

**HEALTH AND SAFETY COMMISSION  
NUCLEAR SAFETY ADVISORY COMMITTEE  
SUB-COMMITTEE ON RESEARCH**

**Minutes of the 40<sup>th</sup> Meeting of the  
Nuclear Safety Advisory Committee Sub-Committee on Research  
6<sup>th</sup> February 2007 at HSE, Redgrave Court, Bootle**

Present:

SCR Members

Prof N Moray (Chair)

Dr R Taylor

Mr P Manning

Prof R Bloomfield

Mr G Munro

Dr A Muir

HSE

Dr P Storey

Dr H Starkie

Licensees

Dr R Ainsworth, BE

Dr P Harston, BNGSL

Mr S Daniell, Magnox Electric Ltd.

Ms J Lloyd, UKAEA

Others

Dr N Smart (NDA)

Apologies:

Mr S Walsgrove, DTI

Mr I Giles, MoD

Ms M Wise, UKAEA

Prof. R Dolby

Dr P Haigh

Prof R Grimes

Mr P McDonald, HSE

## **1. Welcome to New Members and Apologies for Absence**

1.1 The Chair welcomed new members Alan Muir, Peter Manning and Gordon Munro.

1.2 Apologies were received from Richard Dolby, Paul Haigh, Robin Grimes, Ian Giles, Steven Walsgrove, Michelle Wise and Patrick McDonald.

## **2. Approval of Minutes and Matters Arising**

2.1 The Minutes for the 39<sup>th</sup> meeting were approved.

2.2 Action 06/9 remains ongoing from April 2006. Actions 06/11, 06/12, 06/15, 06/16 are complete. Action 06/17 is ongoing.

2.3 Under Action 06/13, Peter Storey reported that OCNS guidance needed to be looked at before any further steps were taken to publish Levy reports. If there were a requirement to expurgate sensitive information from the reports before publication, this would need to be resourced by NSD.

2.4 Peter Storey reported that he had met with Vic Coleman and Patrick McDonald (HSE Chief Scientist) regarding help that the Chief Scientist's Unit could give to help publication of Levy Reports (Action 06/14). He requested that Patrick McDonald be formally invited to the next meeting and asked to provide a position statement with respect to nuclear and new build research that included what he would like to see published and what he could do to help (Action 07/1).

## **3. Terms of Reference for NuSAC/SCR: Feedback from NuSAC (No Paper)**

3.1 The Chair reported that NuSAC had approved his proposed revision to the Terms of Reference of the SCR, with only minor amendments. These amendments are to replace 'ensure' with 'assure' in the first paragraph of the Terms of Reference and 'to support this goal' with 'to support research on nuclear safety' in the second paragraph.

3.2 The meeting agreed to these minor changes and the Chair of the SCR was actioned to notify the Chair of NuSAC that the SCR was happy with these revisions (Action 07/2).

## **4.1 UK Nuclear Safety Research Programme: Update on 2006/2007 Programme and Proposed Programme for 2007/08 Paper NuSAC/SCR/07/2**

4.1.1 Peter Storey reported that 2006/07 had been a smooth year with no major problems so far. He added that the new research arrangements for the NDA Site Licensee Companies were developing satisfactorily and that NSD had started developing nuclear safety research oversight arrangements with the defence licensees.

4.1.2 The SCR asked how NSD questions the need for research. Peter Storey replied that the NRI is developed from a dialogue with British Energy, although occasionally the wider community is brought in to comment upon what research should be done. The Human Factors Workshop at Buxton in 2005 is an example of this. He added that robust Waste and Decommissioning research oversight arrangements had been developed by the NDA, GTAC provided research oversight for the Graphite research programme and TAGSI could be used to provide oversight of the Structural Integrity programme. Bob Ainsworth commented that a recent review of the Structural Integrity programme by Serco led to the recommendation that the NRI should become strategic in the way it identifies research needs. He added that when deciding priorities for undertaking research, British Energy looks not only at the NRI but also at the company's Risk Log in terms of what could limit a reactor's life. This is why the total programme is a combination of NRI and non-NRI nuclear safety research programmes in terms of funding.

4.1.3 The Chair expressed his dissatisfaction at the state of maintenance of the NRI, in particular the Human Factors section. He listed examples of Issues where the date raised or the priority attached to the programme had not been given. He cited cases where apparently high priority Issues had sat on the NRI for years with no works ever being undertaken to address them. He recognised that severe resource limitations in NSD had been responsible for the state of the NRI. He felt that it made his task of assuring the HSC on the adequacy of the 2007/08 programme difficult, when the NRI did not give him a clear benchmark against which to make this judgement. He asked that HSE arrange a complete review and tidying up of the NRI (Action 07/3).

