



# innovate

ISSUE 8 December 2015

## National Nuclear R&D Programme Welcomed

Chancellor George Osborne has set out the state of the economy in his Autumn Statement and spending plans for the next four years in the Comprehensive Spending Review. The announcement that some £250M will be made available over the next five years for an ambitious nuclear research and development programme has been strongly welcomed by NNL Managing Director Paul Howarth.



*MD Paul Howarth was delighted with the announcement*

The research will “revive the UK’s nuclear expertise and position the UK as a global leader in innovative nuclear technologies.”

The new funding builds on the £25M of Government investment in the UK-China Joint Research and Innovation Centre (JRIC), which was announced by the Chancellor during his recent visit to Beijing and on which NNL will lead for the UK (see page 2).

Paul Howarth said: “I’m delighted by the news that the Government has recognised the vital importance of a UK nuclear R&D programme to help return Britain to the global ‘top table’ of nuclear countries.

“This is the culmination of several years of work, which began with the detailed assessment of the state of nuclear R&D carried out by the House of Lords Science and Technology Committee in 2011.

## Contents

- 2 NNL Leads for UK on JRIC
- 3 Q&A with Fiona McLachlan
- 4 NNL is Officially Excellent
- 5 New Reactor Dialogue Study
- 6 Creating a Positive Perception
- 7 Jordan Teaches in Abu Dhabi
- 8 Nuclear Training Pilot is a Winner
- 8 Alice Wins First Prize
- 9 NNL Hosts Delegation from Slovakia
- 10 Attracting Girls to STEM
- 11 A Presidential Win
- 11 NNL’s Visiting Professors
- 12 Green Light for GeoMelt
- 13 Ellen’s a Procurement Star
- 13 TFT Speed Dating
- 14 NNL People: Ian Jackson
- 16 In the Media
- 17 Collaborating for an Innovative UK
- 18 Stephen’s Champion Speaker Feature
- 19 Dave’s the Soul of Eden FM
- 20 They Did It - Epic Cycle Challenge Completed
- 22 Oliver in at the Deep End!
- 22 Mike’s a Chemical Brother
- 23 NNL Launches First CSR Report
- 23 Ruth’s NNL Adventure Begins
- 24 NNL Prominent at Industry Events
- 25 New Position Paper Published

**Innovate Editor**  
Peter O’Brien  
Communications Manager  
National Nuclear Laboratory  
Tel: 01925 289967/07801 856257  
Email: peter.o'brien@nnl.co.uk

# National Nuclear R&D Programme Welcomed

"Since that time, NNL has been at the forefront of the call for the establishment of a national nuclear research programme and we are pleased that Government has today responded so positively to that advice.

"We now anticipate that NNL will play a central role in the delivery of the newly-announced programme."

One key element of the new funding will be a programme of work to help pave the way for one of the world's first Small Modular Reactors (SMRs) in the UK in the 2020s. This follows the publication, in December 2014, of a feasibility report by a consortium led by NNL into the potential impact of SMR technology on the UK energy sector and nuclear supply chain.

---

## NNL Leads for UK on JRIC with China

**An exciting new agreement between the UK and China has seen NNL named as joint leaders of a new UK-China Joint Research and Innovation Centre (JRIC). The JRIC and NNL's involvement were first announced during Chancellor George Osborne's visit to Beijing in September.**

The agreement was rubber stamped when NNL Chairman Richard Maudslay and China National Nuclear Corporation (CNNC) Vice-President Yu Peigen signed a Heads of Terms statement in London.

The ceremony was witnessed by the UK's Secretary of State for Energy and Climate Change, Amber Rudd and China National Energy Administration Director, Nur Bekri. This is another step forward in NNL's research and development co-operation with CNNC. The UK and China have jointly committed £50M to the JRIC over a five year period.

NNL and CNNC will establish and run the Centre and will commission projects in a number of different areas of work across the whole nuclear fuel cycle. In addition, the JRIC will act as a portal to enable UK companies

and academia, and their Chinese counterparts, to work together in areas of mutual collaboration and benefit.

NNL and CNNC first signed a ground-breaking Memorandum of Understanding agreement last year that has acted as a pathway to future collaboration and ultimately the new Heads of Terms statement. The JRIC will support the development of subject matter experts and others with higher level skills in both countries.

Over the coming months, NNL and CNNC will work together to agree a programme of work for the JRIC and will develop and strengthen links with other UK bodies. These include the Nuclear Advanced Manufacturing Research Centre (NAMRC), the National Skills Academy for Nuclear (NSAN), the Nuclear Innovation and Research Advisory Board (NIRAB) and key UK Universities working in support of the nuclear sector.

Commenting on the new JRIC, NNL MD Paul Howarth said: "I'm very pleased to see this announcement, which is the result of a great deal of effort by colleagues in NNL and in CNNC. The JRIC is an important step in building the relationship between the UK and China as that country becomes increasingly important on the international nuclear stage. "The work of the Centre will help to optimise the nuclear power

generations systems we have operating today as well as working to develop the reactors and fuel cycles which we will deploy in future and better ways of dealing safely with nuclear waste. It will be a significant contributor to delivering high level skills and jobs in the North West of England which has always been the heartland of Britain's nuclear industry."

The establishment of the JRIC illustrates the value of NNL working closely with Government and being a key enabler for international research links into the UK in the civil nuclear sector.

The growing relationship between NNL and CNNC was first highlighted earlier this year with the signing of a research contract with the China Nuclear Power Engineering Company (CNPE), a CNNC subsidiary. The scope of that agreement covers the various aspects of reactor design.

The announcements of closer links with China are important cornerstones of the developing connection between the nuclear industries in both nations, exemplified by the significant Chinese investment in the proposed new nuclear reactor project at Hinkley Point in Somerset, and will help to move both NNL and the UK generally to a more prominent position on the international nuclear stage.

# Q & A

with Fiona McLachlan, Business Manager, Materials, Chemistry and Modelling, Culham



## What does your job involve?

I manage a team of 15 nuclear scientists within the Reactor Operations Support technical directorate. We are part of the Reactor Chemistry and Materials (RCM) business area and are based at the new NNL office at Culham, Oxfordshire. The team is made up of material scientists, corrosion scientists and chemists and we operate a consultancy based business supporting a wide variety of customers. The team has world leading experts in a number of fields and we are currently focused on developing the next generation of experts so that we can support our customers in the future. I also do technical work in radiation chemistry, red oil chemistry and solvent extraction chemistry - I like to keep things busy and varied!

## How long have you been in the nuclear industry (or with NNL)?

I joined NNL (or Nexia Solutions as it was then) in 2007 after completing a PhD in chemistry at Imperial College London. My background was not in nuclear but it seemed an interesting area to work in. My PhD was in palladium chemistry in ionic liquids and I joined NNL to work on the related chemistry of molten salts. However, I think it was three years before I actually did any work in that area. The work streams changed in the time between recruitment and joining NNL and I started working in the reprocessing and actinides area instead, which turned out to be very enjoyable. Following almost four years working in the Central Laboratory, carrying out experiments, personal reasons required that I move south

and I happily relocated to work at NNL Harwell, which has now transferred to Culham.

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

I was interested in the fact that the RCM team was growing and I was keen to be a part of that. I also thought it was time to challenge myself with something that wasn't technical so I applied for the Business Manager role. It has certainly been a challenge but I enjoy working with my team and it's good to see the new starters developing and growing in confidence.

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

In five years I hope to be still working at Culham with a vibrant and busy team with all of the new starters we have recruited in the past few years having successfully found their niche in the industry.

## What does working at NNL mean to you?

A variety of things! It means the opportunity to be involved in some fascinating work. Not many people can say they have worked with plutonium and a variety of other actinides plus been involved in work related to operating reactors and also plants at Sellafield. It means the opportunity to work with some really interesting people and get out to Universities and see the work they do.

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

I like the diversity of things I get to do - from working alongside really brilliant scientists to guiding new starters in the industry to make those first steps along their career path. I like to get stuck into new technical work and see the progress I'm making in solving a problem or meeting a need. The part I like least is the fact that sometimes there isn't enough time in the day to do everything that I would like to do!

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

I carried out the first plutonium experiment in the Central Laboratory glove boxes in the Plutonium and Minor Actinides (PuMA) facility. PuMA is able to run experiments with greater quantities of civil plutonium than any other research laboratory of its type in the UK.

That first PuMA experiment involved looking at a variety of different solvent systems for use in the Grouped Actinide Extraction (GANEX) process. This work was for the advanced reprocessing European wide ACSEPT programme. Further work led to the NNL developed solvent system being adopted as the preferred GANEX process for the rest of the ACSEPT programme and the follow up SACSESS project.

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

There are many people who have influenced me. I've worked and continue to work with many amazing

and inspiring people. From senior staff to the newest starter you can learn things from people. The best advice I have been given was be open to anything, consider all options and take as many opportunities as you can.

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

Do your research and then go for it! There are so many different jobs you can do and there is bound to be something that suits.

