NATIONAL NUCLEAR LABORATORY

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NATIONAL NUCLEAR LABORATORY

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Andrea Leadsom at Preston Laboratory

The Minister visits the Pellet Laboratory with a uranium pellet manufactured on plant.

"It was great to have the opportunity to visit the National Nuclear Laboratory to see their world-leading research and development facilities and to meet their talented scientists, engineers and apprentices."

Earlier this year, NNL was delighted to welcome Andrea Leadsom, the then Minister of State at the Department of Energy and Climate Change (DECC), to the Preston Laboratory.

Hosted by Chairman Sir Andrew Mathews and Managing Director Paul Howarth, Mrs Leadsom met with NNL's senior management and many others as she toured the facility, located on the Springfields nuclear site.

The Preston Laboratory provides uranium active research and development to customers and operates a pilot plant for larger scale uranium work and a rig hall. In addition to plant personnel, the Minister also took the opportunity to meet and talk to apprentices, technicians and graduates.

Mrs Leadsom was appointed Minister of State at DECC in May 2015 having become MP for South Northamptonshire in 2010. She previously worked in the banking and finance sector.

More recently she was a high profile challenger for the leadership of the Conservative Party and Prime Minister following the resignation of David Cameron. With Theresa May, she reached the final two before withdrawing from the contest. She was subsequently named in Theresa May's first cabinet as Secretary of State for the Environment, Food and Rural Affairs.

At the time of her visit to the Preston Laboratory, Mrs Leadsom was a very important stakeholder in the nuclear sector and her wide ranging responsibilities encompassed the Government Investments portfolio, which includes NNL, the Nuclear Decommissioning Authority (NDA), the examination of options for a Geological Disposal Facility, new nuclear build, safety and regulation.

Outside of nuclear her brief also covered carbon capture and storage, renewables, oil and gas policy, the electricity market, new energy infrastructure and energy security.

During a question and answer session at the Preston Laboratory, Mrs Leadsom noted that she was impressed with the range of activities undertaken both in the facility and by NNL as a whole.

She said: **"It was great to have the opportunity to visit the National Nuclear Laboratory to see their world-leading research and development facilities and to meet their talented scientists, engineers and apprentices.**

"I was delighted to see the level of innovation at NNL. From developing safer, more resilient fuel rods to designing new ways to decommission nuclear waste, this innovation is an important contribution to UK plc and will ensure the UK remains a nuclear world leader."

Following her appointment as Prime Minister, Theresa May's new cabinet announcements brought an end to DECC, which has been replaced by the newly-created Ministry of Business, Energy and Industrial Strategy led by Secretary of State Greg Clark. In addition to the former DECC, Mr Clark's new department also includes the remit of the Department for Business, Innovation and Skills.

Claudia's **DISTINCTIVE** Prize

An exciting and innovative multi-disciplinary collaboration, the DISTINCTIVE project includes NNL in partnership with ten UK Universities, Sellafield Ltd and the NDA.

Dr Rick Short with Claudia Gasparrini and Sophie Rennie, University of Bristol (right)

DISTINCTIVE, or Decommissioning, Immobilisation and STorage solutions for NuClear wasTe InVEntories, is a programme of work that incorporates 32 research projects within the broad area of nuclear waste management, decommissioning and disposal.

The collaboration is arranged into four themes:

- AGR, magnox and exotic spent fuels
- Plutonium dioxide and fuel residues
- Legacy ponds and silo wastes
- Structural integrity

The second Annual Meeting of the DISTINCTIVE University Consortium was held earlier this year in Bristol and featured an impressive prize winning performance for NNL. The award for Best Oral Presentation was presented to Claudia Gasparrini by NDA's Research Manager Dr Rick Short.

Claudia is a student at Imperial College London and is undertaking an iCASE PhD funded by NDA.

NNL manages the contractual arrangements for PhD bursaries on behalf of NDA. Funding is made available to UK academic institutions for PhD projects and in 2016 up to £500,000 passed through to Universities and research institutes.

Claudia has been investigating 'Options for Exotic Carbide Fuels' under the supervision of Professor Bill Lee at Imperial College and NNL's Dr Duncan Coppersthwaite who is based at the Preston Laboratory.

Significant quantities of spent and unused fuel and manufacturing residues are currently stored on the Dounreay site in northern Scotland. Some of these materials are in the form of uranium-plutonium carbide.

The long term storage of carbide materials is very challenging and direct disposal of the fuel is not considered to be viable as the reaction of the carbide material with water leads to the generation of considerable volumes of flammable gases.

A key component of Claudia's PhD project is the investigation of uranium carbide oxidation mechanisms and her preliminary results formed the basis of her presentation at the Bristol event. The work has direct relevance to the stocks of UK exotic carbide fuels, which will most likely require conversion to a stable uranium oxide structure prior to extended storage or disposal.

Claudia's work at the Preston Laboratory has enabled her to access uranium carbide fuel pellets previously manufactured for use in the former Prototype Fast Reactor (PFR). Working alongside members of NNL's Waste and Residues Processing, Decommissioning and Fuel Technology Teams, Claudia has been able to use a range of experimental and characterisation equipment including facilities in the recently established Fuel Centre of Excellence.

Through the DISTINCTIVE Consortium, she has also secured access to complementary characterisation facilities at the University of Bristol's Interface Analysis Centre and arrangements are underway for the transfer of uranium carbide pellets from the NNL Preston Laboratory to Bristol.

Access to actual PFR fuel pellets and the use of state of the art characterisation facilities at the Preston Laboratory and through the wider DISTINCTIVE consortium will enable the application of experimental results to wider UK carbide fuel stocks.

Innovation Research Gathers Greater Momentum

By playing an increasingly important role as hub and integrator for national nuclear research and development programmes, NNL delivers value to customers and the very best authoritative advice to stakeholders including the UK Government.

NNL's newly launched Science and Technology strategy has set out a five year forward programme. The strategy is aimed at NNL becoming more established as a national laboratory operating commercially as well as being recognised as the UK's premier nuclear science and technology organisation.

NNL will look to make a real and sustained impact in the future by being positioned at the frontiers of nuclear science and technology.

The Science and Technology strategy outlines the core elements of NNL's 2020 Vision to be the UK's premier nuclear fission science and technology organisation and in the top 10% of similar organisations worldwide.

This ambitious goal will be achieved by delivering a combination of profitable commercial science and technology programmes and a key Innovation Research and Development (IR&D) programme. NNL IR&D looks to deliver projects that drive innovation into national/international nuclear programmes while also maintaining a strong strategic nuclear capability.

