

Facilities



Welcome

FROM PAUL HOWARTH
MANAGING DIRECTOR



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With the nuclear industry experiencing a welcome resurgence, the National Nuclear Laboratory (NNL) is committed to producing better, cheaper and faster technology to support our colleagues across the nuclear sector.

We have the essential ingredients to make a full and lasting contribution: exceptional people and world class facilities. NNL has the all round capability to provide technology services across the entire nuclear fuel cycle from fuel manufacturing to power generation, treatment of used fuel and decommissioning.

Our facilities are second to none. At Sellafield, we operate the most modern nuclear technology research facility in the world, the Central Laboratory, alongside the workhorse Windscale Laboratory.

We also operate the Preston Laboratory on the Springfields site and have a non-radioactive test rig facility at Workington. NNL also operates out of Risley, Stonehouse and Harwell.

The Central Laboratory is at the core of NNL. When fully commissioned, the Laboratory has world class potential to make a very significant contribution to global nuclear research and development.

Innovation and safety are at the foundation of NNL and we are determined to make the best possible use of our assets to support a vibrant and exciting industry going forward.

Unique Facilities

The UK's National Nuclear Laboratory is a leading nuclear technology services provider. We specialise in providing customers with tailored solutions by applying the right level of technical innovation and intellectual support.

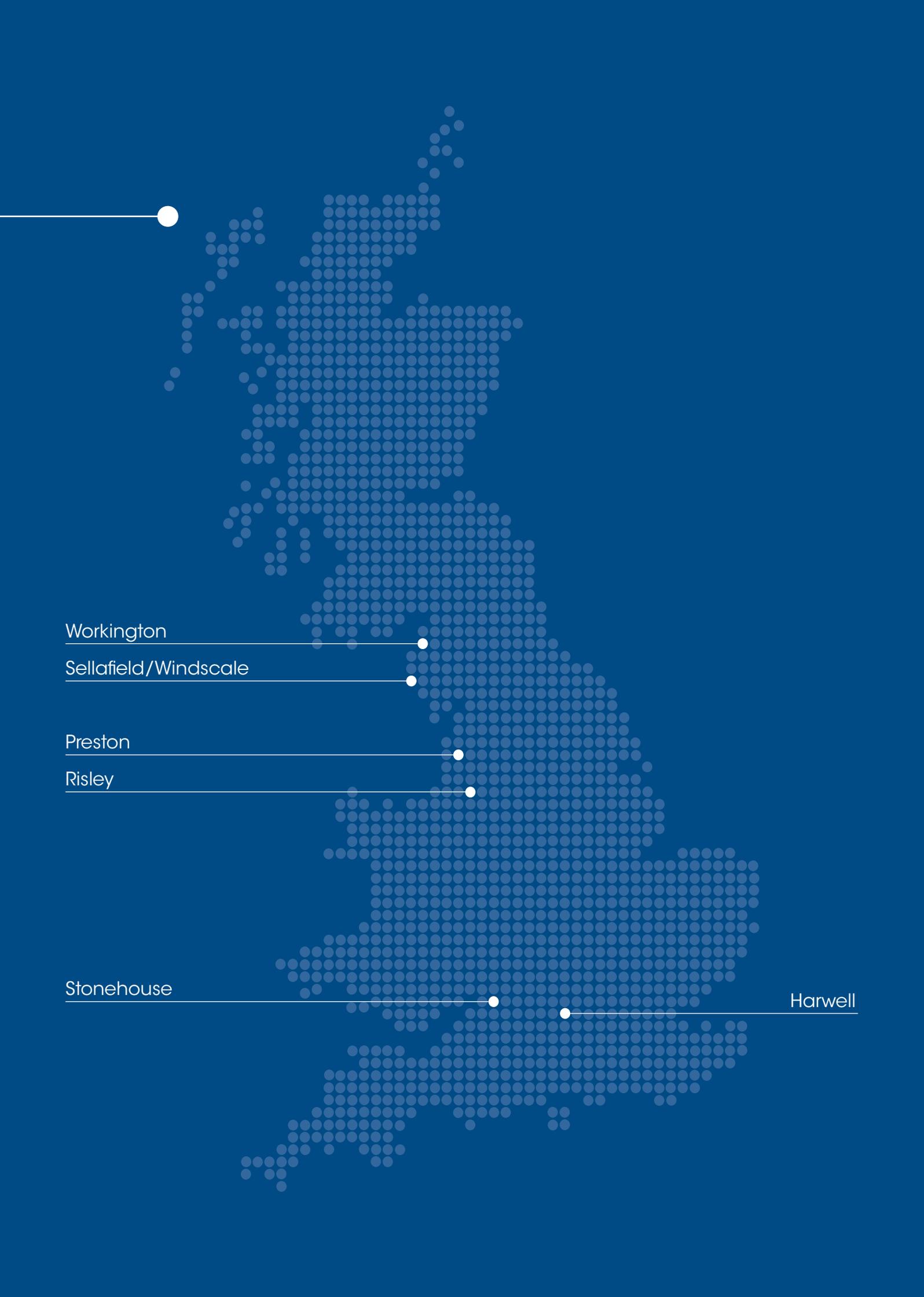
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A number of different elements make up the UK's National Nuclear Laboratory:

