

NNUF and the Culham Materials Research Facility (MRF)

Introduction & Overview

Martin O'Brien
MRF workshop, 9 July 2015

Outline

1. Agenda for today
2. NNUF - history, facilities (NNL, DCF, ADRIANA)
3. MRF Overview
4. Pricing
5. MRF – Future Expansion

Today's Agenda

1. Introduction/Overview – Martin O'Brien
2. Progress with UK Irradiated Materials Archive – Peter Flewitt/Steve Roberts
3. Nuclear aspects – Damian Brennan
4. Hot cells – Steven Van Boxel
5. Tritium capability, Thermal Desorption Spectroscopy – Rob Smith
6. Scientific Equipment - Chris Hardie

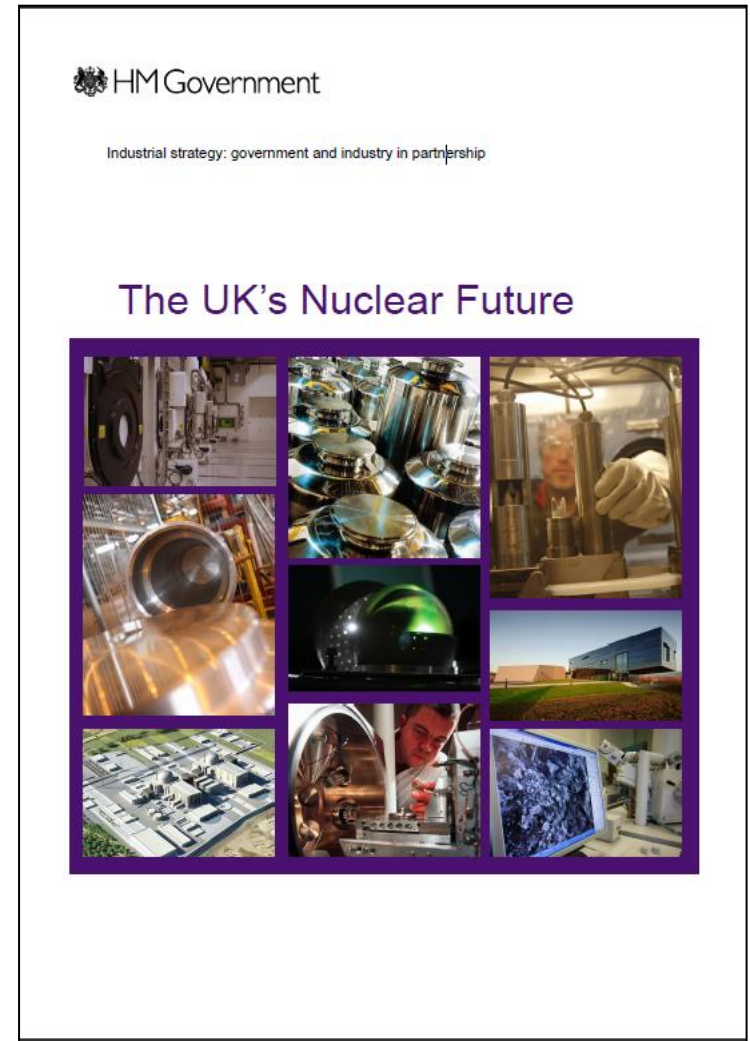
Lunch, Tour

7. This afternoon: priorities for further investment – chaired by Jon Hyde (NNL)

Q&A, Further discussions, Tour

National Nuclear User Facility - NNUF

- In its 2013 Nuclear Industrial Strategy, Government launched NNUF with £15M for new facilities at DCF, NNL and UKAEA. A further £1M for nuclear instrumentation (“ADRIANA”) invested at Lancaster, Liverpool, UKAEA.
- Multi-site facility to give academia and industry access to experimental equipment for nuclear research on materials with greater radioactivity than can be handled in universities
- NNUF Steering Committee. Now chaired by C Grovenor (Oxford) and M Joyce (Lancaster)
- Further £60M for NNUF announced in December for period to 20/21 (see later)
- www.nnuf.ac.uk