### **What do you do to relax outside of work?**

I like to potter around in my garden growing things to eat – I'm not so keen

on non-edible plants - but the main focus of my spare time is planning my next holiday or trip. I love to travel with trips this year including Vietnam, Paris, Croatia, the wilds of Scotland and the Isle of Wight festival.

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

If I'm travelling for work then a good book. Eating dinner by yourself in hotels is never fun without something to read and after a busy day it's good to curl up and lose yourself in a story. If I'm travelling for pleasure then a guide book for the place I'm going. I love to collect guide books for all of the different places I've visited.

### **Which famous figure would you most like to meet?**

This is a difficult question to answer as there are so many interesting figures through history. I did hear recently however about women who delivered planes from factory to airfield during World War 2. While male combat pilots flew only one or two types of planes these women had to be able to fly many different planes with only one page of guidelines for each type. They were not involved in combat but did have a very important and difficult job to do and I think it would be fascinating to find out more about what it was like at that time.

---

# **NNL is Officially Excellent**

## **NNL has been named as part of an award winning team working with Sellafield Ltd to resolve a major challenge in the management of Highly Active Liquor (HAL).**

NNL and Sellafield Ltd have been working together to enhance existing Highly Active Evaporator capacity in support of HAL stocks reduction and reprocessing. The combined team has been named as winners of the Sellafield Excellence Award for 2015 in the People's Choice category.

The Sellafield Excellence Awards recognise outstanding performance across the Sellafield Ltd business and include partners and suppliers. Winning submissions were exhibited at Sellafield Ltd Excellence Days held at Energen in Cumbria and Hinton House in Warrington. NNL was a sponsor at both events.

Highly active evaporator remnant life is extremely important to the Sellafield site. Until new evaporator facilities become available, highly active residues from reprocessing are processed through existing evaporator facilities. Remaining operational life on current facilities was predicted to run out before new facilities become available. This would have a negative impact on the site with the potential to limit operations.

While the level of impact would be dependent on the length of the gap between the availability of currently operating and new plant, there was significant potential to increase lifetime costs. The combined team's challenge was the bridging of the gap in evaporative capacity to enable operations to continue while maintaining support for downstream plants at Sellafield including the Waste Vitrification Plant (WVP).

The integrated team approach led to more innovative problem solving and the use of complementary strengths, which ultimately improved the efficiency of the programme. This helped to identify issues, implement solutions and leverage benefits. As a result, existing highly active evaporative capacity has been enhanced reducing the risk to continuous operations. Ultimately, this will save the taxpayers considerable money.

Congratulations to the large NNL team involved, which consisted of people sourced from the Fuel Cycle Solutions and Waste Management and Decommissioning businesses. In addition, two members of the NNL Evaporator Inspection Team - Martin Armstrong and Sandra Hindley - were also part of a smaller group that received a Sellafield Employees of Excellence Award.



# **Sellafield Ltd**

# New Reactor Dialogue Study

A new dialogue project has been developed to review and improve the public's involvement in design assessments of new nuclear reactors that could potentially be used in the UK. NNL has played a key role in the work.

The project has provided a review of how members of the public are engaged in reactor design assessments (known as the Generic Design Assessment or GDA). NNL participated with others in an Independent Oversight Group in the dialogue study.

The driver for the project was the provision of support to UK regulators - the Environment Agency (EA), Office for Nuclear Regulation (ONR) and Natural Resources Wales - in helping to create a better understanding for the public in relation to GDA and to engage in effective and improved dialogue.

The project has helped to address a suggestion made in the independent evaluation of the EA's previous engagement and consultation arrangements during the GDA for the Westinghouse AP1000 and Areva EPR reactors between 2007 and 2011. The independent evaluation concluded that the EA should start engagement early with key target groups and clearly establish the place of each engagement opportunity in the overall process for building new nuclear power stations.

In addition to the regulatory bodies and NNL, the project and report were supported by Sciencewise, which is the programme funded by the UK Government's Department for Business,



## *Boosting public engagement*

Innovation and Skills to improve policy making involving science and technology.

It's widely recognised that a major contributing factor to improved policy making is the increased use and effectiveness of public dialogue. Openness and transparency are clearly important objectives in the assessment of new nuclear power station designs.

UK regulators are keen to build public confidence. A dialogue project in parallel to the ongoing GDA of the Advanced Boiling Water Reactor (ABWR) has been completed and has enabled the regulators to gain new perspectives and insights from the public. The ABWR is a design by Hitachi-GE and will potentially be used here in the UK at the Wylfa and Oldbury sites. This in turn helps to further build public trust in the regulators and their decisions.

NNL Laboratory Fellow in Nuclear Regulation Dr Colette Grundy was involved in the public dialogue project as a member of the Independent Oversight Group. Colette was a regulator on nuclear new build in GDA from 2007 until late 2011 when she joined NNL.

She said: "It was good to be working with nuclear regulator colleagues again on GDA matters. I thoroughly enjoyed the opportunity to draw on my past experience as a regulator in GDA in attending the dialogue workshop for the ABWR reactor.

"It was great to work with the members of the Independent Oversight Group, to ask questions and challenge the design of the dialogue process. I found this extremely interesting and it provided valuable insight."

# Creating a Positive Perception

NNL Chief Scientist Andrew Sherry has been out and about advocating the contribution of nuclear research and development to the industry and highlighting NNL's involvement, influence and impact. From his role with the UK Nuclear Industry Council (NIC) where he leads the work stream on Public Understanding of Nuclear Energy (PUNE), Andrew is a great champion of the importance of engagement and dialogue.



*Professor Andrew Sherry, Chief Scientist*

The NIC was established as a result of a key recommendation of the UK Government's Nuclear Industrial Strategy. The Council is representative of the partnership between Government and the industry with a view to providing high-level strategic direction to the UK's nuclear sector.

## **Blogging for DECC**

Britain's energy infrastructure is changing significantly for the first time in a generation. This was the main message in a blog from Andrew that appeared on the UK Government's Department of Energy and Climate Change (DECC) website.

The theme of Andrew's blog was 'Nuclear's Role in a Changing Energy Landscape'. The blogs represent an opportunity for contributors with an interest in energy and climate change to publicly share their thoughts, ideas and experiences.

In his blog, Andrew outlined how we must become far more dependent on low carbon technologies including renewables, gas with carbon capture and of course nuclear. He explained that switching to a low carbon electricity system represents a long-term, capital-intensive infrastructure programme with a number of complementary components. Collectively, these will ensure the UK has reliable, cost effective and low carbon electricity.

This includes a strong presence from nuclear in the energy mix, a move that has increasingly gained public support over the past decade. Opinion polls have revealed that four out of five people support a diverse energy mix to ensure a reliable supply of energy. This is partly due to nuclear power's low carbon credentials and also because the public's voice has been sought out and listened to via a number of consultations.

Andrew highlighted the two main elements contributing to the UK's nuclear programme - the operation of existing reactors and the new build programme that will make up the nuclear component out to around 2100 with three international developers planning three different reactor designs across five UK sites. The nuclear sector has recognised the importance of engaging with the public and Andrew highlighted the initiatives taken by EDF Energy in opening up Visitor Centres at their reactor sites and Sellafield Ltd creating a state-of-the-art exhibition at the Beacon Museum in Whitehaven near the Sellafield site.

A comprehensive strategy for public engagement was published in 2014 by the NIC, recommending that the sector follow four key principles of best practice namely dialogue, trust, clarity and consultation. Looking further ahead, Andrew highlighted the scope for developing new concepts including Small Modular Reactors (SMRs), which can provide both electricity and potentially heat.

He concluded his blog by discussing more advanced reactors that generate less waste. He said that advances in reactor technology will need research drawing together universities, national laboratories and industry all linking in with the international community.

## **Materials World**

Andrew was interviewed in the October 2015 issue of Materials World, the magazine representing the materials, minerals and mining communities. In a lengthy and detailed piece, Andrew spoke about his background and experiences in the industry, his current work and the contribution made by

Article continues on the next page

## Creating a Positive Perception

continued from the previous page

materials and materials science to the nuclear sector. He also presented his view about the future of nuclear in the UK and the challenges it faces. Catch up with the latest and back editions of *Materials World* via the Institute of Materials, Minerals and Mining website at [www.ion3.org](http://www.ion3.org).

### SMR UK Summit

Taking place in London during October, the Small Modular Reactor UK Summit attracted a mix of high level delegates from home and overseas. Andrew took his place among a select group of speakers including Dame Sue Ion, Tim Yeo (Chairman, New Nuclear Watch Europe), Lord Hutton (Chairman, Nuclear Industry Association) and Mike Tynan (CEO, Nuclear Advanced Manufacturing Research Centre - NAMRC).

The event was hosted by Gordon Waddington of Rowan House Consultants Ltd. Gordon led last year's feasibility study into the potential use of SMR technology in the UK. NNL played a prominent part in the consortium project that also included AMEC, Atkins, KPMG, Lloyd's Register, the NAMRC, Rolls-Royce and The University of Manchester.

Andrew's well received presentation was themed 'Public Perceptions of Nuclear in the UK' and he again emphasised the importance of public engagement in the development of an SMR programme in the UK. He spoke about the importance of public opinion for new nuclear and what needs to be done to keep the public supportive of new build. Andrew also outlined his view of the challenges with SMR deployment compared to those of larger reactor systems.