4.1.4 Peter Storey thanked the Chair for his comments and added that the priority of an Issue was more a statement of what should be funded rather than a statement of safety significance. He stated that HSE would look into the chair's concerns about the Human Factors Programme and provide a clear way forward at the next meeting. Paul Harston commented that the Technology Baseline and R&D needs (TBRD) documents that the NDA's Site Licensee Companies (SLCs) were required to produce for the NDA included the concerns that NII's Technical Representatives had raised although the full programme went beyond NII's concerns. Peter Storey clarified that the HSC co-ordinated nuclear safety research programme applies to anything that HSE regulates in nuclear and includes operating power reactors, plant undergoing decommissioning, defence, GE-Healthcare and research reactors. Neil Smart pointed out that HSE regulates its SLCs but not the NDA itself.

4.1.5 Peter Storey reported that the HSE Levy programme presented in Paper 2 was only an interim position because only Issue 1 of the licensees' proposed research programmes had been assessed and the licensees needed to respond satisfactorily to NSD's comments in Issue 2 before the programme can be agreed without need for further levying. The SCR asked why Nirex's research had not been included. Peter Storey replied that in his view, waste repository research would not come into the HSE research arrangements until the NDA submitted a licensing application to build a

repository. The SCR next asked if Dounreay's research programme was included in the scope of the arrangements. Peter Storey confirmed that it was.

## **4.2 British Energy's Proposed programme for 2007/08**

4.2.1 Bob Ainsworth reported that Issue 1 of British Energy's Nuclear Research Schedule has been developed, discussed with NII and submitted to the company's business planning round. During 2007-08 the company expects to shift some of its in-house resources away from research to address plant issues. However, the shift would be compensated by increased external spend. He commented that the programme had been presented as nine technical areas because some of the technical areas in the NRI had been consolidated in the company's Nuclear Research Schedule. He also confirmed that some of the projects previously undertaken under the levy arrangements, such as membership of the OECD Halden project, had been transferred to direct British Energy funding.

4.2.2 University Alliances with Bristol, Manchester and Strathclyde have been established and a fourth one with Imperial College is being developed. British Energy has had three projects approved under the EPSRC's Eng.D scheme and are seeking to recruit students. The Magnox closure programme has reduced the scope for collaboration with Magnox Electric, but significant collaboration is still taking place in the C&I and Graphite areas. New research collaboration arrangements with Rolls Royce have been established. Bob Ainsworth believes that the boiler component cracking observed at Hinkley and Hunterston will give rise to research needs additional to those declared in the Nuclear Research Schedule.

4.2.3 The SCR commented that because something had gone wrong with its reactors, British Energy had to do research to address the boiler-cracking problem. He was left with the impression that the company waits for things to go wrong before doing research to sort out the problem. Bob Ainsworth answered that the boiler-cracking problem was an example of how past research by the company into creep cracking had been used to put the current problems into context and had identified potential ways of addressing them such as quantifying the benefits of lower operating temperatures. New research was then only needed to address new issues arising from changes in operating conditions such as the influence of prior creep on low temperature fracture. The SCR next asked if the PSR programme had informed the research programme. Bob Ainsworth replied that the PSR programme does inform research and cited the example of research into the effects of materials ageing.

## **4.3 The Magnox Electric 2007/08 programme of Waste and Decommissioning Research Paper NuSAC/SCR/07/04**

4.3.1 Steve Daniell reported that Magnox Electric was currently the SLC for 10 sites and that the company's two remaining steel pressure vessel reactor stations had ceased generation at the end of 2006. The Company was in the process implementing the NDA strategy of splitting into two SLCs. At present,

Magnox Electric is operating with two semi-independent Regions (North and South) and is expecting to move to shadow working in the summer with full legal separation in 2008. In discussions with NII, it has been agreed that the research arrangements should change; Instead of responding to the NRI the company has responded to the NII Research Strategy Statement for Decommissioning Licensees through preparing the Technology Baseline and R&D needs (TBRD) document that the company produces for the NDA. The 2007/08 programme is still being finalised.

4.3.2 Steve Daniell reported that work was still going on to support the generating stations in collaboration with British Energy, principally in the Graphite and C&I areas. He added that the regulatory safety case process rather than the research arrangements would be used to give NII transparency of this programme.

4.3.3 He reported that the principal means of research technical exchange with regulators is through the RWDIG and he expected these arrangements to develop. Magnox Electric had identified no essential Research Capability (ERC) that needs supporting.

4.3.4 The SCR asked if there were any information exchanges with the French. Steve Daniell replied that the company had been in discussions with the French over Graphite and Neil Smart added that NDA itself was developing a relationship with the French.

