# Note of SAFESPUR Meeting

**International Knowledge Transfer in Nuclear and Defence Decommissioning**

**University of Salford, Manchester, 10 May 2012**

This meeting was about how nuclear and defence decommissioning in the UK has benefitted, and can continue to benefit, from technologies and management approaches developed in other countries. It was held in the Think Lab at the University of Salford, which was a very high-tech venue, quite different to the usual meeting rooms. At the end of the meeting participants were given an introduction to the work of the Think Lab and a short demonstration of its impressive 3D modelling and data display capabilities.

### *Introduction and scene setting*

The meeting was chaired by Peter Booth of WSP, who gave a brief introductory presentation. He reminded participants of how the nuclear industry had changed over the past ten years. A decade ago the challenges of dealing with the nuclear legacy (wastes, buildings and land) were not well understood, R&D was fragmented, there were no firm plans for replacing the nuclear power stations that were coming to the end of their useful lives, and the workforce was ageing. There was relatively little engagement with stakeholders and considerable public distrust of the industry.

The situation now is very different. The Nuclear Decommissioning Authority (NDA) is well-established and has set out its strategy for dealing with the nuclear legacy. R&D has been expanded and its coordination improved. The regulators' Generic Design Assessment for new reactors is nearly complete and consideration of the planning application and nuclear site licence application for Hinkley Point C is underway. Current and future skills gaps have been identified and work is in progress by the National Skills Academy for Nuclear (NSAN) and others to fill them. Stakeholder engagement has greatly increased.

NDA's strategy is being implemented by its Site Licence Companies (SLCs), which are owned by Parent Body Organisations (PBOs). All of the PBOs involve overseas companies and thus there is much greater potential for the UK to acquire overseas experience and expertise. The benefits for UK decommissioning and radioactive waste management could include increased safety, faster resolution of long-standing problems, smarter working and lower costs. Peter ended by saying that this SAFESPUR meeting and the next one would illustrate what had been achieved so far and explore the possibilities for the future.

### *International reachback at Sellafield*

This presentation was by Sean Morgan from the Technical Directorate of Sellafield Ltd. He said that Sellafield had a long history of international collaborations, starting when it was a UKAEA site and continuing through the BNFL years to the present day. Sellafield Ltd is now owned by Nuclear Management Partners (NMP), which is a consortium of US, French and UK companies (URS, Areva and AMEC). NMP provides directors for Sellafield Ltd, making it easier to access site and corporate experience from the consortium companies. There is now a larger talent pool from which to fill gaps in expertise at Sellafield and there have already been about 100 staff secondments from NMP.

Sean then focused on the technical implementation of thermal treatment processes for radioactive wastes, as an example of international reachback. The advantages of thermal treatment are that it reduces chemical reactivity, is appropriate for a wide range of wastes and produces a high quality waste form. There are a number of thermal treatment processes

in use worldwide. One of these is vitrification, which has been used for many years at Sellafield for high activity liquid waste. The relevant plant (the Waste Vitrification Plant, WVP) is based on French technology. Collaborations with France began before WVP was constructed and assistance programmes have been in place with Cap de la Hague since 2004.

Hot isostatic pressing (HIP) has been under consideration by Sellafield for many years, starting in the 1990s with collaboration with the Australian organisation ANSTO. HIP is now proposed for treatment of plutonium residues that are not suitable for re-use in MOX fuel.

Sellafield is currently investigating the implementation of three types of thermal treatment processes: plasma arc, joule heated and induction. Most of the experience of these is in other countries and Sean gave examples of full scale plants in operation in the US, Korea, Japan and Sweden. Sellafield is interested in using the processes for pond solids (skips, mixed beta/gamma wastes and other wastes) and for plutonium contaminated materials (PCM).

Inactive trials have shown that a joule heated process could result in a good quality product for high metallic wastes. These trials were carried out by Impact Services (a US company) and AMEC for Sellafield Ltd. For PCM a treatment such as plasma arc could offer considerable volume reduction as well as an inert waste form. Decisions on which processes to use for pond solids and for PCM might be made late in 2013.