NNL's creative technical community is actively encouraged to be involved in IR&D to drive innovative programmes that look to meet both commercial and national needs. The objective is to use the great ideas generated by IR&D to raise NNL's technical reputation as a top national laboratory by developing internationally leading capabilities in at least five fields of science and technology.

The re-energised and re-focused IR&D programme will look to push innovation more aggressively to help reduce costs and accelerate programmes across the nuclear fuel cycle. IR&D will also provide invaluable support to the technical development of NNL people through involvement in exciting research projects.

NNL is RoSPA Winner

NNL has added to a tremendous record of achievement by again being named as a winner at the Royal Society for the Prevention of Accidents (RoSPA) Occupational Health and Safety Awards. NNL achieved a 'Commended' award in the Research and Development Sector.

A group led by Mark Edmiston, Head of Environment, Health, Safety and Quality was presented with the award during a ceremony at the Hilton Birmingham Metropole hotel in July.

The RoSPA Awards are open to businesses and organisations of all types and sizes from across the UK and overseas. Judges consider occupational health and safety management systems, including practices such as leadership and workforce involvement.

Julia Small, RoSPA's Head of Awards and Events said: **"To win an award at such a highly-regarded event as the RoSPA Awards is a great achievement for our winners.**

"It recognises their commitment to maintaining an excellent health and safety record and raises the bar for other organisations to aspire to. We offer them our congratulations."

Keith Johnson, NNL's Facilities and Safety Director said: **"We're really proud to receive this RoSPA award. We're committed to ensuring health and safety is a priority for everyone in NNL".**

Landmark Success for GeoMelt®

Considered an unlucky day in superstition, Friday 13th proved the opposite for the innovative GeoMelt® project in the UK. Described as the In-Container Vitrification (ICV) process, GeoMelt® has great potential for addressing nuclear decommissioning challenges. The process produces an ideal waste package suitable for storage and disposal.

NNL and pioneering waste technology company Kurion have been collaborating to demonstrate active operation for the GeoMelt® process with a system installed in NNL's Central Laboratory active rig hall.

The rig successfully completed its landmark first inactive melt on Friday 13th May 2016. The 450kg glass product was produced using soil that is geologically similar to the Sellafield site and contained inactive caesium. Around 50% volume reduction was achieved.

Following on, there have been successful active soil melts. The initial active melt was a landmark achievement being the first time a vitrification system has actively processed material other than high level waste in the UK. The active and inactive melts represent significant progress in waste treatment for NNL and the wider nuclear industry.

The NNL/Kurion collaborative project has progressed towards this point over the past two years and is the result of significant funding and resource investment from both partners. Kurion was founded in 2008 and the company has been so successful it was acquired this year by Veolia the huge French corporation that specialises in water, waste and other essential services.

The GeoMelt® process creates ultra-stable glass that is typically ten times stronger than concrete and is considered more durable than granite or marble. Leach-resistance in the matrix is considered to be among the highest of all materials in the world and GeoMelt® is ideal for treating solid wastes, sludges and mixed debris.

The initial non-radioactive phase of the GeoMelt® rig's commissioning programme was completed in November last year at NNL's Workington Laboratory. The system was dismantled and transported to Sellafield and the Central Laboratory active rig hall for reassembly.

The GeoMelt® rig will remain in the Central Laboratory for a number of years and will act as a demonstrator to illustrate the benefits of active vitrification - volume reduction, passivation, product quality and leach resistance. The research will also answer questions around the behaviour of key volatile radionuclides during thermal treatment.

The rig is expected to prove an invaluable resource for customers handling waste streams currently unsuitable for storage or treatment through established stores and plants, and could also support any future large scale plant constructed in the UK in the same way that the Vitrification Test Rig supports the Waste Vitrification Plant at Sellafield.

With GeoMelt®, the operational rig is the first big step towards NNL's objective to become the world's go to national laboratory for thermal treatment expertise.

NNL remains central to national and international developments in thermal treatment and contributes to the Horizon 2020 Thermal Treatment Integrated Project. Horizon 2020 is the European Union's framework programme for research and innovation. The programme is making nearly €80 billion of funding available up to 2020.

The Thermal Treatment Integrated Project is aimed at the handling of active waste and plans are in place to install an active Hot Isostatic Pressing (HIP) rig in the Central Laboratory to study the immobilisation of plutonium. HIP work is being carried out on behalf of NDA.

NNL has been working for a number of years with the Australian Nuclear Science and Technology Organisation (ANSTO) to develop immobilisation technology using HIP. The process deploys high temperature and pressure to create a stable ceramic matrix.

Great News on AGR PIE

Having fun during the visit are Ffion Powell, Matthew Barker, Michelle Hambley, Tony Mills and Francesca Woodman

It's fair to say that NNL has a long track record in delivering Post Irradiation Evaluation (PIE) services to the UK's fleet of Advanced Gas-cooled Reactor (AGR) stations.

To ensure the best value possible is delivered for PIE customers, NNL seeks to openly engage with the supply chain. This approach has led to the development of closer links with Studsvik Nuclear AB to provide PIE services to key customer EDF Energy.

A group of three from NNL's AGR PIE team, part of the Reactor Operations Support (ROS) business, recently visited Studsvik Nuclear AB. Matthew Barker, Michelle Hambley and Francesca Woodman travelled to Sweden to collaborate on measurements of AGR fuel.

A key aim of the visit was to initiate a programme of work to guide and support Studsvik on methods for analysing samples of carbonaceous deposit.

Matthew Barker became a NNL Laboratory Fellow in 2015 and specialises in PIE services. NNL's cohort of Laboratory and Senior Fellows work collectively to develop and promote technical capability within their own areas and across the whole of NNL and the wider industry.

Francesca Woodman is NNL's Deputy Delivery Manager. During the visit to Studsvik she provided guidance about the sampling of deposit flakes from fuel pins. Michelle Hambley is NNL's Technical Lead covering Scanning Electron Microscope (SEM) capability and led a session advising on how to accurately measure the deposit flake samples.

The NNL team was accompanied by Ffion Powell (Contract Manager) and Tony Mills (Branch Manager) from EDF Energy. The customer is supportive of the collaborative approach being taken between Studsvik and NNL.

In a separate PIE development, NNL has agreed a renewal of its Supply of Engineering and Support Services (SESS) contract with EDF Energy for a further five year term. This contract provides the platform for the delivery of fuel, endoscopy and graphite PIE and other services in support of the AGR fleet.