# Jordan Teaches in Abu Dhabi



*Jordan and fellow teachers in the UAE*

**Teaching in the United Arab Emirates (UAE) nuclear energy training programme proved an irresistible opportunity for NNL's Jordan Knapp. Jordan, a Reactor Chemist with NNL made his way to Abu Dhabi to help support the development of future reactor chemists and health physicists.**

Working via the UAE nuclear energy training programme, Jordan gained valuable personal experience and contributed to post-graduate further education. The UAE Government is looking to recruit 60% of nuclear personnel among people of Emirates origin. The challenge is that only 15% of the population in the UAE are actually Emiratis.

With so few recruits available, training courses require a very high

pass rate. Experienced personnel from the USA and Spain working for the Emirates Nuclear Energy Corporation were overseeing the training. With reactor chemistry a key area, NNL was contacted via the Gen 2 joint venture training company based in Cumbria. NNL's reputation in the reactor chemistry field led to a request from the UAE to provide a representative to help out.

Happily, when it came to taking exams, all of Jordan's students passed and he received positive and constructive feedback. He was among a teaching group from the UK, Spain and USA, which led to interesting discussions about respective nuclear programmes and technologies around the globe. He also found time to explore the two great and developing cities in the UAE: Abu Dhabi and Dubai. As a mark of appreciation and gratitude, on his final day before he returned to the UK a group of students treated the teachers to a traditional Emirati meal.

# Nuclear Training Pilot is a Winner

**An exciting new training and induction programme to support new starters has been launched by NNL and partners.**

The first 'Introduction to the Nuclear Industry' course took place at the NNL Workington Laboratory in September. It was led by University Links Manager Dominic Rhodes MBE alongside Adam Qaisar from the NNL Microscopy and Mechanical Testing team.

The two-day programme was rolled out to an enthusiastic group that included apprentices, new starters, recent PhDs and industrial placement and University students. The programme is designed for those who have recently joined or are looking at the industry and NNL as potential employers. NNL is collaborating on the programme with

the Nuclear Industrial Partnership (NIP) and the National Skills Academy for Nuclear (NSAN).

NIP is providing a cohesive model for ensuring implementation of the people element of the UK Government's Nuclear Industrial Strategy. NSAN is the employer led membership organisation that looks to make sure that the nuclear sector has the skills and people resources available to deliver the industry's needs.

The 'Introduction to the Nuclear Industry' course forms part of NNL's drive to inspire and support the next generation of nuclear subject matter experts. The launch involved a wide range of presenters and content and also featured a quirky quiz session that acted as an ice breaker to set the scene.

Following the launch, two further

courses were held at Summergrove Hall in Whitehaven in late September and November. Each course is available for students to attend free of charge with accommodation and meals provided. A typical programme includes the historical background to the industry, radiation, the nuclear fuel cycle, reactors, waste management, spent fuel and geological disposal.

The programme also includes sessions on public and stakeholder perceptions and a site visit. The NNL Workington Laboratory has featured on the course with an opportunity for delegates to tour the non-radioactive rig halls.

Two further courses will run in West Cumbria in January and March 2016. If you're interested in attending or require more information, please email Dominic at [dominic.rhodes@nnl.co.uk](mailto:dominic.rhodes@nnl.co.uk) or Adam at [adam.qaisar@nnl.co.uk](mailto:adam.qaisar@nnl.co.uk).

## Alice Wins First Prize

**It's always nice to be a winner and Alice LaFerrere returned from a recent trip to the European Federation of Corrosion Congress held in Graz in Austria with first prize.**

Alice's presentation to the congress was extremely well received by an enthusiastic audience representing both academia and industry. Alice, who is a member of the Reactor Chemistry and Corrosion team based at NNL Stonehouse, clearly made a positive impression as she received the 'Best Oral Presentation' prize from the Nuclear Corrosion Working Party.

The working party is chaired by Damien Feron, Director of Research at the Atomic Energy and Alternative Energies Commission (CEA). Damien was on hand to present Alice with her prize.

The conference highlighted the critical role of corrosion science, technology and engineering in extending the life of materials across different applications including the nuclear industry. Alice's talk, 'in-situ imaging of corrosion processes in nuclear fuel cladding', introduced the audience to advanced techniques for clarifying corrosion in Magnox and Advanced Gas-cooled Reactor (AGR) spent fuel cladding.

The talk covered a range of techniques that Alice and her NNL colleague Robert Burrows have helped to develop with the projects funded by NNL's own Signature Research programme. The work was carried out by NNL visiting scientists at the Universities of Swansea and Bristol.

The prize, coupled with publication in the peer-reviewed journal 'Corrosion Engineering, Science and Technology', is recognition of the excellent work carried out in NNL's Signature Research projects. It is also clear recognition of the importance of mutually beneficial collaborations between NNL and the Universities.





# NNL Hosts Delegation from Slovakia

Earlier this year, NNL was pleased to host a visit from a delegation representing the Slovakian nuclear waste management and regulatory sectors. The party consisted of six specialists from a number of organisations including VUJE (nuclear power plant research institute), JAVYS (nuclear decommissioning) and UJD.SR (nuclear regulatory authority of the Slovak Republic).

The visit was promoted by the International Atomic Energy Agency's Department for Technical Co-operation and was specifically aimed to share waste management experience. In particular, the visit focused on support for the management of nuclear waste arising from the decommissioning of the A1 Nuclear Power Plant (A1NPP) at Bohunice in Slovakia.

The Slovakian delegation to NNL reported on research and development and waste management processing undertaken in the decommissioning of the A1NPP. While decommissioning began in 1979, it did not gather momentum until the mid to late 1990s and decommissioning and waste management operations remain ongoing.

Key challenges facing the project include waste characterisation, immobilisation and disposal. To manage the waste, immobilisation technologies include encapsulation in cement and bitumen and vitrification in glass.

During the visit to NNL, UJD.SR (Slovakian regulator) gave a presentation on the low level waste



*Slovakian delegation at NNL Sellafield*

repository site operated at Mochovce. This is a near surface repository which receives cement flasks of low level encapsulated waste.

The NNL team included representatives from the Waste Management and Decommissioning business. NNL presented on current work being carried out to support radioactive waste management at the Sellafield site. Specifically, this included waste characterisation of materials in storage facilities, Highly Active Liquor Evaporations and Storage (HALES), high level waste vitrification, Intermediate Level Waste (ILW) vitrification using the Geomelt technique (see page 12) and operation of the encapsulation plants at Sellafield.

The NNL team also presented information on the development of a deep geological disposal capability in the UK. The Slovakian visitors were given tours of NNL facilities including the non-radioactive test rig hall at the Workington Laboratory covering cementation, Geomelt, robotics laboratories and HALES. The party also saw the Central Laboratory non-active laboratories and Vitrification Test Rig.

It was very clear that the UK shares areas of common interest with Slovakia including the development of a vitrification based process for treating ILW. This initial technical exchange has the potential to lead to further collaborative work in the future.



# Attracting Girls to STEM

**In the UK, it's a fact that less than 10% of the engineering workforce is female. This represents the lowest percentage of female engineering professionals anywhere in Europe.**

The Women in Nuclear (WiN) professional association is looking to do something about improving those statistics and achieve a more even gender balance across the nuclear sector.

WiN represents women working in the various nuclear related fields. The UK Chapter of WiN was set up in 2014 and is continuing to gain influence and profile. It is focused on addressing the issue of attracting women and girls into Science, Technology, Engineering and Mathematics (STEM) and encouraging them to take up careers in the nuclear industry.

NNL's Corporate Social Responsibility (CSR) strategy is primarily focused on promoting STEM and providing support to young people in making their career choices. With keen support for the work of WiN UK, NNL CSR is aimed at both girls and boys.

NNL and WiN UK are continuing to work with the well-respected Smallpeice Trust. NNL and Smallpeice have collaborated for a number of years in running 3-5 day residential courses aimed at pupils in Years 9 and 10.

The courses are held at Universities around the country and present students with the opportunity to find out about specific areas of engineering and get a valuable taste of what life after the classroom will look like.

In 2015, the Smallpeice 'Girls into Engineering' course has proved particularly popular running alongside other courses such as 'Physics in Engineering' and 'Nuclear Engineering'. The most recent 'Girls into Engineering' course ran at the University of Bristol in July and attracted 100 girls from Year 9.

With support from NNL, WiN UK hosted a nuclear design and build project as part of the course. Teams of students were required to design and build a centrifuge to separate 'naturally occurring radioactive material'. Centrifuge technology is used in the nuclear industry to separate and enrich the fissile component in uranium. This material is ultimately used to create nuclear fuel for reactors.

NNL provided mentoring on the 'Girls into Engineering' course with Olivia Thompson, Hannah Fenwick and Lynsey Rome supporting the students. Olivia is a Business Manager specialising in decontamination and waste assessment

and is also a member of the WiN UK Executive Committee. Hannah is a former Industrial Placement Student who worked in the NNL Process Chemistry capability while Lynsey is a Project Engineer.

