- Discussions were held with NDA, Rolls-Royce/MoD and EdF
 - A range of samples might be made available: steels (plates, forgings, welds); Zircalloy claddings; graphites; cements, concretes, grouts; etc
- Meetings held with 17 universities, who were enthusiastic about the archive, and indicated materials important to archive, pedigree information needed and timescale requirements
- Issues such as ownership, liability, conditions of use, transport and disposal considered

Stage 1: Recommendations

- An archive should be established, with central stores at Sellafield and Culham that are gradually populated as suitable samples either become available or are requested
- An archive will be more cost- and time-efficient than present arrangements
 - An essential element is a central, user-accessible database integrated with suitable processes for assessing user applications, transfer of material, etc
 - These can be based on existing NDA processes
- Originally proposed that the archive could be established by March 2023, but subject to revision based on an EPSRC-NNUF offer to implement recommendations (Stage 2)
- During Stage 2, the detailed arrangements for long-term operation of the archive (Stage3) need further consideration and agreement

Stage 2: Implementation

- Proposal submitted to EPSRC April 2021
- Discussed at EPSRC panel 11 August 2021, well-received with a few conditions
- Next step is consideration by EPSRC for a formal offer when they receive response to conditions
 - Response required by 15 September 2021
- EPSRC need assurances about funding continued operation when the archive is established
 - Stage 3 cost estimate ~£1.5M/yr

Links established during Stage 1

- USA Irradiated Materials Library Idaho National Laboratory (Rory Kennedy)
- Nucleus Archive (NDA Caithness) Store of civil nuclear records (reports, etc) (Gordon Reid)
- Ion-irradiated material data records Being considered by Dalton Institute (Kevin Warren)

Project team for Stage 1

- UKAEA Martin O'Brien, Rosie Lay
- NNL Jonathan Hyde, Rob Jones, Jason Dean, Aaron Ellis
Phil Ivison, Simon Dumbill
- University of Bristol Peter Flewitt, Keith Hallam, Sabrina Shirazi, Gezina Lambert

Thank you for your attention

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