Renewal of the contract is a significant milestone for both organisations and reflects the tremendous delivery performance achieved by NNL and the strengthening relationship between NNL and EDF Energy.

The new contract will support the continued delivery of services and will also enable the provision of a broader range of services which will add much greater value to EDF Energy.

Agreement of the SESS contract also provides the foundation to enable discussions about a Lifetime Agreement between NNL and EDF Energy, which will demonstrate a strategic intention between both organisations to work together for the lifetime of the AGR stations.

Space Batteries - First Five Years and Beyond

NNL's contribution to European Space Agency (ESA) space battery work has delivered great value and recognition in recent years.

NNL Business Leader Tim Tinsley with David Morris MP for Morecambe & Lunesdale and Chair of the all-party Parliamentary Space Committee

NNL has been engaged in proving that the nuclear isotope americium is an excellent power source for future space missions. Americium is a potentially plentiful energy resource that can be extracted from stored civil plutonium.

For a number of years, NNL has been participating in ESA funded projects to develop a Radioisotope Power System (RPS). More commonly known as a space battery, RPS is the new and exciting energy system being prepared for future European space missions.

After participating initially as a sub-contractor, NNL took the lead when putting together a programme of work to assess the feasibility of building a small scale plant within the Central Laboratory and proving the operational flow sheet. The success of the project has led to three contract extensions to provide additional research on material logistics, pellet formation and criticality assessment.

Over the five years that NNL has led on the project, over €3M worth of income has been generated. The project has been widely praised by ESA as being a good return on their investment and they are pushing forward with the RPS programme.

The ESA roadmap has defined a programme worth €12M over the next five years. NNL's successful track record so far means being in a good position to bid on a significant part of the new work.

NNL is also a member of a consortium developing a small nuclear reactor concept for electrical propulsion in space funded by the European Union's Horizon 2020 framework programme for research and innovation. This has so far generated €200,000 in income and has considerable growth potential with NNL leading on reactor core design.

The ESA work has also led to the opportunity to supply americium to industrial users. This has the potential to be worth around £5M each year. Other spin out opportunities are being considered in areas such as robotic/autonomous systems, materials, radiation effects, sensor and measurement, design of environmental containment facilities and security.

With the ESA RPS project receiving worldwide attention in the media, the NNL brand has been boosted by being attached to such exciting and ground breaking research. Other stakeholders have also shown a keen interest in the project.

The next decade promises to be a really exciting chapter in the history of space exploration as capability develops to send manned expeditions to Mars. Closer to home, the possibility of taking private spaceflights is becoming increasingly real.

NNL is looking forward to being in pole position to unlock the huge energy potential of americium to revolutionise power generation in space.

Innovus News – Hydrospyder

Another successful innovative demonstration has illustrated the value, success and support provided by Innovus, Cumbria's successful technology commercialisation programme.

HYDROSPYDER

Operated by NNL and The University of Manchester's Dalton Nuclear Institute, Innovus is transforming the culture of research and development in Cumbria and inspiring clients to continually seek out the new innovation that will become the future of their business.

Appleby based Barrnon Ltd are recent recipients of an Innovus grant. The company was keen to demonstrate its 'Hydrospyder' technology to an invited audience at the picturesque Ullswater in the Lake District national park.

Hydrospyder can be deployed in marine environments and can lift and move very substantial weights while also having the capability to be fitted with a variety of tools and equipment. These include lifting, cutting and inspection tools along with sludge collection and robotic manipulation capabilities.

The technology can also deploy other applications to carry out activities including concrete scabbling and decontamination. Hydrospyder has the flexibility and versatility to be moved autonomously to a variety of work areas under load.

Innovus, has already created or safeguarded a very impressive 79 jobs linked to projects it has supported. Launched in 2013, Innovus reaches out to individuals, researchers and small and large businesses, wherever they're based.

The programme helps businesses seek out solutions to technology gaps and supports decommissioning challenges on the Sellafield site.

The key driver in everything Innovus does is to create jobs and wealth for the Cumbrian economy, whether through increased turnover, licensing or the creation of new enterprises.

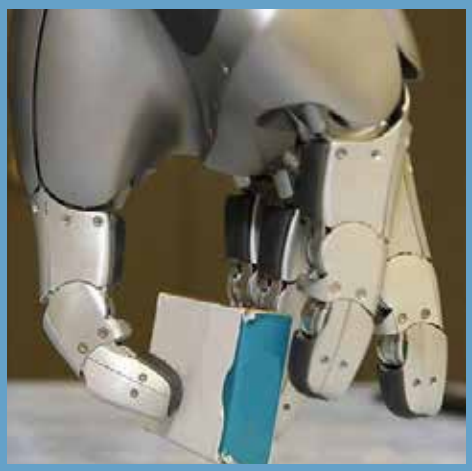
The scheme has invested nearly £2M in innovative research projects, unlocking over £3M of research and development activity in private sector Cumbria based firms.

With support from the Regional Growth Fund, Innovus is forecasting more jobs and growth as a result of continued success and benefits from new initiatives like Game Changers, a partnership with Sellafield Ltd.

INNOVUS
COMMERCIALISING INNOVATIVE TECHNOLOGIES

RoMaNS to Conquer Waste Challenges

Summer 2016 saw NNL host a week long annual workshop for the RoMaNS project. A priority project for the European Union's Horizon 2020 framework programme for research and innovation, RoMaNS is 'Robotic Manipulation for Nuclear Sort and Segregation'.



The project is looking to develop advanced robotic autonomous grasping using novel arms, hands, grippers and advanced vision to identify wastes and investigate their composition and condition.

The workshop took place at NNL's Workington Laboratory with the aim of providing robotics training as well as bringing together principal stakeholders to discuss project progress and future strategy.

In addition to NNL, representatives from the four principal partners attended the workshop:

- University of Birmingham
- Technical University of Darmstadt (Germany)
- National Centre for Scientific Research (France)
- CEA Alternative Energies and Atomic Energy Commission (France)

The RoMaNS technology has a wide range of applications in the nuclear industry and beyond, but is targeted specifically at nuclear waste sorting and segregation to improve plant throughput and reliability, while lowering operational costs and generation of secondary wastes.

Nuclear sites in the UK currently store legacy waste containers with contents of mixed composition and contamination levels and sometimes unknown inventory. There will be a need to open many of these containers to remove, investigate and sort their contents. Due to the nature of the waste material, this can only be done remotely using robots.