- Robust portfolio of nuclear science and technology programmes
- Attraction, retention and motivation of the best people
- Scientific innovation in world-class research facilities
- Nuclear science and engineering education and training (skills pipeline to private industry)
- Technology transfer programme (facilitate creativity in private industry)
- Nuclear advisor to Government
- National and international collaborations and links with academia

The National Nuclear Laboratory has access to some of the most advanced facilities in the world. Combined with our highly skilled technical people, this ideally positions us to provide customers with all-round technical capability and flexibility.





Workington

Sellafield/Windscale

Preston

Risley

Stonehouse

Harwell

Central Laboratory

As the NNL flagship facility, the Central Laboratory has enormous potential. A fully functional Central Laboratory will increase NNL capability and establish the Lab as a provider of a full suite of nuclear technology services.

Active and non active laboratories and active rig hall are already in operation. Plutonium laboratories and high active alpha/beta/gamma cells are being commissioned. Once completed the plutonium laboratories will carry out mixed oxide fuel development and general plutonium related work. The high active cells are modular and reusable providing access to five plug and play shielded working areas that are designed to be fully interchangeable.

When fully operational, the Central Laboratory will become the most advanced nuclear research facility in the world and a real asset to the nuclear industry and the UK.

Non Active Laboratories

- Modules consisting of a fume cupboard and workbench
- Carry out physics, chemistry and materials science

Rig Hall

Able to accommodate large process and experimental rigs, the active rig hall includes a high tower, reagent storage area, workshops and series of rig bays.

A 3.2 tonne crane spans the full width of the hall. The reagent tower, 18m in length, 9m wide and 25m high, is equipped with a hoist well and five tonne lifting beam.

Test rigs can be introduced into the Central Laboratory in a pre-fabricated form to reduce construction time within a radioactive environment and minimise installation work prior to commissioning. On completion of the experimental work, rigs are decontaminated and prepared for removal from the lab. This process increases the overall availability of space in the rig hall.

Active Laboratories

Uranium and trace active laboratories:

- Undertake waste treatment and characterisation research work for both solid and liquid effluents
- Equipped with a comprehensive active ventilation, filtration and drain system

Medium active laboratories:

- Activities carried out using glove boxes and fume cupboards
- Undertake plutonium studies, sludge and cementation trials, radiometric systems, wet chemistry and instrumental process
- Additional laboratories examine low active materials, looking at waste treatment and characterisation for solid and liquid effluents along with decontamination development studies

Aerial effluent treatment laboratory:

- Supports experimentation to evaluate different systems for removing/reducing NOx and iodine emissions

Aerial effluent treatment laboratory:

- Supports development of process equipment or measurement systems based on lasers and magnets using low or medium levels of radioactive samples and sources

Alpha Radiation Laboratories

Overall there are 7 alpha radiation laboratories totalling 45m x 58m. Featuring glove box modules designed for efficient operation, safety and containment. Mixed Oxide (MOX) fuel and plutonium research is carried out along with radiometric instrumentation.

The laboratories are essentially small-scale pilot plants providing support to existing manufacturing at Sellafield and enabling research and development to be carried out on separated plutonium, mixed oxide fuels and mixed matrices fuel.

High Active Cells

Comprise separate working environments each with a dedicated containment area, covering a footprint of 30m x 56m. Activities include decontamination development on real plant materials and research into immobilisation techniques using retrieved high and medium active wastes.

The facility provides a line of five removable biologically shielded alpha/beta/gamma/neutron cells. To the rear of each cell, a shield door leads into the transfer area, through which an inner containment box is moved remotely. Cells one and two can be linked via an access port to enable larger experiments.

These 'plug and play' cells can be completely decontaminated and new equipment inserted and positioned after each use.