WiN was additionally represented at the event by Alex Lamacraft and Rosie Archard from 'nucleargraduates'. This is an organisation created by the Nuclear Decommissioning Authority (NDA) and backed by over twenty nuclear sector organisations. The 'Girls into Engineering' course was also supported by Babcock, Lloyds Register Quality Assurance (LRQA) and Selex.

Student feedback was extremely positive and included the following comments:

"We didn't know much about either the nuclear industry or centrifuges. However, after completing this project we all feel we know a great deal more. Some of us have been inspired to take up engineering."

"I knew nothing about nuclear plants and centrifuges before this course and I know so much more now than I once did. The project was really fun and I liked the fact that it was not too simple or 'young' but was perfect for our age. I would definitely do it again."

"At the beginning, not many people in our team were familiar with the nuclear industry. We learned a great amount as a team and as the time passed by we started to understand."

Via involvement with the Smallpeice Trust and other initiatives and schemes, WiN UK and NNL are looking to continue their strong joint focus on STEM subjects and the achievement of a better gender balance in the nuclear sector.

Successful partnerships with the Smallpeice Trust and similar organisations will be a major contributing factor to achievement of those objectives.



*WiN: representing women working across the nuclear industry*

# A Presidential Win

Continuing a great tradition of achievement at the annual Royal Society for the Prevention of Accidents (RoSPA) Occupational Health and Safety Awards, NNL has emerged triumphant yet again.

NNL has been announced as winner of the 2015 President's Award. The presentation of the award took place at a ceremony and gala dinner at the Hilton Birmingham Metropole Hotel.

RoSPA's Occupational Health and Safety Awards are regarded as the ultimate celebration of health and safety management excellence. The prestigious President's Award is given to organisations that have shown consistent and exemplary levels of safety performance over a sustained period of time. NNL is a winner based on our eleven consecutive RoSPA Gold Awards, which reward high levels

of occupational health and safety performance.

In addition to receiving the President's Award, NNL was also invited to give a presentation on 'NNL Best Practices'. Health and Safety Standards Advisor Gary Bellard made the presentation in the RoSPA Winner's Lounge alongside Head of Environment, Health, Safety, Security and Quality Mark Edmiston and Alex Gregory, the winner of this year's NNL Safety IMPACT Award.

Commenting on NNL's latest recognition, Mark said: "This award is particularly pleasing because it not only recognises how seriously we take health and safety but shows that we have done so consistently over the past decade and beyond.

"It highlights the contribution of each and every individual across the entire NNL. It's they who work hard to ensure we're safe on a day to day basis and that we focus on continual



improvement. The award highlights the importance of never allowing complacency to creep in."

NNL's Safety performance over the years has often been externally recognised as being outstanding. Prior to winning the President's Award this year, NNL has secured the coveted RoSPA research and development Sector Award in eight of the past eleven years and been 'Highly Commended' in the other three.

---

## NNL's Visiting Professors

Enhancing student learning as well as building the employability and skills of UK engineering graduates has been the driving force behind the Royal Academy of Engineering's (RAEng) industry-into-academia scheme.

NNL is playing a key role in providing the RAEng with industrial experience via a series of Visiting Professorships.

In the latest application round, NNL has been awarded four RAEng Professorships. These are three-year stipendiary positions and contribute to undergraduate teaching.

The latest announcement is great news for NNL as only 23 awards were made across the whole of the UK.

The new NNL Visiting Professors are:

<b>Scott Owens</b>	<b>Imperial</b>
<b>Dave Goddard</b>	<b>Manchester</b>
<b>Steve Graham</b>	<b>Liverpool</b>
<b>Darren Lee</b>	<b>Lancaster</b>

Under the RAEng scheme, senior industry practitioners (VPs) deliver face to face teaching and mentoring at the host University. They may also contribute to postgraduate teaching, curriculum development (new modules/programmes) and strategy development.

As the UK's national academy for engineering, the RAEng brings together the most successful and talented engineers from across the engineering sectors for a shared purpose, which is to advance and promote excellence.

# Green Light for GeoMelt

NNL and partner Kurion have announced a key milestone in the collaboration to establish a full-scale, GeoMelt® In-Container Vitrification (ICV™) plant at the Central Laboratory in 2016. The team has successfully completed the non-radioactive testing phase of the commissioning programme.



*Successful GeoMelt testing at the NNL Workington Laboratory*

Kurion creates technology solutions to access, separate and stabilise nuclear and hazardous materials and isolate them safely from the environment. Last year, NNL and Kurion announced a joint project to deploy a full-scale, active ICV plant based on Kurion's GeoMelt® technology.

A GeoMelt® demonstration was staged for the Nuclear Decommissioning Authority (NDA) at the NNL Workington Laboratory non-radioactive test rig facility using simulated waste.

Following the successful demonstration, the equipment is being moved to the NNL Central Laboratory for final commissioning followed by commercial operation. NNL and Kurion intend to increase the capacity of the system in 2016.

The UK's radioactive waste inventory currently lists over 300,000 tonnes of intermediate and low-level waste that could be suitable for thermal treatment using GeoMelt®. The technology is uniquely capable of processing varied forms of waste simultaneously enabling it to turn liabilities, such as contaminated soils and inorganic ion exchange media, into assets as glass formers.

GeoMelt® is also suited to the treatment of radioactive contaminated asbestos, which is present at many plants undergoing decommissioning.

Nick Hanigan, NNL's Director of Waste Management and Decommissioning said: "The cold-commissioning of the GeoMelt® system is an important milestone as part of our core mission to evaluate options to improve the lifecycle cost for managing waste streams in the UK nuclear complex, including problematic waste streams that currently lack a path to disposal.

"This collaboration with Kurion brings together world-class scientists and engineers to accelerate the treatment of hazardous and radioactive waste."

The system started up safely, reliably and achieved its design goals. In 2016, NNL and Kurion plan to increase the total throughput up to a maximum annualised processing capacity of over 200 tonnes. The collaboration will also evaluate the installation of additional systems.

In contrast to other processes, GeoMelt® reduces the volume of waste and creates a superior, leach-resistant waste form that decreases the need for packaging, storage, handling, transportation and disposal. As a result, it lowers the lifecycle costs for managing waste streams.

"We are proud to work with the UK's National Nuclear Laboratory to install a GeoMelt® system at its Central Laboratory, which is emerging as an innovation hub for developing solutions for radioactive waste around the world," said John Rayment, founder of Kurion.

"Leading decision makers from the US, Japan and Europe have come to respect the great work taking place at NNL and we intend to use this new system as a demonstration platform for the worldwide nuclear market."

In 2014, NNL participated in a joint agreement with the NDA, The US Department of Energy's Office of Nuclear Energy and Office of Environmental Management to collaborate on radioactive waste and nuclear materials clean-up and management.

# Ellen's a Procurement Star

Although a relatively new face in the NNL Procurement team, Ellen Hunter is already an award winner. She has received the Sue Walker Award for Outstanding Contribution to Collaborative Procurement.

NNL is part of the Shared Services Alliance (SSA) Group with Sellafield Ltd, LLWR Ltd and Magnox Ltd. The Alliance takes part in collaborative procurement across the Nuclear Decommissioning Authority (NDA) estate.

Collaborative procurement enables SSA members to leverage the best deals possible for each of the businesses. Ellen was responsible for collating and producing a procurement progress report to the NDA that was used for forward reporting to Government.

Her much coveted award was presented by Ron Gorham, NDA's Head of Supply Chain Optimisation at a recent Collaborative Procurement Workshop. The award is named after Sue Walker, the first chair of the Heads of Procurement Group in the SSA. The Group runs the collaborative programme.

Ellen joined NNL from Magnox Ltd in March. She spent nearly five years in the Magnox business and worked as a Buyer/Analyst at Trawsfynydd in North Wales for three years before moving up to Daresbury in Cheshire for a further two years.

When she left Magnox she was asked to produce the latest collaborative procurement progress report as she had moved to another SSA member in NNL. She was happy to volunteer in addition to her new role.



---

## TFT Speed Dating

Earlier this year, the NNL Training for Tomorrow (TFT) team held their latest 'meet and greet' sessions. Taking the form of 'speed-dating', each 'meet and greet' was aimed at matching mentors and mentees together for the second cohort of the TFT Mentoring Scheme.

TFT was initiated as a project a few years ago within NNL's Emerging Talent cohort to recognise the importance of mentoring especially among younger people. This evolved into an NNL wide mentoring scheme under the TFT banner and the first cohort was launched in 2014.

Mentors volunteered from various areas across the NNL business and mentees applied to take part in the scheme. The purpose of the mentoring relationship was kept suitably broad to allow each mentee to shape the mentoring

relationship personally. The 'meet and greet' sessions enable each mentee to spend a few minutes discussing their aims and goals with each mentor and how they believe mentoring could help them achieve these goals.

The mentors then discuss what they think they can offer in support. The sessions have featured high levels of enthusiasm prompting lively and constructive discussions throughout. There has been an encouraging level of positive feedback, which has included reference to the networking opportunities created.