Current robotic techniques may not have the dexterity to handle waste items arriving in a variety of shapes, sizes, weights and consistencies. These operations are expected to have unique technical challenges for robotic manipulation. The RoMaNS project is looking to improve the efficiency of retrieval, segregation and sorting operations by developing more advanced technology.

Clean-up of legacy nuclear waste is one of the largest environmental remediation challenges affecting Europe and therefore the EU has categorised the RoMaNS project with having a high impact.

The workshop received extremely positive feedback from all partners. Training took place on robots supplied by KUKA Systems (UK) Ltd and was provided by Orange Automation Ltd.

The internationally recognised training helped develop skills ranging from robot health and safety, basic operation, inline programming and introduction into various pieces of software. These will be necessary to facilitate the meeting of project targets and the integration of consortium developed automated programmes.

The workshop also provided the opportunity to convene an executive meeting to discuss strategy and plans for the next RoMaNS team meeting in Paris due to take place in December. This meeting will include active demonstrations of the NNL test bench capabilities to the European Commission and independent peer reviewer.

NNL Delivers New Simulator to Brokk

Brokk has been a leading designer, manufacturer and supplier of remote controlled demolition machines for over 40 years.

Over the past eighteen months, Jeff Kuo and Daniel Downes from NNL's Remote Operations Team, based in the Fuel Cycle Solutions Business, have worked closely with Brokk to develop a new and highly realistic simulator designed to support work planning and training.

In 2015, Jeff spotted an opportunity to develop a new simulator for Brokk's robots, which are widely used in the nuclear industry. There are over fifty employed on the Sellafield Site alone.

The proposal was to incorporate kinematics and dynamics to create a realistic simulated experience. When Brokk expressed an interest in the project, Jeff worked with NNL's Technology Commercialisation team to develop a business case to release funding for development of the simulator.

To maximise the realism of the new simulator and get a feel for how a real machine handled, Jeff and colleagues attended an operator training course at Brokk UK's headquarters near Kendal in Cumbria, where they successfully obtained their Brokk 'Driving Licence'.

This experience, together with multiple demonstrations and progress meetings with the technical experts at Brokk, helped Daniel and Jeff create and code an authentic simulator.

So successful was the simulator that Brokk headquarters in Sweden were pleased to add it to their catalogue of products. The simulator is now available in 40 countries around the world.

Sales are going well and enquiries about developing bespoke versions for specific demolition and decommissioning projects have been received.

The simulators will be used by Brokk's clients for mission planning and to train machine operators. This enables them to work towards their licence on the virtual machine when real hardware is being used on demolition tasks.

The success of the project was made possible through the technical expertise of both NNL and Brokk and the collaborative approach taken to ensure that the final product creates an enhanced learning environment and an enjoyable experience.

Simon Kennaugh of Brokk UK commented: **"We have been very pleased with the result of the collaboration with NNL and look forward to further opportunities to work together in the future."**

Steve Shackleford, Acting Director Fuel Cycle Solutions with NNL added: **"The Brokk UK Simulator is a fantastic example of technology and know-how transfer.**

"The expertise that NNL has developed through our Innovation, Research and Development (IR&D) portfolio has created a new product for our partners and expanded our offering.

"The simulator can be used by Brokk machine operators in nuclear and non-nuclear sectors. I'd like to thank Brokk UK for the opportunity and I look forward to collaborating again in the future."

NNL People – Sheila Rae

Head of Facilities Strategy Delivery

Recently voted the fourth best island in the world by National Geographic magazine, the beautiful and rugged Isle of Skye located off north-west Scotland is the birthplace of Sheila Rae, NNL's Head of Facilities Strategy Delivery.

"Yes I'm a true highlander," said Sheila. **"I was born in Skye and then moved to mainland Scotland when I was six months old."**

The move took her to Fort William in northern Scotland. **"My Dad is a Chartered Civil Engineer,"** she said. **"He worked on the road network on Skye and became responsible for the network of roads and ferries around Fort William when we moved.**

"My parents still live in Fort William in the shadow of Ben Nevis," she said. **"So my current base in the north of England at Gosforth in Cumbria makes me feel like quite a southerner! It's a 500 mile round trip to visit but I always enjoy going back."**

Research and Technology

Sheila has been involved in nuclear research and development since 1996 having joined the Research and Technology (R&T) department of nuclear fuel cycle services company British Nuclear Fuels plc (BNFL). R&T has since developed into today's NNL. Her move into the nuclear sector followed completion of a chemical engineering degree.

"I've had a very varied career so far," she said. **"The opportunities to progress across a number of disciplines are available in the nuclear industry if you want them. I did a lot of engineering based support work on plant at the beginning of my career but since 2014 I've been involved with the NNL Facilities team in a strategic role."**

Managing Diverse Facilities

Sheila is part of a Facilities organisation that manages resources supporting operations and delivery for NNL's customers and other stakeholders. The group comprises over 250 people located at each of the six sites where NNL maintains a presence.

The facility portfolio consists of a diverse range of operational buildings including non-radioactive and radioactive chemical laboratories and engineering rig halls. There is also a suite of highly active alpha, beta, gamma containment cells and large scale cave lines capable of handling post-irradiated nuclear fuel. Facility management at each site has responsibility for safe and efficient operations and compliance with statutory requirements.

Sheila is involved in some current key strategic facilities projects and is also looking ahead to define what will be needed for NNL to deliver on its future business plans and commitments.

"The job has been a good challenge so far," she said. **"Being relatively new to the Facilities area there was a fair amount of familiarisation and learning. Everyone's been helpful and supportive and there are some excellent projects on the go and in the pipeline so it's a very exciting time to be part of the team."**

For example, discussions are underway with the Sellafield Ltd Analytical Services team about relocating to the NNL Central Laboratory from their current base on the Sellafield site. **"It would be a big change, but it would bring some good opportunities,"** said Sheila.

> "If we go ahead, we'll need to make some changes to the Central Laboratory. It's expected that it will mean around 150 people will move off the site to a new location at the Westlakes Science and Technology Park a few miles north near to the town of Whitehaven."

Facility Utilisation

Westlakes is home to a cluster of nuclear and other energy related organisations. **"We're looking at the Westlakes facility working alongside the University of Manchester's Dalton Cumbria Facility. Sharing will align with our strategy to engage with Universities and industry partners to maximise facility utilisation.**

"We want to develop a user model that grows access to facilities on and off nuclear sites, for our own people, academia and industry experts. Our ultimate aim is to align our investments in facilities and

equipment with the needs of national programmes and create a real UK hub for world-class nuclear R&D."

