

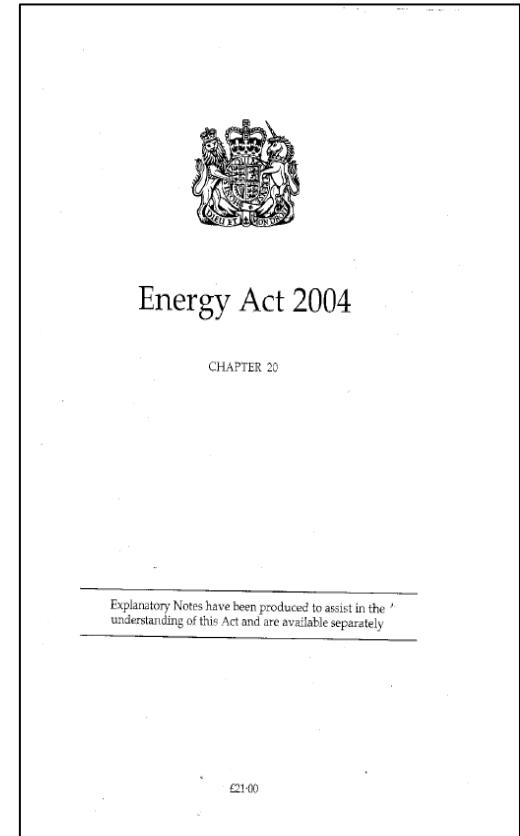
R&D across the NDA for waste and decommissioning

Darrell Morris – Research Manager

Why do we do R&D?

- **Established via Energy Act 2004 by Government to:**
 - Safely clean up the UK civil public sector nuclear legacy with due regard to the environment and security and socio-economic issues.
 - Ensure that current commercial operations are run safely and efficiently on behalf of UK taxpayer.

Dealing with the past
Protecting the future



What do we do?