NNL

- Field Emission Gun Transmission Electron Microscope
- Focused Ion Beam
- FEGTEM and FIB to be in new suite of labs
- X-Ray Micro-tomography already in use in active lab

See Dominic Rhodes,
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NATIONAL NUCLEAR
LABORATORY



Dalton Cumbrrian Facility

NNUF funds to upgrade/expand large scale irradiation facilities

- 5 MV tandem ion accelerator
- Dual beam system incorporating new 2.5MV accelerator (2015)
- Beamline hot cell to enable increased damage depth and damage rate experiments
- High energy ^{60}Co gamma irradiator



On site material preparation and various PIE techniques

Ability to transfer activated samples to Culham & NNL Central Lab for processing/inspection

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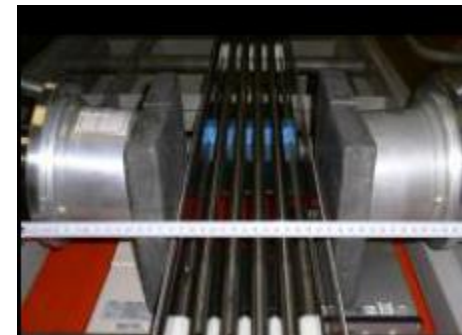
MANCHESTER
1824

The University of Manchester
Dalton Nuclear Institute

ADRIANA

(Advanced Digital Radiometric Instrumentation for Applied Nuclear Activities)

Lancaster -
High-order neutron multiplicity analysis of
actinide materials (32 channel array)



Liverpool - spectroscopic imaging & location of γ
contamination

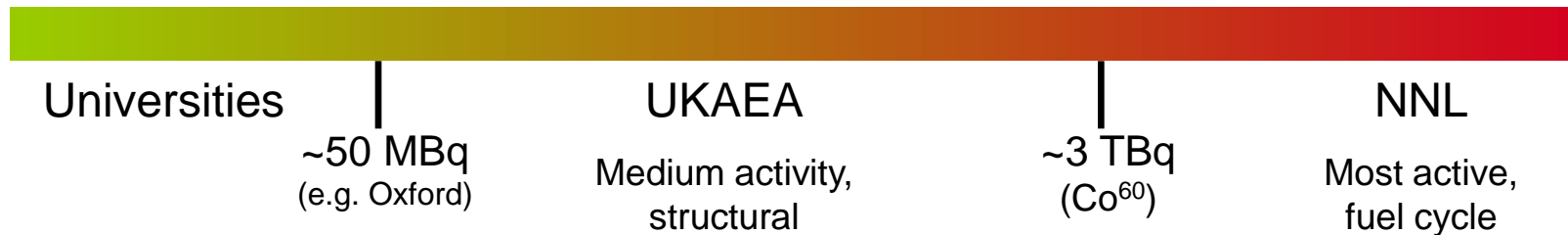


UKAEA - Ultra-low background
 γ -ray spectroscopy systems

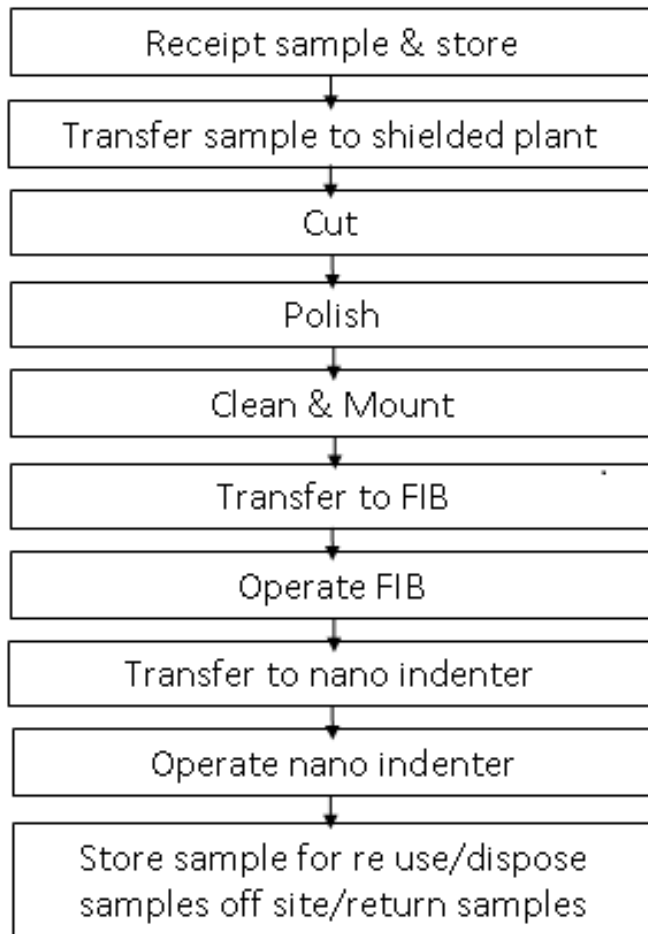
M Joyce (Lancaster), P Nolan & L Harkness Brennan (Liverpool), S Lilley & I Jenkins (UKAEA)