STEM to Chemical Engineering and Sellafield

It was her Dad's enthusiasm that first triggered Sheila's interest in engineering. Her Mum is also involved in science as a radiographer. **"I think I was probably a classic Science, Technology, Engineering and Mathematics (STEM) student,"** she said. **"I enjoyed chemistry, physics and maths at school and chose chemical engineering when I went to University at Strathclyde. Both my parents encouraged me all the way."**

After achieving a first class honours degree, she arrived at the Sellafield site. "It's been a very quick couple of decades," she said. **"When I first arrived I was immediately involved in plant support work for the Thorp reprocessing plant and the Highly Active Liquor Evaporation and Storage (HALES) facility.**

"I moved on to take up an offer of a secondment to the Sellafield MOX Plant where I gained some valuable commissioning experience."

Secondment to the USA

She made good early progress and earned a secondment at the turn of the millennium to the United States and the huge Hanford site. **"Those were the days of subsidiary company BNFL Inc.,"** said Sheila. BNFL Inc. looked to transfer decommissioning and waste management expertise and specialism from the UK to nuclear sites in the USA.

"It was great experience for me and I worked on flow sheet modelling for the proposed Waste Treatment and Vitrification plant at Hanford. The plant is expected to process millions of gallons of radioactive and chemical waste stored in underground tanks at the site.

"I was involved in the very early stages of process development. I had a brilliant year in the USA and worked for Andy Elsden who later became NNL's Strategy Director."

Sheila's boyfriend, now husband, Ian was also based at Hanford at the time. Ian worked for BNFL Engineering and is currently part of the NuGen team looking to develop the Moorside nuclear power station project adjacent to the Sellafield site.

"It was great that Ian was in the States at the same time as me although it was a busy time on the projects while we were over there," said Sheila. **"He's from Whitehaven and we met not long after I arrived in Cumbria."**

She returned to the UK to take up a Team Manager role in the NNL Solvent Extraction team. After a year she returned to HALES as a Technical Manager undertaking safety case work to support continued operations.

A Special Assignment

During her second stint on HALES, Sheila was presented with a really exciting opportunity. **"I was approached to take over the Special Assistant role to BNFL's Technology Director Dr (now Dame) Sue Ion.**

"Working with Sue was a really brilliant experience for me," said Sheila. **"She already had an international reputation and has continued to be a positive supporter of the nuclear industry across the world. This gave me the opportunity to travel to countries such as Japan, South Africa and the USA. As everyone knows, Sue is very influential when promoting the industry and is comfortable and enthusiastic whatever her audience.**

"I was very grateful for the opportunity and learned a tremendous amount during my time in the role. The experience enabled me to gain a broader appreciation of the nuclear industry across the whole fuel cycle and a better understanding of the issues. The only slight disappointment was that it was relatively short term and I could have carried on for much longer."

Customers, Bids and Sales

Prior to her spell working with Dame Sue Ion, Sheila had focused on technical roles. Her next move saw her career shift towards customer relationship management and sales. **"We were in the early stages of bidding against commercial tenders for customers,"** she said. **"This meant getting up to speed quickly and I enjoyed acting as the interface between researchers and operators."** Sheila's technical and chemical engineering background came in very handy. **"It felt very natural to be translating technical data into operator friendly language while making sure we also understood the customer's needs and wants,"** she said.

Technology Commercialisation

Sheila had a break in the mid-2000s when she took maternity leave and her son John is now nine years old. **"When I returned to work the process to create the National Nuclear Laboratory was underway,"** she said. **"It was an exciting time and NNL was initially contractor operated by a consortium made up of Serco, Battelle and the University of Manchester."**

Battelle were national laboratory operators in the United States and ran a well-developed and successful technology commercialisation programme. With Battelle keen to introduce a similar programme into NNL, Sheila was appointed Technology Commercialisation Manager.

"The job was about nurturing good innovative ideas and bringing them to market," she said. **"It was exciting because it was new to NNL and I managed the interface between customer funded work and new ideas. Here in NNL we have creative people who generate lots of ideas. The trick is to decide which projects have the right level of commercial potential."**

Bridging the Gap

Her involvement in technology commercialisation resulted in Sheila setting up a ground breaking initiative to support businesses in the Cumbria region. 'Innovus' bridges the gap between research and marketable technology by offering access to facilities, funding and technical and business expertise.

"Innovus was set up with the University of Manchester and is partnered with Britain's Energy Coast, the NDA and Regional Growth Fund," said Sheila. "I'm very proud of my involvement especially the connections made between NNL and small and medium sized businesses in Cumbria." Although Sheila has moved on, Innovus is still going strong and is acting as a model for other regions looking to engage more effectively with the local supply chain.

This year, Innovus reported that 79 new jobs had been linked to projects it had supported. It is set to continue to grow in 2016.

Family, Music and Nursery Director

Away from work, Sheila enjoys an equally busy life. Her son John is a sports and football fanatic and plays for local team Bigrigg Bulls. She is also a Director at her local pre-school charitable nursery. "I first got involved when John was young and have got more engaged since," she said.

"I contribute to management and fundraising to improve facilities. A big achievement was moving from a temporary building into a permanent brick built structure. We were also delighted to be given an 'outstanding' grading following our most recent inspection by the Office for Standards in Education (Ofsted)."

Sheila is also a musician, playing the guitar and piano. She grew up singing in Gaelic choirs and folk groups. But, she doesn't regard herself as naturally talented. "I've achieved a reasonable standard in guitar, piano and singing," she said. "But I think my competence comes with practice rather than flair. Music is always a nice way to relax."

Full Steam Ahead

Back at work, Sheila is enjoying the challenge. "NNL and the industry are on the verge of exciting times and I'm delighted to be part of a business that's looking to make the most of its opportunities in the future," she said.

Nick Explores the **Frontiers of Science**

Laboratory Fellow Nick Smith has been invited to join the planning committee as co-convenor for the prestigious UK / Japan Frontiers of Science Symposium this winter.

Geology expert and enthusiast Nick is Laboratory Fellow for Geocharacterisation and is also a Royal Society Industry Fellow in Remote Laser Characterisation.

Nick's strong connection with the Royal Society, the UK's academy of sciences, helped place him in prime position to be involved in planning for the symposium.

He will also co-convene the earth science and environment theme sessions with his Japanese counterpart Hirohiko Masunaga.

The Royal Society and the Japan Society for the Promotion of Science are behind the symposium, which takes place at the Royal Society's Chicheley Hall in Milton Keynes in November. This is the second symposium with the first taking place in 2008 in Kanagawa, Japan. The 2008 event celebrated the 150th anniversary of the Anglo-Japanese Treaty of Amity and Commerce.