Active Rig Hall

The uranium active rig hall is 45m x 18m. Six test rig bays in the main area and two in the tower area. Each bay is identical and can accommodate a test rig of 4m (l) x 3m (w) x 2.5m (h). In addition, the six main bays can house double height rigs and for larger rigs, bays can be linked together. A 3.2 tonne crane spans the full width of the rig hall.

At the west end of the Rig Hall is an 18m (l) x 9m (w) x 25m (h) tower with a hoistwell and 5 tonne lifting beam. Mechanical, electrical and instrument workshops can deal with repairs and make modifications to rig equipment.

Test rigs can be introduced into the Central Laboratory pre-fabricated, thereby reducing construction time in a radioactive environment and with minimal installation work prior to commissioning. In order to increase the availability of the Rig Hall, rigs are decontaminated and prepared for removal from the Central Laboratory once experiments have concluded.

Note: NNL's activities in its leased facilities at Springfields (Preston Lab) and Sellafield (Central Lab and Windscale Lab) are operated under Command & Control regimes by Springfields Fuels Ltd and Sellafield Ltd respectively. Activities carried out under those regimes are constrained by the relevant Environmental Permits and Nuclear Site Licences held by Springfields Fuels Ltd and Sellafield Ltd.



Windscale Laboratory

Located on the Windscale nuclear licensed site at Sellafield, the Windscale Laboratory is a unique facility able to offer unrivalled flexibility in provision of essential services to customers, including:

- Post-Irradiation Examination (PIE) of nuclear fuel and irradiated materials
- Radioactive Waste Processing and Management
- Handling and Management of Radioactive Sealed Sources
- Material Analysis
- Mechanical Testing

High Active Facility

Used for non-destructive and destructive examination of reactor fuel and irradiated materials. The Laboratory also has facilities dedicated to the processing and management of radioactive waste and sealed sources.

The Laboratory comprises of:

- 13 shielded cells ("caves") with typical dimensions of 11m wide, 2.5m deep and 4m tall
- Active Corridor linking all cells allowing movement of materials
- Concrete shielding (beta/gamma levels)
- Service Cranes able to transport flasks up to 60te



Mechanical Testing and Optical Examination

Provides mechanical properties testing of highly irradiated reactor components, and material analysis services including radiological and physical characterisation, isotopic analysis and elemental chemical analysis.

The Laboratory houses an electron optics suite comprising transmission and scanning electron microscopy equipment. Facilities are also available for the preparation and microstructural analysis of highly irradiated materials.

Receipt of Fuel and Materials

The Windscale Laboratory is unique in the UK, as it is able to handle all reactor fuel types (including LWR, AGR, Magnox and others) in a vast range of flasks, including:

- General flasks and sample flasks
- AGR Type A2 flasks
- Any cuboid flask such as Magnox flasks
- Horizontal sample flasks (PWR)
- Modular flasks



Preston Laboratory

A purpose-built facility designed to service customers requiring uranium active research and development. In addition, it provides technical support and business services from its office base. The facility also operates an active, flexible pilot plant for larger scale work. The principal areas of the building deal with:

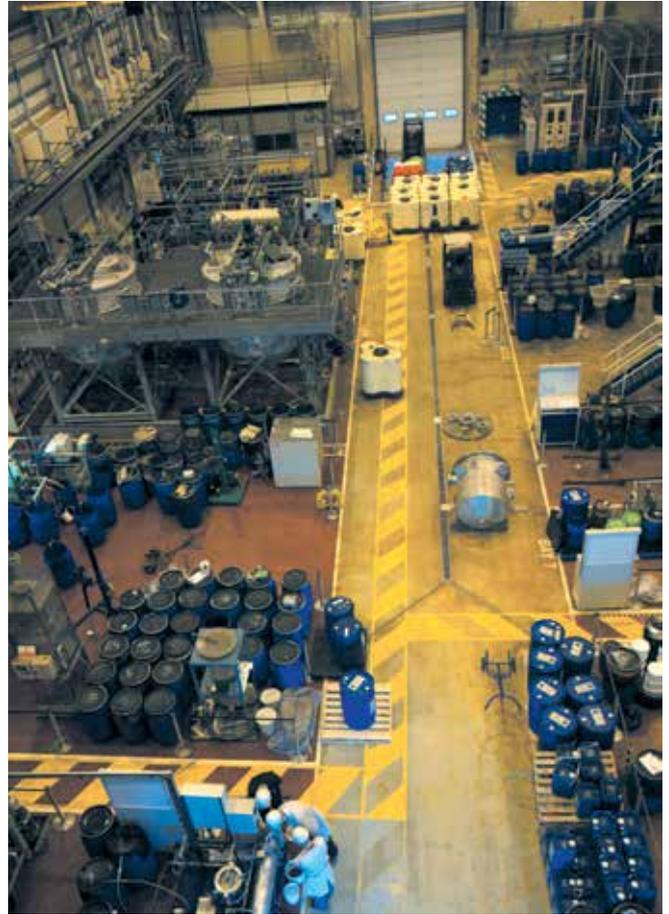
- Uranium-active materials
- Low and non-active research and development
- Office and laboratory based technical support