Context

Policy
Legislation
Regulation
Funding

Operations

Magnox Fuel Cycle
Oxide Fuel Cycle
Recycling

Core Values

Safety
Delivery
Value for money
Transparency

Clean-up

Sellafield LP&S
Dounreay retrievals
Active facilities
Reactors
End states

Enablers

Competition
Socio-Economics
Skills, R&D
Stakeholders
Capability

Waste Mgt

LLW
GDF
Transportation
Interim stores

Best Practice

US DoE
Japan
France

Commercial

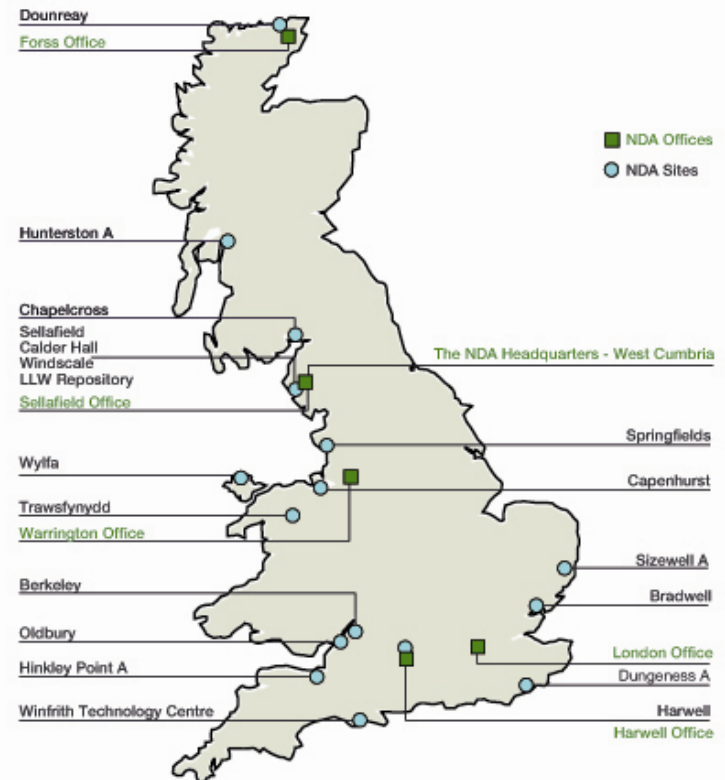
Generation
Land
Fuel Services
Materials

Risk

Technical
Financial
Political

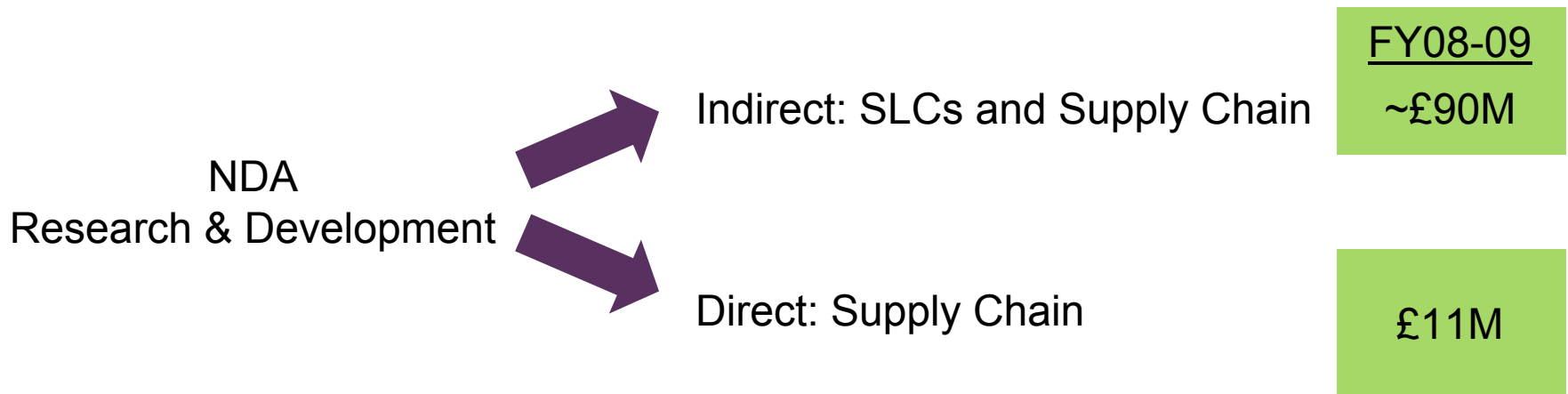
Where do we do it?

- **Primary function is to decommission and clean up 19 sites in UK**
 - reactors
 - fuel reprocessing plants
 - fuel fabrication plants
 - redundant enrichment plant
 - nuclear laboratory complexes
- **Develop national solutions for dealing with Low Level Waste**
- **Implement the geological disposal facility for higher activity wastes**



How NDA delivers R&D

- **NDA R&D role:**
 - Promote and, where necessary, fund generic research relevant to nuclear decommissioning and clean-up
- **Current R&D strategy:**
 - SLCs carry out R&D in conjunction with the supply chain, with an NDA led strategic R&D programme being carried out by the supply chain. NDA provide overall leadership in order to deliver the NDA's mission



Direct NDA-funded Research

- **Key objectives:**
 - Inform strategy / policy
 - Innovation – Generic needs / risks / opportunities
 - Maintain / develop key technical skills
 - Promote link to SLC

Direct Research Portfolio (DRP)

Lot 1 – University Interactions
Lot 2 – Waste Processing
Lot 3 – Material Characterisation
Lot 4 – Actinide & Strategic Materials

Framework Contractors
Competed via OJEU

Concepts

Multiple
< £50k

Technology Demonstration Project

Single
< £1million

Supply Chain
Competed via Open Calls

DRP: Lot 1 – University Interactions

- **Framework Contractors**
 - NNL and Serco
- **Direct funding of Universities**
 - Capability: Professorships / Lectureships / PDRAs
 - PhDs / EngDocs / CASE awards
- **Technical support**
 - Providing industrial perspective
 - DIAMOND – www.diamondconsortium.org
 - RCNDE – www.rcnde.ac.uk
- **Access to experimental facilities**
 - Active experiments within NNL Central Laboratory

DRP: Lot 2 – Waste Processing

- **Framework Contractors**
 - Hyder Consulting Consortium, NNL, UKAEA Consortium
- **Full cycle**
 - Retrieval / Processing / Wasteform / Packaging / Storage / Disposal
- **Examples from FY08-09**
 - Modular/mobile effluent retrieval and transfer plants – NNL
 - Opportunities to segregate short-lived and long-lived ILW – Hyder
 - Silicone polymers as encapsulants - UKAEA



DRP: Lot 3 – Material Characterisation

- **Framework Contractors**
 - NNL, Serco, UKAEA Consortium
- **Two main areas of investigation**
 - Contaminated land & Waste characterisation
- **Examples from FY08-09**
 - Good practice in data management & storage for land quality – Serco
 - Monitor on industrial scale – NNL
- **Examples from FY08-09**
 - Graphite characterisation – UKAEA
 - Rapid characterisation of contaminated material without a reliable gamma fingerprint - Serco

DRP: Lot 4 – Actinide & Strategic Materials

- **Framework Contractors**
 - NNL and UKAEA Consortium
- **Three main areas of investigation**
 - Plutonium
 - Uranium
 - Spent-fuel: Magnox, Oxide, Exotic
- **Examples from FY08-09**
 - Radiolysis and Surface Reactions during the Storage of Plutonium Oxide - UKAEA with ITU
 - Immobilisation of Plutonium in a Ceramic Wasteform – NNL

Concepts

- **Small scale innovation projects**
 - Overall cost of <£50k
 - Duration of less than 1 year
 - Potential deployment typically medium to long term
- **Open call with supply chain**
 - Nuclear Waste Research Forum used to technically evaluate proposals
- **Examples**
 - Demonstration of NVisage™ for thick shielding geometries – REACT
 - Computer modelling of organic forms – Fortis Mechanical Design Ltd