The second symposium will bring together around 60 delegates from various fields of science. In addition to the earth science and the environment session, other areas will include biology and life science, chemistry and material science, mathematics and informatics, medical and neuroscience and physics and astrophysics.

In addition to his NNL Laboratory and Royal Society Industry Fellowships, Nick is seconded to the University of Manchester where he is Visiting Professor at the School of Mechanical, Aerospace and Civil Engineering and Visiting Research Fellow at the School of Earth, Atmospheric and Environmental Sciences. He is also a Technology Manager in Geology and GIS within NNL's Environmental Characterisation Team.

Nick's involvement in planning for the symposium will further cement NNL and the University of Manchester's involvement and collaboration with Japanese scientists.

Graham Fairhall MBE

Graham Fairhall with Paul Howarth (left) and former BNFL CEO Mike Parker

Everyone in NNL was delighted to hear the tremendous news that former Chief Scientist, Professor Graham Fairhall was awarded an MBE in the Queen's Birthday Honours list. Graham's award is for "Services to UK Nuclear Energy Research and Development".

He retired in March last year, following a long and illustrious career with NNL and its predecessor organisations. Having joined BNFL (NNL's former parent company) in 1979, he spent his entire career working in R&D and technical roles in the civil nuclear sector.

In his Chief Scientist role at NNL he was responsible for the longer term science and technical strategy for programmes covering the breadth of the nuclear fuel cycle as well as external technical collaborations in the UK and internationally. He had extensive international links with other national laboratories and universities and sat on many national and international committees covering nuclear R&D.

In the latter part of his career, Graham played a central role in re-positioning both NNL and the wider nuclear research agenda, culminating in the Nuclear Industrial Strategy in 2013 and the more recent announcement of a substantial programme of Government funding for nuclear research work.

He is a Fellow of the Royal Society of Chemistry and a Chartered Engineer and held a role as Visiting Professor at The University of Manchester in the Dalton Nuclear Institute.

Graham commented: **"I am greatly honoured to receive this award. I'm also extremely pleased to see recognition of the important role which R&D has played underpinning the nuclear sector in the past, which it will continue to play in the future.**

"There are many outstanding people in the nuclear industry and I have been very fortunate to have worked with a good number of them over my long career. I would like to acknowledge their support and in particular that of my NNL colleagues over the past few years."

NNL MD Paul Howarth added: **"I know that everyone in NNL will join me in congratulating Graham on this honour which is very well-deserved. His contribution to the industry was tremendous, based on his exceptional technical knowledge of all aspects of the nuclear fuel cycle.**

"He played a big part in helping to develop and optimise much of the technology we see across the industry today."

Many congratulations to Graham on receiving his prestigious and well-deserved honour.

Celebrating 50 years of Smallpeice

NNL's close links with the Smallpeice Trust were again illustrated when MD Paul Howarth was invited to make the after dinner speech at the Trust's 50th Anniversary celebrations.

The dinner was also attended by the group of Year 9 (pre GCSE) students taking part in the latest course at the University of Manchester. Each course accommodates up to 100 students and covers three days and two nights.

Year 9 is a pivotal time for students with decisions to make on GCSE options. The Smallpeice Trust alongside industry partners looks to be a positive influence on students to choose to take up Science, Technology, Engineering and Mathematics (STEM) related subjects at GCSE and beyond.

An independent educational charity, the Smallpeice Trust runs the hands-on STEM based courses at Universities to give students the opportunity to find out about specific areas of engineering and get a taste of what life after the classroom will be like. Over the past decade, NNL has worked closely with Smallpeice to help deliver courses relevant to the nuclear industry.

The Trust has consistently provided young people with the opportunity to find out more about the exciting world of engineering. Paul spoke about his own personal enthusiasm for engineering and described the opportunities Smallpeice has presented for NNL volunteers to get involved with mentoring young people on the courses.

Each course requires a team of four or five industry volunteers to help deliver design and make projects as well as giving talks about their specialist areas. Paul emphasised that NNL volunteers have been inspired by the skills, creativity and flair demonstrated by the students over the years.

In NNL, the growth of STEM capability, skills and expertise is a key part of a nationally strategic role for Government. Skills are a huge factor for any industry and the nuclear sector needs to do all it can to ensure that a skilled, competent and safe workforce is available to deal with workload across the nuclear fuel cycle.

While there is optimism and excitement around at the moment about nuclear expansion the right people must be available to make the most of opportunities. Like all industry, the sector faces a real challenge to recruit the right people in the right numbers.

Paul emphasised that NNL is committed to offering jobs that present a challenge and stimulate the mind and imagination. He went on to discuss his own STEM related background and career so far and the fact that being involved in engineering and science has enabled him to get involved in fascinating and ground breaking work.

In the UK, it's estimated that well over 800,000 STEM graduates will be needed by 2020. Paul highlighted that there will be a job in engineering available to all of the students completing the latest course if they chose to follow that route.

He also referred to the presence of a considerable number of girls participating on the course. He referenced statistics that point out that only 9% of engineers are currently female in the UK compared to 42% of doctors and 50% of lawyers. Attracting girls into engineering has been a real challenge for the UK.

He added that NNL (and the industry) is working hard to attract female engineers. He pointed out NNL's keen support for the Women in Nuclear (WiN) network. WiN is looking to strengthen the contribution of women working in the nuclear industry, achieve a better gender balance and engage with women in the wider public arena. His overall message was that there are opportunities for all in the nuclear industry.

Supporting the Smallpeice Trust courses is a great way for NNL people to get involved with Corporate Social Responsibility (CSR). It's an ideal opportunity for newer recruits such as graduates or apprentices to develop confidence in communication and presentation skills.

During the 'Design and Make' phase of the course, initial design and development takes place and then the teams take their idea to a 'Dragons Den' style panel to gain funds to buy building materials.

Funds are used to realise and demonstrate the effectiveness of their design in a simulated setting. NNL has developed a number of 'design and make' projects which are delivered to the courses.

NNL Q&A – with Reuben Holmes

Reactor Chemist, Reactor Chemistry and Corrosion team

What does your job involve?

My principal role in NNL is as a Reactor Chemist in the Reactor Chemistry and Corrosion team based at Stonehouse in Gloucestershire. The team is part of NNL's Reactor Operations Support business.