In conclusion Sean said that NMP has brought increased resources and experience to Sellafield. There is also now more incentive for Sellafield Ltd to engage with the supply chain in seeking innovative solutions.

In answer to a question, Sean said that formal agreements were in place about technology transfer from NMP to Sellafield Ltd. He was then asked about workforce attitudes to new technologies. He said that, as might be expected, some people were keen on innovation and others sceptical. A further question was about secondments out of the UK. Sean replied that there had been some secondments from Sellafield to URS and Areva, but mostly for work experience.

### *International knowledge and experience sharing at LLWR Ltd*

David Rossiter, the Head of National Programme at LLWR Ltd, gave this second presentation. LLWR Ltd was formed as an SLC in 2008, when UK Nuclear Waste Management Ltd (NWM) became the PBO. There are four companies in the NWM consortium: URS (from the US), Serco (UK), Areva (France) and Studsvik (Sweden). Each of these brings its own expertise and experience to LLWR Ltd's two major tasks: to develop and implement a UK nuclear industry low level waste (LLW) strategy, working in partnership with NDA, and to become a LLW management company, rather than simply an operator of the Low Level Waste Repository.

URS's experience of running the Waste Isolation Pilot Plant (WIPP[1]) in the US proved valuable in a number of respects. When WIPP first opened the rate at which waste could be shipped to it was low. This was because much of the waste was not characterised sufficiently or packaged appropriately. In partnership with the US Department of Energy (USDOE), URS started an integrated national programme to assist the many sites that wished to consign wastes to WIPP. This increased the shipment rate by about a factor of 30.

LLWR adopted a similar inclusive approach. It involved a group of stakeholders in developing the LLW Strategy and continues to involve them in implementing it. Key objectives of the strategy are to reduce the amount of LLW consigned to the LLWR, improve waste characterisation so that more can be dealt with as non-radioactive, increase re-use

[1] WIPP is a geological disposal facility for transuranic wastes (i.e. long-lived alpha contaminated wastes such as PCM).

and recycling, find alternative routes for disposal of very low level waste (VLLW) and reduce the amounts of VLLW and LLW generated. In addition, the capacity of the LLWR is being maximised by optimising waste packaging and vault design.

LLWR now offers a comprehensive range of waste management services to its customers, including re-use and recycling. For example, it recently arranged for five boilers from Berkeley to be shipped to Studsvik in Sweden for recycling. It is encouraging greater waste segregation at source, which is routine in France and the US. It has introduced re-usable transport containers for LLW and is promoting the use of soft-sided packages (also routine in France) for wastes such as soils and rubble.

Knowledge transfer to LLWR from NWM has occurred via long-term and short-term secondments. Topics have included business change and project management, as well as technical matters. The aim is to increase the capabilities of LLWR Ltd, so that it is self-sufficient and does not need to rely on NWM. For LLW, much of the change has been about employing good management practices, not new technologies. Attitudes that have had to be overcome include: “not invented here”, “the regulators would not allow it”, “too difficult to change” and “we thought of that before but nobody listened”. While international experience has been a catalyst for change, it is also important to identify when UK practices are different for a good reason.

Points that arose in Q&A included whether there was in-built conservatism in the UK nuclear industry and a fear that PBOs would cut corners to increase their profits. David responded that there were many people who were keen to bring in change and that doubts about the approach of PBOs had not been well-founded. Some LLWR Ltd staff had found the pace of change difficult. US experience in managing people at USDOE sites had been useful in this respect. The increased emphasis on recycling domestic waste had also been helpful in changing general attitudes to managing nuclear industry wastes.

***Data quality objectives***

This presentation by Stephanie Bloomer of AMEC was about the use in the UK of the data quality objectives (DQO) methodology developed by the US Environmental Protection Agency (USEPA) and the Visual Sample Plan (VSP) software developed at US universities. It focused on work carried out by AMEC on delicensing land at the Maynard Centre, which produced tritium and carbon-14 labelled compounds until it ceased operations in 2008.