Uranium Active Chemistry Facilities

- R&D chemistry laboratories
- Process instrumentation laboratory
- Rig development hall
- 10-bay pilot plant with 10 tonne crane
- Radiometrics counting laboratory
- Low level waste separations laboratory
- Intermediate level waste physical and radiochemical characterisation laboratory

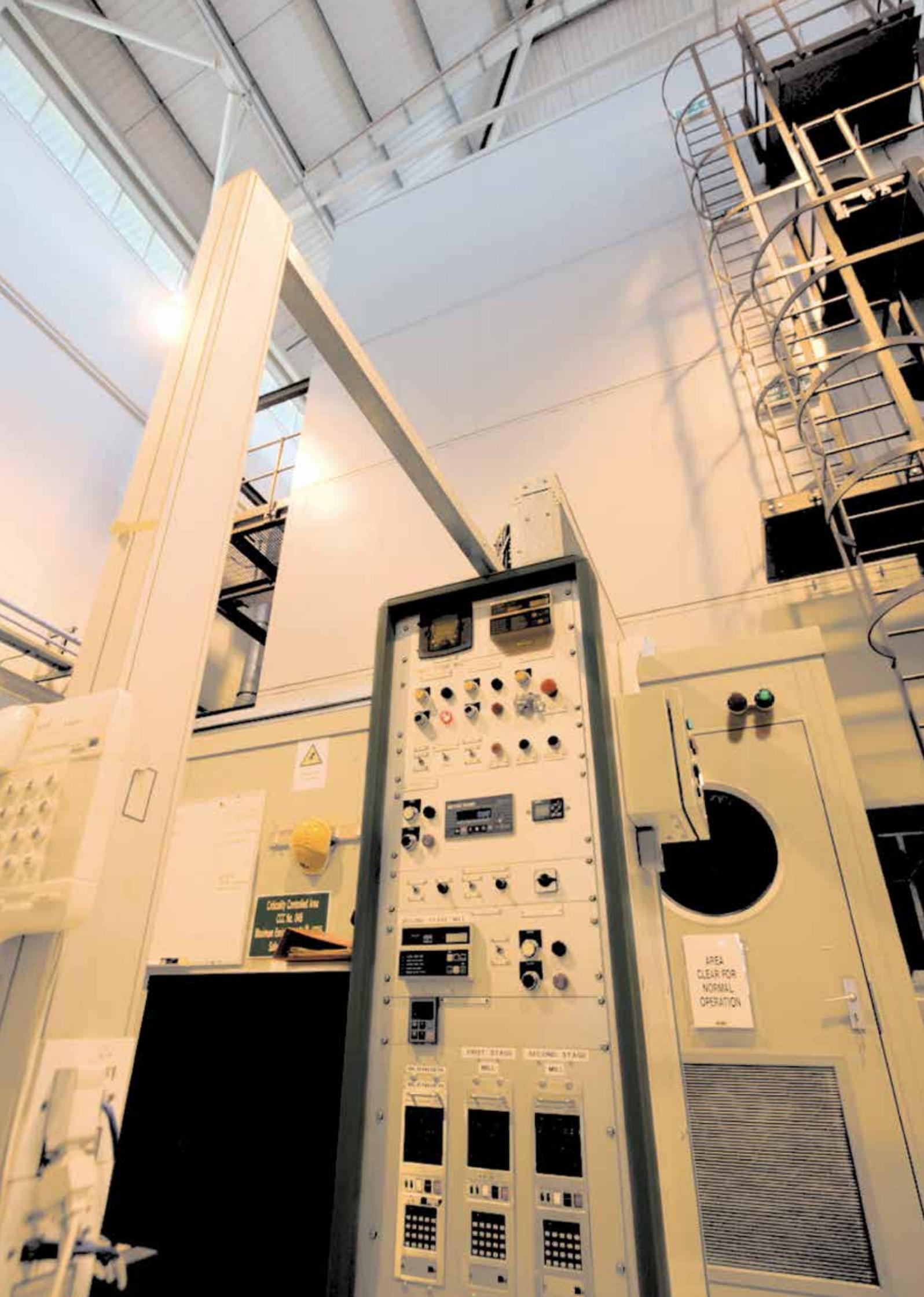
Uranium Active Oxide Powder Development Facilities