14 mentees were matched in Cohort 1 in 2014 and all 21 mentees in this year's Cohort 2 were successfully matched. The scheme is then handed over to each mentor-mentee pair to enable them to embark on their journey together. TFT continues to link all parties periodically to obtain feedback and provide support where required. Feedback will be used to inform TFT Cohort 3 in 2016.

# NNL People:

## Ian Jackson - Business Developer, Strategic Business Development

If variety is the spice of life, then Ian Jackson's career has consisted of an exciting and often challenging assortment of flavours.

In nearly thirty years in the nuclear sector, Ian has been involved in a range of areas including regulation, consultation, decommissioning and also with the energy utilities, private equity and institutional investors.

"So far, I think I can separate my career into three broad chapters," said Ian. "Including NNL, I've spent 13 years in nuclear research, six years as a regulator and ten years in private practice running my own business."

He's been with NNL since 2012 and is responsible for international business development in the Strategic Business Development (SBD) team. "I'm part of the new business work stream, diversifying NNL's customer base," said Ian. "We look ahead at growing and developing new overseas business opportunities in the medium term around twelve to 36 months into the future."

### Overseas Business Strategy

NNL's strategy for overseas business falls into three categories. "Firstly, we're looking at Government-driven international work," said Ian. "This includes participation in international research programmes and engagement with Government operated organisations.

"Then we're also seeking commercially driven work so we can leverage NNL's skills and experience in the public and private sectors. There's also international work that combines both Government and commercial clients and our recently announced agreements with China are a

good example. These are based on Government to Government arrangements but are being conducted on commercial terms."

### Joint Research and Innovation Centre

Ian and his colleagues in the NNL SBD team have been closely involved in the process to establish a UK-China Joint Research and Innovation Centre (JRIC). "The JRIC has been a main focus for me for a while now," he said. "We've worked hard to sell the benefits of the Centre to the UK Government at very senior levels especially the Treasury.

"NNL helped to facilitate the deal with the China National Nuclear Corporation (CNNC) and we'll be working equally as hard over the coming months to establish the JRIC. We're looking to get the best value in the future from the Centre for both the UK and China and we want to have it operating during 2016.

"It's a very exciting time in our relationship with China and we're discussing contracts that will apply across the nuclear fuel cycle. It's great that NNL is leading negotiations on important agreements with the world's second largest economy. If we get it right, the JRIC will be a perfect portal for the UK and China to work together on a series of projects and create value."

The Centre will probably be based in Manchester but will buy in research services from around the UK and



China. A longer term aim is to create a second branch of the Centre based in China probably in the Beijing area where CNNC has its headquarters.

### International Markets

"China and the Far East are the fastest growing global markets for nuclear new build," said Ian. "But, while economies in the region are developing very quickly there is a view that there's too much reliance on coal to generate electricity.

"Air pollution is also becoming an issue and this is a great opportunity for nuclear to grow as it has a small environmental footprint compared with fossil fuels. The UK is keen to contribute and NNL has a tremendous opportunity to be involved and develop new markets."

With countries like China, Japan and Vietnam there's sales potential across a range of nuclear related areas.

"The Chinese investment in the new build projects at Hinkley Point, Sizewell and Bradwell means there will be opportunities for NNL to get more involved in discussions on the Generic Design Assessment (GDA) of Chinese reactor designs," said Ian.

### Versatility, Tenacity and Regulation

Originally from Coventry, Ian now lives near Warrington. He has a degree in Applied Chemistry from his local University and started his career in 1986 working for the UK Atomic Energy

Authority (UKAEA) at the Harwell site in Oxfordshire.

"When I started at Harwell, it was just after the accident at Chernobyl and the industry was at a low point," he said. But he found himself doing well and focused on the business side of UKAEA's operations. "UKAEA was gearing itself up for privatisation," he said. "It was a very challenging but rewarding period. After four promotions in ten years I felt the time was right to move on."

## See You in Court

He then spent four years as a nuclear regulator working for the Environment Agency with responsibility for London and the south-east of England. His role presented him with the opportunity to become more involved with Government, politicians, civil servants and the legal system.

"I led three major court cases," he said. "This included a prosecution brought by the EA against a nuclear site and a pair of Judicial Reviews brought against the EA by an anti-nuclear group and the European Commission."

Again, an opportunity arose to further his career. Nuclear heavyweight British Nuclear Fuels plc (BNFL) was seeking a new Policy and Strategy Manager based in Warrington. Ian was offered the job and at the turn of the millennium he moved up to the north-west of England.

"BNFL was recruiting a number of former regulators to add rigour to their structure," he said. "I remained with the company during an excellent couple of years. BNFL was beginning a transition that resulted in the break-up of the company. The eventual creation of NNL was part of that process."

## Going Solo

Ian thought he would benefit from a change of direction while maintaining his involvement in nuclear and decided to run his own business. "It seemed like the right time," he said.

"With the break-up of BNFL and UKAEA the nuclear sector was becoming

more commercially accessible. I wrote regularly in the business and trade press and created a website that became popular and led to international consulting work."

He was building his knowledge of the industry at home and overseas. "I found myself in demand on the lecture circuit discussing nuclear business issues in diverse locations such as Moscow, Brussels, Paris, Ljubljana, Hanoi, Beijing, Kuala Lumpur, Abu Dhabi and Amman. I enjoyed being the interface between Governments and the commercial and banking sectors."

## Published Author

Ian was asked by the Blair Government to provide advice on the siting of new nuclear reactors in the UK to increase generating capacity and contribute towards the achievement of carbon targets. His paper 'Siting New Nuclear Power Stations - Availability and Options for Government' was published alongside the 2007 Energy White Paper.

He also applied his writing skills with a business book. Nuclear Engineering International magazine commissioned him to write 'Nukenomics: The Commercialisation of Britain's Nuclear Industry', which was published in April 2008.

"The book was aimed at the banking sector," he said. "A particular highlight during this period was a spell lecturing at the Skolkovo School of Management, the Moscow business school sponsored by Russian President Vladimir Putin."

## Royal Institute of International Affairs to NNL

Ian was then offered the opportunity to become an Associate Fellow in the Energy, Environment and Development programme of the Royal Institute of International Affairs. More commonly known as Chatham House, the Institute is a leading independent policy organisation (or global think-tank) based in London.

"Chatham House is world-class and

you have to be elected to join," said Ian. "I was among a small group of Nuclear Fellows and focused on the middle-east and weapons proliferation."

At this point Ian had been running his own business for a decade and his career was about to take another twist. "I knew Government was putting its Nuclear Industrial Strategy together," he said. The strategy would lead to NNL taking on a greater international focus, deploying expertise and helping accelerate nuclear related exports by UK companies.

Ian arrived in NNL in 2012 and the Government published the Nuclear Industrial Strategy the following year. "I think my ten years working as an independent helps me to introduce a private sector mentality and attitude," said Ian.

## Family Matters and Martial Arts

Away from work Ian has a very busy life. He and his wife Shehnaz have four children with two girls aged 16 and five and eleven year old twin boys. Ian and Shehnaz met while working at Harwell and have been married since 1992.

"The children keep us both on our toes," he said. He admits to having no time available for hobbies but still occasionally practices TaeKwonDo, the Korean martial art. "I fought as a Light Heavy Weight in the 1990s and hold a 1st Dan Black Belt," he said.

## International Leadership

Looking ahead, Ian is keen that NNL maintains an active role in business development on the international stage in the far-east, Europe and the USA.

"By implementing the Nuclear Industrial Strategy, the Government has endorsed NNL's role in strengthening the UK's international presence, said Ian. "We're working hard in the SBD team to make sure NNL is at the forefront of new emerging international nuclear energy and decommissioning markets. The future is international."

# In the Media

NNL has again attracted considerable interest from the media. We like to think this a sign that we are doing things right and presenting opinions that people find interesting. Selected highlights from our media coverage are....

## • Channel 4 News

In early October, a feature on alternative approaches to the proposed functionality of the Sellafield Silos Direct Encapsulation Plant (SDP) was featured on Channel 4 News in the UK.

NNL Process Chemist Dr Robin Orr was interviewed for the piece, a segment of which was broadcast live from the Sellafield site. He commented on SDP and the scientific understanding developed by NNL to provide a basis for an alternative, safer and cheaper approach to deal with effluent streams.

Robin emphasised that NNL's enhanced understanding of the chemistry has provided a lot more confidence in proceeding with alternative options to SDP. Robin is a Chartered Chemist and is based in the NNL Central Laboratory.

## • Inside Sellafield

As part of the BBC TV's 'BBC Four Goes Nuclear' season of programmes around the 70th anniversary of the Hiroshima atomic bomb, a one-off documentary 'Britain's Nuclear Secrets: Inside Sellafield' gave audiences unprecedented access to the most iconic of the UK's nuclear facilities.

NNL was featured briefly in the programme presented by Jim Al-Khalili. Speaking about his experience reporting on Sellafield, Jim said: "As a nuclear physicist, I found gaining such amazing access to somewhere as huge and important as Sellafield a once-in-a-lifetime opportunity."