The MRF

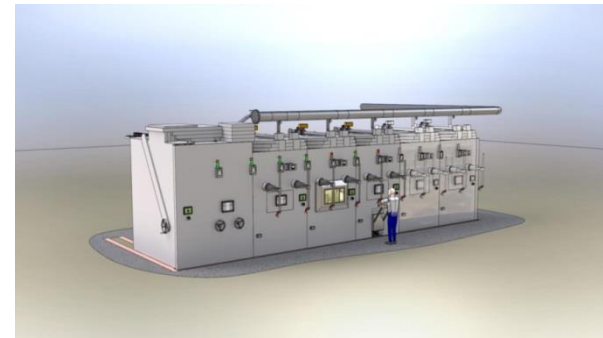
- ~ 2200m² building with hot cells and scientific equipment. ~ £9M - £5M from NNUF, remainder from UKAEA funds
- Process active material for analysis on-site or back at the university
- Intermediate between universities (very low activity) and NNL at Sellafield. Non-licensed site – but with nuclear expertise, MRF can take material up to inventory ~ 3 TBq



Typical Process (more details in later talks)



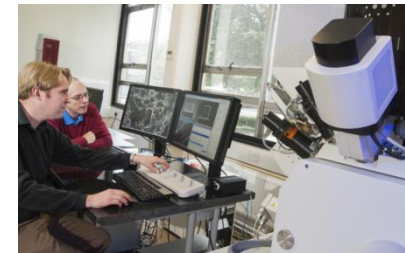
Shielded Activity



Or transferred to university



Limited and temporary storage (inventory for non-licensed site)



MRF - Timeline

- Sept/Oct 15 Building & Hot Cells complete
- Oct/Nov 15 move and recommission scientific equipment
- Nov/Dec 15 MRF Open

Pricing

- Price will be sum of generic MRF costs and job specific costs. Job specific costs will depend on one or more of:
 - Use of hot cells and for how long
 - Which instruments, and for how long
 - Non-routine support from UKAEA scientists and technicians
 - “Nuclear aspects” – waste, etc.
- Some of the more “nuclear” jobs may be several £k/day
- Please talk to us as early as possible – for universities, this means before you put in grant applications!

Future Expansion of MRF

- We intend to have more hot cells and instrument cells to house new equipment – some could be owned and run by universities
- Plenty of room - especially when we extend building ~2200 to ~ 3300 m² (\equiv doubling of space for equipment)
- Tell us what you want so together we can develop “oven ready” proposals to put to NNUF and other funding sources
- Session this afternoon chaired by Jon Hyde (NNL)

NNUF's new £60M

- Funding period is to 2020/21.
- Bids for wide range of equipment and sites expected. Some for active material will need to be at NNL Central Lab or Culham
- Evaluation process under discussion between NNUF Steering Board and EPSRC
- We want proposals ready early – money is sometimes available at short notice.
- We would like views on our own suggestions and your own ideas, so we can go to NNUF and other funding sources with joint proposals.

And finally

We intend to set up a user committee to advise on MRF operations and enhancements. Please let me know if you are interested in being a member.

CCFE contacts for use of MRF

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www.ccfе.ac.uk/mrl.aspx