The DQO methodology covers gathering and distilling historical information (e.g. staff knowledge, site drawings, project files, incident reports) and developing a sampling plan that will support land management decisions. It involves DQO workshops for particular buildings or areas of land and the production of a DQO report that contains clear decision statements. For the Maynard Centre these statements were about whether the land was uncontaminated (and therefore required no further control), contaminated at low levels (possibly requiring some restrictions on future use) or contaminated at a level that necessitated remediation. The DQO process also covers sample storage and choice of the best laboratory techniques. Statistical considerations are built-in, in the sense that sample numbers are established through the confidence required in the results and the type of grid sampling approach that is appropriate.

This was the first use of the VSP software in a major delicensing project. AMEC has customised the software for UK use. It shows, in graphical and tabular form, where samples are to be collected, how many and of what materials. After sampling and analysis, it can be used to display the results.

Stephanie said that use of the DQO methodology had been very successful. It had reduced costs (by reducing the number of samples that needed to be taken by about a factor of 10), and allowed buildings to be stripped in a logical order and wastes to be segregated. The

documents produced were easily auditable and the VSP software had been very useful. There had been early buy in from regulators, who found the process rigorous and robust.

After the presentation there was some discussion of how DQO compares with previous techniques. There seemed to be a consensus that DQO codifies and formalises good practice, rather than offering something entirely new, but this is very valuable in itself. There was also a question raised about record keeping and whether VSP was sufficiently geared towards long-term storage of records in electronic form.

### *International co-operation in waste management and decommissioning*

Jamie Townes of the World Nuclear Association (WNA) described the general work of his organisation and then the activities of its Waste Management and Decommissioning Working Group. WNA is a trade association and has about 200 members drawn from the whole of the nuclear industry. It represents the industry in key international fora such as the International Atomic Energy Agency (IAEA), the Nuclear Energy Agency (NEA) of OECD, and the International Commission on Radiological Protection (ICRP). It has expertise in the nuclear fuel market and supply chain, enables industry contacts and cooperation and provides the public with information and news (e.g. through its World Nuclear News website).

WNA's Waste Management and Decommissioning Working Group involves operators, decommissioning organisations, waste management companies and organisations, and uranium mining companies, from Europe, North America, Asia and Australia. In 2011 the group produced a position paper on managing LLW. The paper concluded that recycling, re-use and disposal are all essential options in LLW management, that techniques for carrying them out exist and that it is the industrial business case that is most important in choosing between the options. It emphasised that recycling and re-use is a controlled process, with specifications on the input materials and output products, and that clearance is not the only means to achieve recycling and re-use. It also made the point that it is essential to have and use a disposal route for those wastes that cannot be recycled or re-used, or for which it would be too expensive to do so.

Jamie then gave several examples of international cooperation on waste management and decommissioning:

- the Studsvik metal recycling facility in Sweden, which has customers from around the world
- the transport of decontaminated skips from Hinkley Point A to Bear Creek in the US for smelting and re-use in the nuclear industry
- EDF Energy's co-operation with German companies on treatment and storage of ion exchange resins
- Japanese use of recycled aggregates in off-site construction (and potentially in some new nuclear build applications)
- recognition of EDF by the US organisation EPRI for expertise in decommissioning.

One question after the presentation was about UK performance in technology transfer. The response was that the UK is doing fairly well and is seen as being flexible in adopting new ideas. Another question was whether WNA made knowledge freely available. Jamie said that WNA's working groups were primarily networking opportunities, with much of the information available only to the members who take part in them.

### *Conclusion*

In concluding the meeting Peter Booth thanked the speakers and the audience for taking part, and the University of Salford for hosting the event. He said the presentations had covered a number of different aspects of knowledge transfer. The Sellafield Ltd and LLWR Ltd presentations had shown how the UK was benefitting from international knowledge and

expertise. The AMEC presentation had described an example of how a US methodology could be applied to UK nuclear and defence sites. The final presentation had described the WNA role in international knowledge transfer. Peter then drew people's attention to the next SAFESPUR meeting, on research and innovation.

Marion Hill for CIRIA-SAFESPUR+

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