Jim was given unprecedented access to facilities at Sellafield that included 'jaw-dropping' technology. The programme examined operations on site including waste treatment, storage and decommissioning and Jim conducted his own experiments to demonstrate scientific discoveries that lie at the heart of the UK's nuclear journey.

## • UK-China Research Centre

The agreement between the UK and China with NNL named as joint leaders of the new Joint Research and Innovation Centre (JRIC) received detailed and comprehensive media coverage. A Heads of Terms statement was signed in London during the recent Chinese State Visit.

NNL's External Relations Director, Adrian Bull was quoted in a lengthy piece in the Daily Telegraph on 21st October. He said: "China and Britain complement each other's strengths in nuclear capability and this could prove to be a successful long-term partnership between British and Chinese companies.

"As the largest growing nuclear power nation, and with experience across the whole fuel cycle, China can create commercial and economic benefits both in China and third markets by working with British firms.

"We, along with other British companies, are keen to use our experience and knowledge to support Chinese companies looking to navigate their way through Britain's regulatory, planning and procurement processes and manage any concerns the public or other stakeholders may have about safety, security and overall public opinion."

## • Knoxville Radio

During a recent visit to the USA, NNL's External Relations Director Adrian Bull was interviewed on radio in Knoxville Tennessee. Adrian featured on News Talk 98.7 FM. He was in the US visiting the Idaho and Oak Ridge National Laboratories.

The trip coincided with Nuclear Science Week activities in the USA and links with the recent n-eboc15, the nuclear energy business opportunities conference held in the UK.

Adrian also participated in the main event of the 2015 Nuclear Science Week in Knoxville. He also attended a 'Teach the Teacher' workshop and picked up a number of useful ideas to feed into NNL's own Corporate Social Responsibility (CSR) strategy and other outreach activity.

While at the US National Laboratories, Adrian visited key facilities and met with communicators and leads from stakeholder engagement. He also presented the latest news on NNL and the current situation regarding research and development and the wider nuclear sector in the UK.



# Collaborating for an Innovative UK

Since 2010, Innovate UK (formerly The Technology Strategy Board) has run a series of calls for innovation and technologies that 'develop the civil nuclear supply chain'. Innovate UK is the UK's innovation agency and is an executive non-departmental public body, sponsored by the UK Government's Department for Business, Innovation and Skills.

The calls for innovation and technologies are targeted primarily at Small and Medium-sized Enterprises (SMEs). Innovate UK contributes to and also enables access to other public funding generated by the UK Government Department for Energy and Climate Change (DECC) and the Nuclear Decommissioning Authority (NDA) in collaboration with the private sector.

Industrial partners are sought for each project with NNL successfully engaging in feasibility and collaborative R&D projects. Following the call for proposals in 2014, NNL has been active as an industrial partner in two separate projects. NNL internal funding is provided by its Innovation Research and Development (IR&D) Entrepreneurial portfolio.

## Project 1 - Stability of Piezoelectric Materials Feasibility Study

Ionix Advanced Technologies Ltd is a spin-out company from the University of Leeds and has developed 'piezoelectric' materials, originally for the aerospace industry, that are resistant to high temperature environments.

If these materials can also be shown to be resistant to radiation, they could be suitable for remote condition monitoring of nuclear processes and vessels. As industrial partner, NNL has brought its nuclear expertise and relationship with the University of Manchester to the project.

Samples have been irradiated at the University's Dalton Cumbrian Facility based at the Westlakes Science and Technology Park in West Cumbria. Results have been very promising so far and the project is now examining next steps.

## Project 2 - MAPS Collaborative Research and Development

Mosaicing for Automated Pipe Scanning (MAPS) is a three-year collaborative research and development project,

which began in April 2015. The objective is to develop a system combining optical hardware and advanced image processing techniques for interactive 3D remote visual inspection of pipework in the nuclear industry.

A consortium led by NNL also comprises partners from Inspectahire, the University of Strathclyde, Wideblue Ltd and Sellafield Ltd. The project builds on several years of innovative research conducted at Strathclyde, which is now ready to be exploited.

The specification of the system will be driven by NNL, Inspectahire and Sellafield Ltd to meet both of their existing needs and the emerging opportunities associated with decommissioning, reactor lifetime extension and new build programmes in the UK and overseas. The technology also has potential applications in the oil and gas industry.

Speaking about both projects, Dr Paul Collings, NNL's Head of Technology Commercialisation said: "We're delighted to be able to support Innovate UK and our partners in developing these exciting technologies.

"Both projects are excellent examples of SMEs, academics and the nuclear industry working in partnership to demonstrate the potential for technology transfer.

"As the UK's National Nuclear Laboratory, these projects are great opportunities for NNL to provide independent, knowledgeable advice and make facilities available in support of the nuclear industry supply chain. We have high hopes that they lead to exciting and impactful developments."



# Stephen's Champion Speaker Feature

Each year, the Nuclear Institute's Young Generation Network (YGN) hosts local speaking competitions in partnership with various regional branches around the UK. The purpose of the events is to encourage the development of the next generation of young public speakers and also provide them with the opportunity to celebrate their success

A number of NNL graduates took part in the local speaking competitions and Stephen Harrison was very successful when winning in the Cumbria branch with his talk entitled 'Let's Put Things into Perspective'.

Stephen, a Technical Assistant in the Immobilisation Science and Technology team based at the NNL Workington Laboratory, received his award at the University of Manchester's Dalton Cumbrian Facility from Matt Aukett, the NI Branch Events Chair and competition lead judge.

His winning talk examined how facts and figures, when taken out of context, manipulated or misunderstood, could have a detrimental impact on society. It focused on the 'facts' and 'figures' that have been attributed to the nuclear industry and have been either intentionally or unintentionally misleading.

NNL's Tom Majchrowski also took part in the Cumbria Branch competition with his talk 'Corrosion: Nature's Forte and Engineer's Nightmare'.



*Stephen (right) with Matt Aukett*

Having won in Cumbria, Stephen was then invited to compete at the National Grand Final, which took place in Manchester in September. He was up against an impressive array of young speaking talent representing some key players in the industry that included EDF Energy and Cavendish Nuclear Ltd.

In a close fought and very thought provoking contest, Stephen finished in an exciting second place. His talk

impressed the judges Ross Murison (2014 National Winner), John Warden (Chief Executive Officer of the Nuclear Institute) and Mike Hawe (Managing Director for competition hosts Ansaldo NES).

Apart from the glory of competing and receiving excellent feedback, Stephen also collected a cheque for £200.

Having just missed out on first place, he is already thinking of ideas and themes for his talk in next year's competition. "My plan is to go one better," he said.

# Dave's the Soul of Eden FM

There are examples around NNL of people doing different and sometimes unusual jobs away from their usual daily roles. For instance, Dave Eyley, Asset Manager at the NNL Workington Laboratory is attracting a loyal following on local community radio in the Cumbria region.

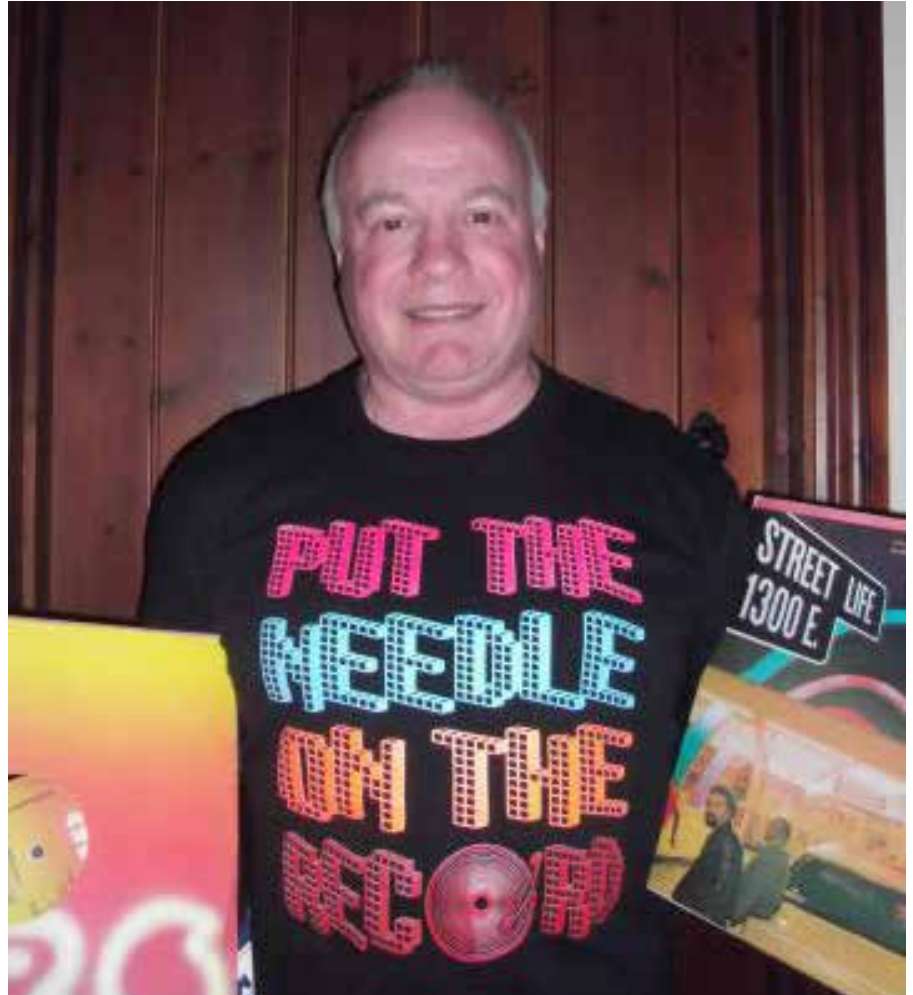
He presents the weekly '70s Show' on Eden FM, a not for profit community radio station based in Penrith near the Eden Valley on the edge of the Lake District National Park.

