

DISTINCTIVE

**Decommissioning, Immobilisation and Storage Solutions for
Nuclear Waste Inventories**

Summary and Progress

Michael Fairweather
University of Leeds

UK Nuclear Academics Discussion Meeting, University of Liverpool, 4th-5th September 2018



Background

- Started 10th Feb 2014, extension to 9th Feb 2019
- £4.91M EPSRC → total £6.13M, plus £2.23M from industry = £8.36M
- University network and project partners:

Imperial College
London

Lancaster
University

Loughborough
University

UNIVERSITY OF
BIRMINGHAM

University of
BRISTOL

UCL

UNIVERSITY OF LEEDS

MANCHESTER
1824
The University of Manchester

The
University
Of
Sheffield.

UNIVERSITY OF
SURREY

University of
Strathclyde
Glasgow

NATIONAL NUCLEAR
LABORATORY

NDA
Nuclear
Decommissioning
Authority

Sellafield Ltd

- Technical themes: AGR, Magnox and Exotic Spent Fuels
PuO₂ and Fuel Residues
Legacy Ponds and Silo Wastes
Structural Integrity
- Cross-Cutting Activities: Active Research Projects
Impact, Outreach and Public Engagement



www.distinctiveconsortium.org



DISTINCTIVE

Activities Since Last Meeting

Theme meetings, Rheged Centre, Penrith, 16th and 17th October 2017:

- Held as two parallel oral sessions in addition to poster presentations
- High industry attendance – including representatives from Amec Foster Wheeler, AWE, Cavendish Nuclear, Fraser-Nash Consultancy, Jacobs, LLWR, NDA, NNL, NSG Environmental, Radioactive Waste Management, Sellafield Ltd, Tuv-Sud Nuclear Technologies
- Enabled useful discussions with end-users providing useful direct feedback



Activities Since Last Meeting

Waste Management 2018, Phoenix, Arizona, 18th-22nd March 2018:

- Pre-eminent international conference on management of radioactive materials, attracting over 2,000 delegates
- DISTINCTIVE held dedicated session showcasing work of consortium
- Session well attended with ~60 people attending
- Focus on key findings to date and achievements, as well as importance of consortium from an industrial point of view
- Many thanks go to Prof Ian Pegg (Catholic University of America) and Dr Laurie Judd (Longenecker & Associates) for chairing session
- Networking event held after session well attended and many new contacts made
- Many thanks go to Longenecker & Associates for once again sponsoring this event
- Six other papers on work carried out by consortium



EPSRC DISTINCTIVE Research Programme

Wednesday 21st March 13:25 - 16:35 Room 106C

DISTINCTIVE is a multi-disciplinary collaboration of 11 universities and three key industry partners from across the UK's civil nuclear sector. Our world-class research programme focuses on the area of nuclear decommissioning and waste management.

Session Structure:

- **The DISTINCTIVE University Consortium: An Overview**
Prof. Michael Fairweather - University of Leeds (18102)
- **Theme 1: AGR, Magnox and Exotic Spent Fuels** (18345)
Prof. Tom Scott - University of Bristol
- **Theme 2: PuO₂ and Fuel Residues** (18132)
Prof. Colin Boxall - Lancaster University
- **Theme 3: Legacy Ponds and Silo Wastes** (18135)
Prof. Joe Hiltjac - University of Birmingham
- **Theme 4: Structural Integrity** (18272)
Prof. Rebecca Lunn - University of Strathclyde
- **Transforming High Activity Materials Research in the UK** (18212)
Prof. Neil Hyatt - University of Sheffield
- **An Industrial Perspective of Research within the DISTINCTIVE program** (18045)
Prof. Anthony Banford - National Nuclear Laboratory

More information about the programme can be found on our website: www.distinctiveconsortium.org or by contacting Dr Lois S Tovey: Ltovey@leeds.ac.uk.