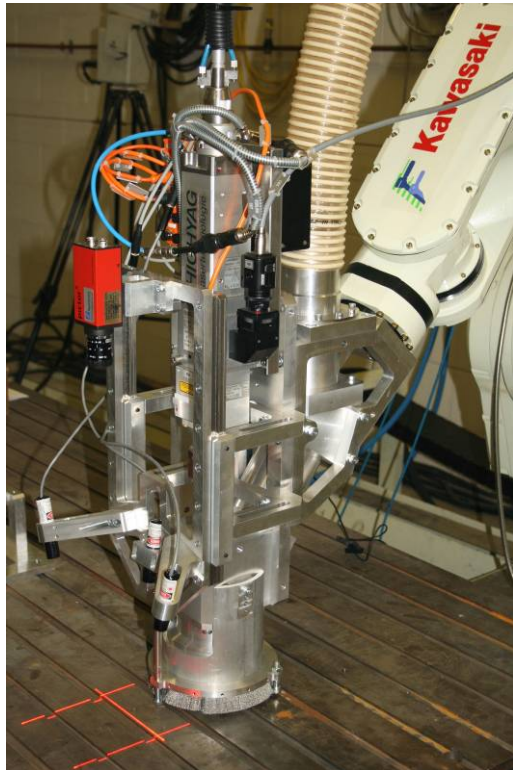
Technology Demonstration Project

- **Laser Cutting and scabbling – TWI**
- **Why**
 - Decommissioning area on appropriate timescale
 - Knowledge transfer
- **Benefits**
 - Uses recent development in fibre lasers
 - Remote laser unit and laser on end of fibre optic cable
 - Cutting – no resistive force
 - Insertion point ~5 years



Technology Demonstration Project

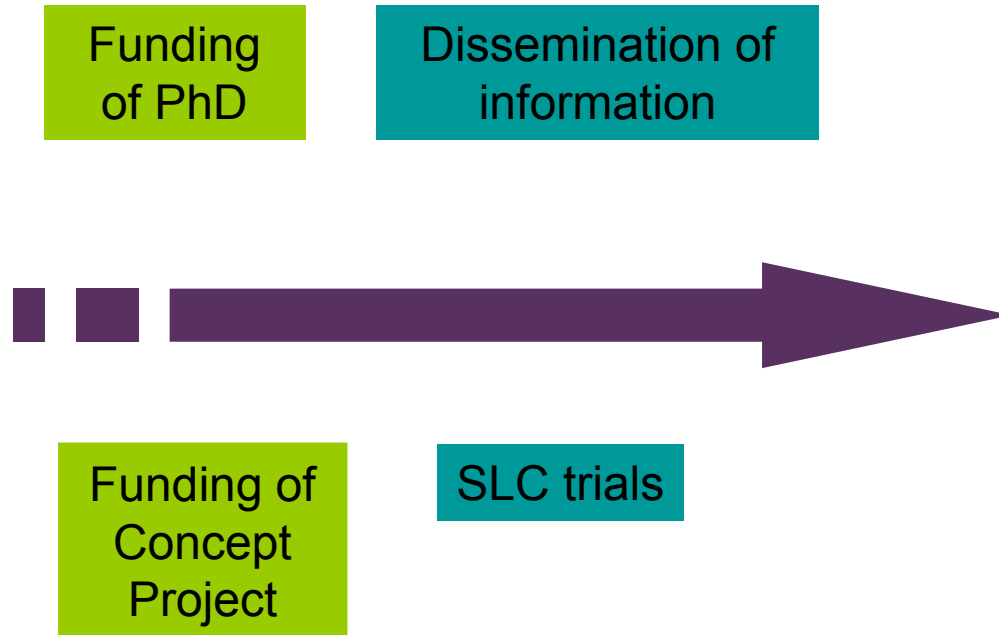
Laser Scabbling Head



First single side cutting trials

R&D Timeline

Ice-Pigging



Dissemination of information

- R&D area on NDA website launched (www.nda.gov.uk/research)
 - Applying appropriate and innovative technology is critical to our mission of accelerating and delivery clean-up programmes
 - Sharing innovative thinking across estate and supply chain
 - Commitment to openness and transparency

- Contact details

research@nda.gov.uk

The screenshot shows the NDA website's 'Research and Development' section. At the top, there is a navigation menu with links for Home, About Us, News & Events, Our Strategy, Our Sites, Stakeholders & Community, Suppliers, Contact Us, and Document Library. A search bar is located in the top right corner. The main content area is titled 'Research and Development' and includes an overview paragraph: 'Applying appropriate and innovative technology is critical to our mission of accelerating and delivering clean-up programmes.' Below this, there is a section for 'Background information' with tabs for Overview, Funded Research, Key Documents, and Key Contact. A 'Research and Development Updates' section displays two news items: one dated 09 November 2009 about the PAMINA Project, and another dated 02 November 2009 about a JRC report on radioactive waste disposal. On the right side, there is a 'See also' section with a 'Latest Research News' list, including a headline about 'Cillit Bang used in clean-up at Dounreay' dated 25 August 2009.

Summary

Applying appropriate and innovative technology is critical to our mission of accelerating and delivering clean-up programmes

- **NDA Direct R&D portfolio**

- DRP
- Concepts
- Technology Development Programme