Dave's happy to play music of all types, especially from the 1970s. While he is a relative newcomer to Eden FM he is already enjoying the musical diversity and knowledge among the station's team.

Dave has always been a huge music fan, especially northern soul. In his youth, he spent time in Wigan, the nucleus of the UK's northern soul scene at the legendary Casino club, Blackpool, Sheffield and Stoke.

He does, however, admit that DJs can't dance. This is why he and his colleagues are happy to stay on the other side of the microphone. He enjoys indulging his soul music passion with Eden FM occasionally when he stands in for the regular soul DJ.

Dave finds broadcasting fun and a great contrast to his work with NNL. He enjoys the 'live' aspect of his show along with introducing listeners to his musical taste while obviously hoping they will actually like and enjoy listening to some of it.



*Put your records on: Dave at Work*

He finds the station's contribution to the local community very rewarding. Eden FM isn't Dave's first presenting job.

Among a number of stints hosting in nightclubs, he was a compere and DJ on a cruise ship for four years. Unusually, this resulted in him speaking very basic Ukrainian as the ship's crew was predominantly from that country.

NNL is involved with Eden FM as part of our Corporate Social Responsibility (CSR) programme. Partnering with

Innovus, the organisation that assists Cumbrian businesses in developing new technologies and innovations, NNL sponsors the Eden FM weather bulletins.

Dave was impressed when he heard the new weather jingle for the first time during a recent show.

If you're in the Penrith area, you can catch Dave's 70s Show every Thursday on Eden FM (107.5) between 6pm and 8pm. You can also listen online at [www.EdenFM.co.uk](http://www.EdenFM.co.uk).

# They Did It - Epic Cycle Chal

**In superhuman style, NNL Project Engineer Nick Robinson and friend Joe Robson from Sellafield Ltd have successfully completed an epic cycle ride. The two friends cycled from Edinburgh Castle to London's Tower Bridge and back again covering an incredible 870 miles in just three days.**

The thought of contributing to a tremendous cause kept them going as all of the cash they raised has been donated to support the Special Care Baby Unit at West Cumberland Hospital. In particular, Joe holds the work of the unit close to his heart as his twin daughters Isabella and Olivia received specialist care shortly after they were born in 2009.

Clearly, this was a very challenging time for Joe and his family. But, with the support of the Special Care Baby Unit, the Maternity department and the dedicated team of midwives, nurses,

doctors and so many other people, the girls are thriving six years on.

Both Nick and Joe were keen to repay the dedication and support of the team at the hospital by putting themselves through the physical and mental pain barrier. While both are very experienced cyclists operating at a high level as members of the Honister 92 Cycling Club, this was quite an extreme challenge to take on.

And the road wasn't the only test they faced with 40mph winds, thunderstorms and driving rain adding even greater significance to their achievement. Day one was Friday 17th July beginning at midnight and then taking in Saturday and Sunday. Hostile conditions meant they found themselves with problems as early as the first morning and there was an immediate awareness that it was touch and go whether they had enough time to complete the challenge.

They decided that that the ten minute and half hour scheduled rest stops would have to be sacrificed and



*Joe and Nick with the cheque for the Special Care Baby Unit*

they would keep riding constantly and eat on the move. Food (fruit pots, flapjacks, bananas, and protein shakes) was passed to them by their support team of Chris Moorfoot (a member of the NNL Vitrification Test Rig team), Amanda Lewitt, Laura and Darren Wylie from two vans. The two riders stopped only for comfort breaks.

They eventually arrived in London around five hours behind schedule. The last few miles into the city were an additional challenge with traffic lights and 20mph speed limits. After a quick break at Tower Bridge that included ice cream and a photocall they were back in the saddle for the return journey to Edinburgh.

They rode until midnight before grabbing an uncomfortable couple of hours sleep in a layby. The final day's itinerary featured another 280 very hard



*Cheers! Nick raises a flask*

# Challenge Completed



*The End: Arrival in Edinburgh*

miles. It rained for the first 100 plus and then it was the Pennines for another 100 miles. While they managed to tackle the constant rolling hills, the strong head/cross winds were having a real and biting negative impact.

At the Scottish Border, 70 miles from Edinburgh, both riders were suffering from a combination of fatigue and injury and their support team tried to persuade them to stop there and then. Nick had an old injury to his achilles tendon flare up and Joe was also in pain from a hamstring injury, which was later diagnosed as a grade two muscle tear.

Rather than give up, they were eventually convinced to tackle the last stint as a relay rather than both riding together. They arrived on Edinburgh's Royal Mile at 11:35 on Sunday night to be met by family, friends and champagne! Exhausted, Nick

admitted to sleeping for 13 hours when he finally got to his hotel.

"It was hard," he admitted. "The weather was a big factor in ramping up difficulty and making the ride quite formidable. We both had injuries to deal with as we got closer to Edinburgh on the return journey.

"But, there was no way we were giving up in view of the tremendous cause we were raising funds for. We had such great support from the fantastic four that made up our team on the road, the Sellafield Site Doctor Russell Newlove and all of our sponsors and family and friends."

Congratulations all round to the entire team especially Nick and Joe on their tremendous achievement.

They raised just over £10,330 in support of the special care baby unit.

A ceremony took place to hand over the cheque at West Cumberland Hospital.



*Halfway: Arriving at Tower Bridge*

# Oliver in at the Deep End!

Success at major championships has given UK elite swimming a boost in recent years. Big names like Rebecca Adlington and new star Adam Peaty are inspiring the next generation to take British swimming forward.

Part of the new wave is NNL apprentice Oliver Smith and his progress has been as rapid as his sprint swimming. This year, Oliver qualified for the newly established British Summer National Championships. The end of season event took place at Sheffield's famous Ponds Forge aquatic venue back in August.

Oliver, who lives in Workington and swims with Cockermouth swimming club, came away with a tremendous pair of silver medals in the 50m backstroke and the team medley relay. This helped his club's male team to a very proud eighth place in the overall medal table.

A main aim of the championships is increasing and supporting junior talent

on their journey to senior medal-winning performance. Up to 24 top ranked swimmers in each age group were invited to the championships including Oliver.

His sporting career is running alongside his NNL Technical Specialist Trainee Scheme (TSTS) apprenticeship with NNL. He first joined in September 2014 and began work at the Central Laboratory having spent his first weeks based at the Gen 2 training facility at the Energun centre in Workington. With NNL he works in the Central Maintenance Team, part of the Facilities group.

Oliver qualified for the British Summer National Championships with impressive results at the North West Regional Championships. An excellent all round performance saw him win the 50m backstroke, finish second in the 100m backstroke and third in the 50m butterfly.

At the British Summer National Championships, he competed in the over 19 age group in his individual event. The ten man 50m backstroke final saw Oliver finish in an excellent 26.39 seconds. In the 400m team



medley, Oliver and his team mates Edward Baxter, Luke Greenbank and Charles McSkeane achieved an equally impressive 3:47.23 again finishing in second place.

Mixing in such competitive company has been a great experience for Oliver as he looks to progress in his swimming career while also continuing to do well with NNL.

## Mike's a Chemical Brother

Congratulations to Mike Harrison, who has earned a Fellowship to the Royal Society of Chemistry (RSC). Mike, a Technical Manager in the Vitrification Test Rig team at Sellafield, is currently specialising in vitrified waste form performance.

Mike's achievement in gaining Fellow status in the RSC is recognition of his high levels of accomplishment as a professional chemist.

Mike is an experienced Chartered Research Chemist with a D.Phil. in

Inorganic Glass Chemistry from the University of Oxford. He joined NNL in 2003 originally in the High Level Waste Processes team. Since then he's worked on a variety of projects covering the treatment of a wide range of radioactive waste streams. In the past ten years, Mike has developed considerable experience in radioactive waste treatment, glass chemistry, leach testing methods and molten salts waste processing.

He has developed a strong link with Radioactive Waste Management (RWM), the organisation responsible for delivering a geological disposal facility and providing waste management solutions. Mike has completed a

number of reviews and has acted on behalf of RWM at various events. He has also collaborated with the Immobilisation Science Laboratory (ISL) at the University of Sheffield covering a number of vitrified waste studies.