- Novel fuel fabrication process development
- Powder processing laboratories
- Total enclosures for bulk uranic work
- Pellet pressing facilities
- Sintering furnaces
- Powder and pellet QA testing laboratory
- Engineering development of uranium active rigs
- Large rig hall



Non-Uranium Active Research and Development Facilities

- Chemistry laboratory
- Chemical engineering rig hall
- Fluorine chemistry facility
- Microscopy laboratory incorporating an environmental scanning electron microscope, an energy dispersal x-ray microscope, a secondary ion mass spectrometer, a laser confocal microscope and an atomic force microscope



Workington Laboratory

Located less than 20 miles from Sellafield, the Workington Laboratory is a non-radioactive engineering and rig testing facility. Services include:

- Technical assessment and solution proposition
- Design, manufacture and build of test rigs
- Rig testing
- Operator training

Facility Features

- 6000m² of fully serviced space
- Craneage up to 60 tonnes with 8m head space to hook, extendable to 14m
- Dedicated encapsulation area can produce large scale cementitious grouts based on different feedstocks
- Large 6m deep pit with 245m³ capacity for underwater testing or housing tall rigs
- 2000m² storage space, including ISO freight space
- Comprehensive mechanical and electrical workshops
- 1500m² office space
- Skilled process workers

Experience includes

- Development of engineered mechanical and hydraulic retrieval systems
- Development of engineered waste process systems
- Development of ultrasonic systems
- Development of remote sampling systems
- Development of decommissioning equipment
- Construction of full-scale plant mock-ups
- Engineering training facility e.g. MSM training



Areas of Expertise

- Science and engineering of waste treatment and management processes
- Nature and behaviour of simulated radioactive waste
- Waste characterisation
- Inactive simulant selection and manufacture
- Cement chemistry and grout manufacture
- Encapsulation plant and screening rigs
- Product quality assessment and evaluation
- Engaging with regulatory stakeholders
- Letters of Compliance submissions
- Radioactive waste effluent treatment
- Process and analytical chemistry support
- Engineering design
- Underpinning modelling support
- Corrosion assessment



Other NNL Facilities

Complementing the NNL's Laboratory based facilities additional capability is located at offices at Harwell, Stonehouse and Risley. NNL Risley leads on modelling and simulation and environmental management. NNL Stonehouse carries out UK reactor services and NNL Harwell features materials science and chemistry.

NNL Harwell

- Post Irradiation Examination Analysis
- Analysis of Fuel and Graphite
- Materials Evaluation and Assessment
- Radiation Chemistry

NNL Risley

- Modelling and simulation
- Engineering
- Environmental Management
- Project Management
- Corporate Functions

NNL Stonehouse

- Station Chemistry and Corrosion
- Graphite Technology



Managing Facilities

Safety

National Nuclear Laboratory ensures best possible safety is maintained at all times in all of its facilities through best practice, training, induction and implementation of procedures. Safety performance has been consistently excellent in NNL and the company has won the prestigious RoSPA Research and Development Industry Sector Award on many occasions. In fact our win in 2011 was our 7th win in the past 8 years and we secured a Highly Commended Award on the other occasion.

RoSPA Occupational Health and Safety Awards are the benchmark for recognition of commitment to health and safety. Sector awards identify and reward best performance over all industrial categories and are a huge acknowledgement that winners are on the right track in delivering occupational safety excellence.

The systems and processes employed ensure that NNL continues to commit to the safety of the public and employees. NNL always seeks to learn from past experience and deploy best practice.

Operating Experience

The NNL Facilities Management team has vast experience of operating active research facilities at Sellafield, Springfields and Windscale.

In operating facilities, NNL has contributed to the achievement of the following:

- High standards of safety and compliance
- Development of lease/tenant arrangements with the Sellafield and Springfields sites (endorsed by the Nuclear Installations Inspectorate (NII) in March 2005)
- Active commissioning of the first phase of the Technology Centre at Sellafield
- Commended by Sellafield site on the demonstration of emergency arrangements

Contact

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Chris Moore

Strategic Business
Development Director

T: 01925 289 827

M: 077256 154 06

E: chris.x.moore@nnl.co.uk



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5th Floor
Chadwick House
Warrington Road
Birchwood Park
Warrington
WA3 6AE

T. +44 (0) 1925 289800
E. customers@nnl.co.uk

W. www.nnl.co.uk

 @UKNNL

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