Other DISTINCTIVE-associated presentations:

H₂ production from H₂O adsorbed on nuclear fuel (18544)
Poster - Monday - Session 035 - Mr Jamie Southworth - University of Manchester

Re-Use and Volume Reduction of Scabbled Contaminated Concrete Arising from Nuclear Decommissioning (18677)
Poster - Monday - Session 035 - Mr Toby Lord - University of Leeds

Cake Permeability of Waste Simulants found in the Highly Active Storage Tanks at Sellafield (18670)
Poster - Monday - Session 035 - Ms Jessica Shiels - University of Leeds

Understanding Radionuclide Interactions with Cementitious Materials for Radioactive Waste Management (18298)
Poster - Monday - Session 035 - Ms Antonia Yorkshire - University of Sheffield

Multiphase Large Eddy Simulation of a Pulsed Sieve-Plate Extraction Column (18123)
Oral - Wednesday - Session 089 - Mr Daniel Theobald - University of Leeds

Characterisation of Caesium Phosphomolybdate and Zirconium Molybdate Found in the HASTs (Sellafield) (18154)
Oral - Thursday - Session 129 - Ms Jessica Shiels - University of Leeds

Please join us for a social networking session in Room 106C immediately after the session. Please take the opportunity to meet the team, to discuss the DISTINCTIVE programme and to explore opportunities for collaboration.

We are grateful to Longenecker & Associates for their generous sponsorship of this event.



DISTINCTIVE

Activities Since Last Meeting

Conference attendance:

- Birmingham Research Poster Conference 2017, 15th June 2017, Birmingham, UK
- PETRUS-ANNETTE PhD and Early-Stage Researchers Conference 2017, 26th-30th June 2017, Lisbon, Portugal
- Actinides 2017, 9th-14th July 2017, Sendai, Japan
- Turbulence, Heat and Mass Transfer 9, 10th-13th July 2018, Rio de Janeiro, Brazil

Visits to facilities

- Diamond Light Source, Didcot, UK
- Australian Nuclear Science and Technology Organisation, Lucas Heights, Australia
- Internships at Hitachi-GE Nuclear Energy Ltd (HGNE), Hitachi, Japan
- Numerous other visits associated with active research: British Geological Survey, Dalton Cumbria Facility, GANIL (France), Little Forest Legacy Site (Australia), National Nuclear Laboratory Central Laboratory, Oak Ridge National Laboratory (USA), Photon Factory (Japan) and Surrey University Ion Beam Facility



DISTINCTIVE – 4th Annual Meeting

Decommissioning, Immobilisation and Storage Solutions for Nuclear Waste Inventories

National Railway Museum, York
11th September 2018

- Impact-focused technical presentations on each of 4 research themes, and 4 associated technical presentations
- Industrial perspective on impact of DISTINCTIVE programme
- Poster presentations for viewing during breaks



TRANSCEND: Transformative Science and Engineering for Nuclear Decommissioning

- EPSRC Nuclear Consortia Follow-on Funding call 3rd January 2018, submission 16th March, interview 5th June, offer letter 31st August, start date 1st September (EP/S01019X/1)
- University network:

Imperial College
London

Lancaster
University

QUEEN'S
UNIVERSITY
BELFAST

UNIVERSITY OF
BIRMINGHAM

University of
BRISTOL

UNIVERSITY OF LEEDS

MANCHESTER
1824
The University of Manchester

The
University
Of
Sheffield.

UNIVERSITY OF
Southampton

University of
Strathclyde
Glasgow

UNIVERSITY OF
SURREY

- Project partners:

AWE

cavendish
nuclear

LLWR Ltd

NATIONAL NUCLEAR
LABORATORY

NDA
Nuclear
Decommissioning
Authority

Radioactive Waste
Management

Sellafield Ltd

TUV
SUD

NUCLEAR
TECHNOLOGIES

- Technical themes: Integrated Waste Management / Spent Fuels
Site Decommissioning and Remediation / Nuclear Materials
- Cross-Cutting Activities: Facilities / Impact

UK Research
and Innovation

TRANSCEND

Relationship to DISTINCTIVE and Expected Outcomes

Metric	DISTINCTIVE	TRANSCEND
Universities	9	11
Industry partners	3	8
Number PI/Cols	19	20
Number early career researchers	6	9
Number PDRAs	10	12
Number PhDs (Uni/Ind/Total)	12.0/10.0/22.0	12.5/14.5/27.0
EPSRC funding	£4.9M	£4.5M
Industry partner funding	£2.0M	£3.7M
Total funding	£8.3M	£9.3M
Number projects	31	40

Increased breadth compared to DISTINCTIVE, particularly in bringing together research and industrial community to take more of whole lifecycle approach to decommissioning and waste management

TRANSCEND – Kick-Off Meeting

Transformative Science and Engineering for Nuclear Decommissioning

National Railway Museum, York
12th September 2018



UK Research
and Innovation