Through this position, I have worked with a variety of UK and overseas customers providing technical support in areas such as Pressurised Water Reactor (PWR) coolant chemistry, corrosion monitoring in decommissioned reactors and bio-fouling mitigation in power plant seawater cooling systems.

Opportunities to develop commercial skills through bid preparation and gain project management experience have also been abundant.

I have been fortunate enough to be able to combine my role as a Reactor Chemist with some more socially orientated work with NNL's internal research programme on public engagement.

This secondary role enables me to contribute towards the future of the UK nuclear industry, primarily by helping to build sustainable energy communities, where Government, industry and the public make decisions co-operatively.

Through this role I have been involved in workshops with the public to develop engagement tools for the UK nuclear industry. I am now leading a project to take these tools and adapt them for use across Europe and in Japan.

How long have you been with NNL?

One year since July 2015. I also completed a six-month secondment at NNL in 2014.

How did you come to be doing the job you have now?

As I was about to graduate from the University of St Andrews with a degree in medicinal chemistry I had no idea what I wanted to do next. An old friend from high school called and asked if I wanted a job at a sugar factory laboratory in Nottinghamshire, to which I basically answered 'why not!'

During this job I thought seriously about which industry I wanted to commit to and contribute towards and decided that UK nuclear fuel reprocessing and decommissioning presented a unique and exciting challenge.

I secured a position on the Sellafield Ltd graduate programme, where I trained as a technical advisor for the Thorp reprocessing plant. This was where I got my first taste of NNL's work, initially as one of NNL's customers and then during my secondment in 2014.

The secondment saw me join the Particle, Sludge and Slurry Science team based at the non-active rig hall at the Workington Laboratory. From that moment onwards, I have been fascinated by the position that NNL holds in the UK, specifically with regard to its location in-between Government, industry, academia and the regulator.

Soon after the secondment, my personal circumstances prompted a move 'down South' and NNL's Stonehouse office was the obvious place to look for my next challenge.

What do you hope to be doing in five years-time?

My personal goal is to become nationally recognised as a suitably qualified and experienced person in both of the roles I'm currently undertaking.

I would also like to be some way through a part-time PhD in one of these fields and expect to be thinking about where I can add most value to my team, NNL and the industry as a whole on both national and global scales. Overall I will continue to challenge myself, pick up new skills and attempt to create a positive environment for everyone I work around.

What does working at NNL mean to you?

NNL plays a crucial role linking Government, industry, academia, the regulator and the public together. This unique position provides the chance to work with and learn from so many inspiring colleagues from different backgrounds, disciplines and organisations, making NNL a special place to be a part of.

What aspects of your job do you like the most (and the least)?

Every day I learn something new. In my first year I further developed my technical skills in reactor chemistry and corrosion as well as gaining competence in commercial and project management disciplines through preparing proposals, interacting with customers and leading projects through to completion.

Additionally, I work with some tremendous role models who are willing to take the time to pass on their knowledge and wisdom to others. The things I like least are those pesky marine organisms that want to corrode our nuclear power plant seawater cooling systems through microbial induced corrosion (if that makes sense).

Tell us something about yourself that people may not know...

I'm a rather keen fan of darts, both playing and watching. Since 2010, I've played competitively in darts leagues and competitions in Scotland, Nottinghamshire and Cumbria and was the St Andrews under-25 darts champion in 2011. Please contact me if you fancy throwing a few arrows at lunchtime.

Who or what has been a big influence on your career journey?

I have an incredible network of family, friends and colleagues that I can call on for advice when making career decisions. My mum and partner continuously give me endless support, stability and encouragement to keep challenging myself at work, while acting as inspiring figures through their own achievements, professionalism and bravery. This definitely keeps me on my toes!

What advice would you give to someone thinking of joining the nuclear industry?

You should apply even if you feel your discipline does not quite match the job description, because once you are a part of the industry there are opportunities to apply your knowledge and add real value where initially you think it may not be relevant.

What do you do to relax outside of work?

Since moving to Bristol I've taken up volleyball, which has been a great way to meet new people and keep fit. I also enjoy planning walks and exploring the Forest of Dean in Gloucestershire and the Cornish coastline with my partner.

What is the first thing you pack to take with you when you travel away from home?

OK I'm going to answer this question literally. I pack the small things that fit in the gaps between the ridges at the bottom of the suitcase, which then gives a nice flat surface to lay your ironed clothes on. It also results in maximum packing efficiency!

We all do this, right...?

Which famous figure would you most like to meet?

I wish I'd been able to meet the late Sid Waddell, the television commentating legend known as the 'Voice of Darts'. Sid sadly passed away in 2012 but is a still a hero of mine.

Here are a couple of his best darts commentary quotes that reflect a small part of his brilliance:

"William Tell could take out an apple on your head - Taylor (Phil Taylor the multiple darts world champion) could take out a processed pea."

"Playing (Phil) Taylor is like eating candy floss in a wind tunnel!"

Mentoring to Success

An environmentally themed ten week STEM project, 'Go4SET' is aimed at 12-14 year olds. It is one of many schemes offered by the Engineering Development Trust (EDT) and looks to inspire students toward STEM related careers by linking education and industry to real life situations using hands on learning and skills development.

The EDT delivers over 30,000 STEM experiences each year for young people aged 11-21 across the UK. The range of work related learning provides opportunities for young people to enhance their technical, personal and employability skills through industry-led projects, industrial placements and specialised taster courses.

The Trust helps to develop partnerships, build links between educators and industry employers and supports organisations in reaching out to talent and connecting with young engineers and scientists across the UK.

In a recent Go4SET project, NNL provided two mentors - Ross Harris and Qasim Kapasi. Ross and Qasim are graduate engineers from Engineering Design in NNL's Fuel Cycle Solutions business. Both were paired with teams of students from Birchwood Community High School located close to NNL's Warrington headquarters. One team was from Year 8 and the other Year 9.

The launch day took place at the Sci-Tech Laboratory in Daresbury, Cheshire in early March and all of the teams from the North West/Merseyside area were introduced to their mentors and given a choice of three projects. Both teams supported by NNL chose the 'Eco Hotel' project.

This involved the design of an eco-friendly hotel from the ground-up to be located wherever the students wished. The project demanded that students demonstrate skills in planning and managing a project, research, communication, team working, report writing and presentation.

As mentors, Ross and Qasim's role was to support the students throughout the project via regular weekly contact. The two mentors supported students by adding context to the skills they were learning in terms of working in the 'real world'.

Student visits to NNL's HQ were arranged with the teams being introduced to the basics of radiation and fission, space batteries and use of robotics in the nuclear field.