Mike is a work package leader for project 'SACSESS', leading on the treatment of wastes from pyrochemical processing of spent fuel, having held a similar role in the previous 'ACSEPT' programme. He has also taken on the management and co-ordination role for the NNL Innovation Research and Development (IR&D) Signature programme for the Waste Management and Decommissioning business directorate.

# NNL Launches First CSR Report

**In NNL, we take our responsibilities as a member of the communities where we are based very seriously.**

We want to make a strong Corporate Social Responsibility (CSR) contribution, be a good neighbour and play a part in making local communities - and the people within them - successful.

More recently, a more structured approach and strategy for CSR has been introduced in NNL. This renewed focus directs how we go about engaging in our CSR activities - whether making a donation to a worthy cause, providing input from NNL's young people to support activities in schools and colleges or sponsoring bigger events.

With NNL taking responsibility on behalf of Government to protect nuclear skills and the national nuclear technology capability the primary CSR focus has been on education. This includes

activities centred on investment in Science, Technology, Engineering and Mathematics (STEM) learning and training alongside more general support for young people.

NNL is pleased to announce the launch of our first ever CSR report. The report presents our CSR focus over the past year or so and covers highlights that include community engagement, ethics, employee engagement, compliance, quality and services.

We are striving to constantly get involved with local communities and organisations. Through sharing our expertise and skills, NNL hopes to raise the awareness of careers and nurturing talent into the nuclear industry while also adding value to communities throughout the UK.

Following publication of NNL's new CSR report, MD Paul Howarth commented: "NNL aims to continue fostering a corporate culture that values CSR by pursuing our initiatives and also

continually expanding our CSR. "We are considerate of the impact of our activities and aim to conduct business in a way that is safe and socially responsible."

The NNL CSR Report 2015 is available at [www.nnl.co.uk](http://www.nnl.co.uk)



## Ruth's NNL Adventure Begins



**NNL has welcomed new Chief Financial Officer Ruth Dunphy into the business.**

Ruth has joined from MWH Global where she has worked since 2008. She was initially with Biwater Services prior to acquisition by MWH Global in 2011.

Her most recent role was UK Finance Director.

Ruth brings almost 20 years of experience in financial management across a range of industry sectors including engineering, construction, consultancy services, manufacturing, retail and tourism.

Welcoming Ruth, NNL Chairman Richard Maudslay said: "I'm delighted that Ruth has joined the NNL Board and Executive teams. She has an excellent track record of leading financial delivery in some very challenging business sectors. She has also demonstrated her ability to deliver transformational change within a business, in parallel with significant growth.

"Once again, her appointment is evidence of the calibre of excellent individual talent which NNL is able to attract and I know she will play a vital role in shaping and supporting the future direction of the business."

Commenting on her appointment, Ruth added: "I'm excited to join NNL at such a pivotal time in both the company's and wider nuclear industry evolution. I'm delighted to be part of an exceptional team whose skills and experience I hope to further complement in the future.

"Although I'm new to the nuclear sector, I think my broad experience in other industries will prove very valuable in this role and I'm looking forward to helping shape the future of the business."

# NNL Prominent at Industry Events

**In recent weeks and months, NNL has maintained a strong profile and presence at various industry events. This year's World Nuclear Association Symposium attracted over 600 of the world's nuclear energy leaders who came together in London to discuss key topics such as new nuclear build, fuel cycle developments and decommissioning.**

As a member of the Association, NNL was part of a comprehensive exhibition at the long established event. Taking place over three days, the symposium is a tremendous opportunity for delegates and exhibitors to take advantage of networking opportunities, question and answer sessions and interactive panel discussions

With over 180 members in more than 35 countries, the World Nuclear Association is the global trade body for the nuclear industry. Membership has made great sense for NNL with business increasing in frequency with customers and research partners from outside of the UK.

NNL is playing a leading role on behalf of the UK in dealings with the worldwide nuclear industry. World Nuclear Association membership presents opportunities for NNL to work closely with other members to take plans forward in a number of different markets. This includes 'mature' nuclear nations and those considering the use of nuclear energy for the first time.

NNL MD Paul Howarth was among a number of key speakers at 'n-eboc15', the nuclear energy business opportunities conference held at Energus in Workington. The Cumbria region is anticipated to have the largest nuclear and third largest infrastructure investment in the UK over the next ten years with tremendous business opportunities set to be created.

Driven by Britain's Energy Coast Business Cluster, the n-eboc15 event was spread over two days and was an ideal platform for delegates, including the local and national supply chain, to find out about opportunities in the nuclear sector in and around Cumbria. As a major event partner, NNL hosted the first day afternoon session covering nuclear research and development.

Paul spoke at the event about NNL and its contribution to the nuclear sector and the region. He also highlighted his role as Chairman of the Centre of Nuclear Excellence (CoNE) that is positioning the Cumbria region to fully capitalise on the opportunities presented by the nuclear sector by bringing together people and organisations for a common purpose.

Also featuring at the event were nuclear new build, the UK military submarine programme, decommissioning and waste management. Each session showcased investments and how real prospects for business are being created.

Paul was also a speaker at the Sellafield Ltd combined Business and EHS&Q Excellence Day. NNL was an exhibitor at the event, which also took place at Energus. Excellence Days feature stands manned by the winning teams from the Sellafield Excellence Awards for 2015.

NNL has provided support in several successful awards categories and will attend a presentation dinner and ceremony during December. A companion Excellence Day took place at the Sellafield Ltd base at Hinton House in Warrington with NNL again providing an exhibition.

During November, NNL attended the Nuclear Decommissioning Authority (NDA) Supply Chain event held in Manchester.

The objective was to present opportunities for suppliers to meet 'buyers and sellers' from the NDA estate and other Government departments. NNL ran a much visited exhibition and popular technology demonstrations in the event's unique 'Innovation Zone'.



*NDA Supply Chain Event*



# New Position Paper Published

NNL has many years of experience of the nuclear fuel cycle and associated science and technology. This places NNL in an ideal position to advise decision makers on key topics which are important when considering the UK's ability to meet these nuclear challenges.

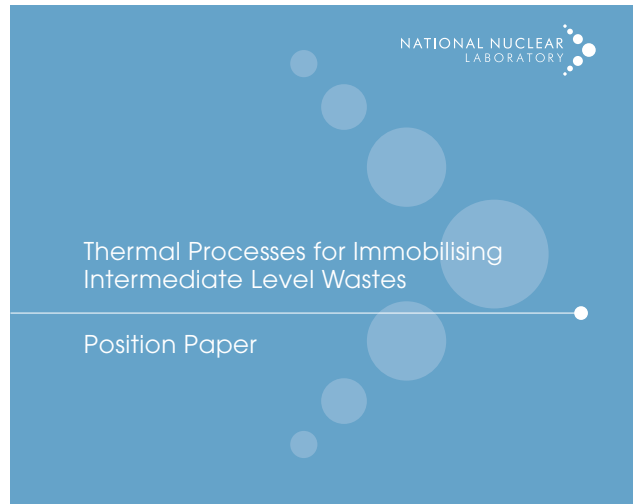
NNL's views are being set out as a series of Position Papers. These papers reflect NNL's independent and authoritative view and are supported by underpinning studies. NNL has published the latest Position Paper 'Thermal Processes for Immobilising Intermediate Level Wastes'.

The UK has gained experience of a number of processes for the immobilisation of radioactive waste over several decades. This experience comprises the development of product formulations, immobilisation processes, as well as commissioning, operating and optimising of plants and includes innovations that have been adopted internationally.

Since 1991, high level liquid waste from reprocessing in the UK has been vitrified to produce a glass based product while most operational intermediate level wastes have been directly encapsulated in cement.

Although substantial progress has also been made in the vitrification of high level wastes produced before 1991, there remains a number of legacy intermediate level wastes from these earlier days of reprocessing for which decisions on immobilisation have yet to be made.

Thermal processes have the potential to provide high quality glass and ceramic based waste products and may offer significant savings on operational and disposal costs of these wastes due to the potential for reduced volume in comparison with cementation.



A wide range of thermal processes exist worldwide that could be used for immobilisation of some of these UK legacy wastes.

The Position Paper discusses the potential benefits of thermal processes as well as the challenges that would need to be overcome to implement thermal processes for intermediate level wastes.

The UK's track record in operating the Waste Vitrification Plant (WVP) on the Sellafield site is also discussed along with a range of other technologies which could be applied for ILW.

# Innovation Delivered

At the UK's National Nuclear Laboratory, we deliver the right amount of innovation to meet our customers' needs.

On one level, we might simply drill a hole to analyse underground waste with our integrated microdrilling technology.

At the other extreme, we are developing state-of-the-art power systems to support deep space exploration.

Find out more about what we can do for you at [www.nnl.co.uk](http://www.nnl.co.uk) or email [customers@nnl.co.uk](mailto:customers@nnl.co.uk)

NATIONAL NUCLEAR  
LABORATORY





# innovate

## NATIONAL NUCLEAR LABORATORY



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



NNL operates at six locations in the UK:

Sellafield, Cumbria • Workington, Cumbria • Preston, Lancashire • Warrington, Cheshire • Culham, Oxfordshire • Stonehouse, Gloucestershire