The Go4SET climax came in the form of a celebration and assessment day and students graduated from the scheme with a qualification to add to their CV. The teams presented to a panel of assessors volunteered by the supporting companies.

Congratulations to the Year 8 team mentored by Qasim who won the student's choice vote.

Completion of the Go4SET programme also put the students in a prime position for more senior schemes offered by EDT such as the Engineering Education Scheme, which offers six month STEM projects within industry.

Both NNL mentors found the main challenge of the project to be encouraging students who didn't know each other to communicate and work as a team. Another challenge was developing the students' ability to question their work and underpin decisions with full possession of facts.

NNL remains involved with Go4SET due to the innovative and creative nature of the projects and the enthusiasm of the students to come up with impressive solutions to quite complex problems.

It provided Ross and Qasim with the opportunity to engage with students and provide a realistic picture to them of the work of an engineer.

Both NNL mentors strongly believe that a good grounding in maths and science is a great foundation of skills to have for most jobs in the modern world.

Go4SET provided Qasim and Ross (pictured below) with the opportunity to share their experiences and positively influence younger people.

Ozma Peaks on Challenge

Typical UK summer weather – driving rain, fog, gusts and snow – could not prevent Ozma Taylor from scaling the three highest peaks in England, Scotland and Wales over a gruelling 27 hour period.

Ozma from the NNL Strategic Business Development team was undertaking the Three Peaks Challenge as part of a team of 26 to raise much needed cash for the Cancer Research and Macmillan charities.

The Challenge was not for the faint hearted and took in Snowdon in Wales (height 1,085m), Scafell Pike in England (978m) and Ben Nevis in Scotland (1,345m).

Ozma's social evening with a good friend and former neighbour turned into an unexpected commitment to take part in the challenge. Her friend persuaded her to join a group tackling the formidable peaks. Each of the 26 taking part has been touched by cancer either by being diagnosed with the disease themselves or through knowing someone else who had.

To prepare, Ozma immersed herself in a four month intense training schedule. This included once a month expeditions to experience Snowdonia in Wales, Hellvelyn in the Lake District, Edale in the Peak District and also around the Buxton area in Derbyshire.

She also took walks with her family around Rochdale, Macclesfield and Yorkshire. These open air adventures were supplemented by intensive gym sessions including the dreaded 'stairmaster' torture apparatus. The indoor and outdoor sessions were tackled with great enthusiasm and meant Ozma was the fittest she had ever been.

The group's challenge began in Fort William in Scotland and the UK's highest peak Ben Nevis. They climbed for 17 km before descending and boarding a mini bus to travel 428 km to Scafell Pike for a further 10 km ascent. Then they travelled a further 337 km to Snowdon for the final push climbing for a further 11 km.

"I can't believe we did it," said Ozma. "It was tough and it took me over a week to recover. I knew it would be a real challenge to complete but it was harder than I actually thought it was going to be. I'm glad I did such a lot of preparation."

Of the 26 who started the challenge, only one had to give up. "I was surprised to only lose one of the team along the way," said Ozma. "If you collect an injury it's very difficult to overcome in such hostile conditions. As we started up Ben Nevis we saw the mountain rescue helicopter, a reminder for us all to be careful.

"The rain started almost straight away and stayed with us throughout. Ben Nevis was a baptism of fire and a really tough climb with snow at the top, which I fell into! Scafell Pike felt tougher still, under cloud and even wetter before Snowdon and driving horizontal rain. We were all quite beleaguered by the end."

The challenge is not an experience Ozma is looking to repeat. "Sheer determination got me up each peak and the need to get off the mountain got me down," she said. "It was quite a weekend!

"The whole team including the drivers were great support and we tackled everything together even a flat tyre on the way to Fort William. It's been life changing for many of us and we've raised over £3,000 for charity so far."

On Your Bikes!

NNL MD Paul Howarth got on his bike with friend Mick Gornall to overcome a formidable challenge and raise much needed funds for charity.

Paul and Westinghouse UK Managing Director Mick took to the hills and tracks in the Lake District National Park to tackle the Sam Houghton Mountain Bike Challenge.

This is a 30 mile long timed mountain bike ride with 5,000 feet of climbing to sap the energy. The challenge began and finished at the Mill Yard, Staveley and covered the Longsleddale, Kentmere and Troutbeck Valleys while also taking in the Garburn Pass.

Picturesque but challenging, the event is organised in memory of Sam Houghton a keen mountain biker who sadly lost a battle with illness and died aged only 22 in 2006. Paul, Mick and around 20 friends and colleagues were riding in support of the 'Kidneys for Life' charity.

Mick's three year old daughter Eliza had one of her kidneys removed aged just nine months.

When her remaining kidney began to deteriorate and failed last year, Mick donated one of his kidneys. The transplant was a success and both Mick and Eliza are doing very well.

The hospital renal team provided tremendous support to Eliza and Mick before and after the transplant. The unit provides care for all children in North West England who have kidney problems.

The funds raised, in excess of £5,000 with Paul alone raising over £700, will be going straight to the charity.

Keen cyclist and triathlete Paul said: **"I've known Mick for a number of years and obviously our two organisations work closely together.**

"I wanted to help out and so agreed to take part in the fundraising event along with a number of others. It was tough but definitely worth it."

Jo's **Pointless** Triumph

Broadcast each weekday evening on national television, Pointless is the BBC1 quiz show that pushes contestants to score as few points as possible by exploring the extremities of their general knowledge.

Hosted by Alexander Armstrong and Richard Osman, the aim of the show is to come up with the right answers to questions that no-one else can think of. In other words the contestants try to get the most obscure right answer possible to a general knowledge question based on surveys of 100 members of the public. The ultimate objective is to gain a pointless score.

Pitting her wits in the show earlier this year was NNL Safety Assessor Jo Fagan appearing alongside her dad Paddy. Jo and Paddy advanced to the final in their single appearance on the show despite both managing to score the maximum 100 points in different rounds.

Having seen off three other couples they qualified for the final to secure the Pointless trophy and move on to try and win the £2,000 jackpot. They opted to answer questions in a category about Manchester United teams from the past. Paddy took the initiative on this one despite being a Newcastle United supporter.

Sadly, on this occasion the father and daughter pairing just failed to win the cash as their top answer missed the prize by scoring one single point! It was hard luck to both - so near and yet so far! However they emerged with pride intact and more than the usual five minutes of fame.

Jo Fagan appearing on Pointless

innovate

NNL is proud to be a member or partner in the following organisations:

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