#### **4.4 The Sellafield 2007/08 Programme (No Paper)**

4.4.1 Paul Harston remarked that things are changing rapidly for Sellafield. The first draft of the Sellafield TBRD is with the site executive and is scheduled to be published on 31<sup>st</sup> March although NuSAC is expected to receive a copy as soon as the Site Executive agree. He gave the SCR an overview of the TBRD, pointing out that the R&D programme is contained in Appendix 3 of the document. He also reported that he had written an overview document to enable NII Research Technical Representatives to relate the issues that they had raised to the relevant entry in the TBRD.

4.4.2 The SCR asked who assesses the projects that are put into the TBRDs, to see if they have a good chance of working before asking if backup projects were proposed if the chances of success were assessed as poor. Neil Smart explained that the R&D needs is only a small part of a larger suite of documents that include a risk register and integration programmes.

4.4.3 The SCR then asked if there was clarity on the process by which needs and capabilities were determined. A further question by the SCR asked who owned the R&D programme, given that some projects were generic and some plant specific. Paul Harston replied that the Business Units own their own R&D issues and are responsible for delivery. Neil Smart added that arrangements were in place to make sure research needs are identified and supported, even if the competitive process resulted in a change of SLC M&O contractor part way through the programme. Steve Daniell remarked that the

SLC was the 'controlling mind' as far as activities on NDA sites are concerned, not the NDA.

#### **4.5 The UKAEA 2007/08 Research Programme Paper NuSAC/SCR/07/06**

4.5.1 Jane Lloyd started her presentation by clarifying that UKAEA's research programme was largely project specific these days with only a small proportion of generic research. Safety related issues have not been identified specifically, because there is a potential for safety impact of most development work. Previously, a UKAEA wide Technology Programme was produced, combining all the sites' research and development work. Under new arrangements with NDA, a new document (the TBRD) was being prepared that combined the Technology Baseline with the Technology Plan for each site. To date, the TBRDs for two UKAEA sites had been prepared and the others were awaited. The plan was to derive a single Technology Plan for UKAEA that draws from all of the sites' TBRDs. The 2007/08 Research Programme will consist of the work identified in the TBRDs plus the generic work to address such issues as site delicensing. The UKAEA has not so far made use of the NII 'Research Strategy Statement for Decommissioning Licensees' but will refer to it when it develops the Technology Plan. This development will also include looking at the work it is undertaking to underpin safety cases, to determine the extent that NII's concerns in the technical areas of Human Factors, C&I and PSA are being addressed.

4.5.2 Jane Lloyd expanded her presentation by pointing out that Dounreay has 94 areas of research, the principal research driver at Culham was dealing with tritiated wastes, at Harwell, legacy wastes, at Windscale the decommissioning of the Piles and at Winfrith the decommissioning of SGHWR and Dragon. The generic research programme included land remediation, development of encapsulation grouts and knowledge and records management. In future, the UKAEA will be split into three SLCs, one for Dounreay, one for Windscale and one covering both Harwell and Winfrith.

4.5.3 The SCR commented that some of the projects looked like long-term on-going work whilst other work was short term before asking if the UKAEA was clear about what it was working on and delivery dates. Jane Lloyd replied that the project management arrangements are able to identify technology needs. Each UKAEA site has a programme management office that looks after the sites' R&D programmes, provides financial controls and develops risk management strategies including identifying fallback options that may be needed, to ensure timely delivery.

4.5.4 The SCR remarked that it was difficult to distinguish development from research. Issues such as Human Factors and PSA were embedded without specific mention such as under safety culture at Dounreay. Jane Lloyd answered that all sites have initiatives in place that cover incidents and unusual occurrences. The SCR responded that this amounted to learning from experience rather than safety culture development. Paul Harston replied

that the development of safety culture was seen as an EHS&Q function at Sellafield rather than research. The SCR asked if the UKAEA had the same opinions. Jane Lloyd replied that the UKAEA treats safety seriously in its culture and priorities work as appropriate to the hazard potential.

4.5.5 A general discussion of the research programme followed the discussion of the Licensees' programmes. The SCR asked if there was scope for joined-up work with other NuSAC Review Groups. Peter Storey cited the example of research to support emergency arrangements and that the prospects of new build had raised this as an issue. He added that 'soft' issues such as stakeholder confidence are not usually considered under research. Neil Smart remarked that research is usually bounded by the technical community and softer issues dealt with outside. Peter Storey added that the EPSRC's KNOO Programme was very technical but the council is launching a programme to address the 'soft' issues that are needed under KNOO.

4.5.6 Peter Storey mentioned that capability issues had not been mentioned in any of the presentations. He has engaged with contractors and found that they are all busy, necessitating that NSD engages with them proactively over its research and support needs, in particular with expert specialist groups. He asked what we would do if these specialists are already tied to other companies. Neil Smart added that Nexia have ring-fenced 153 key individuals that must be supported and that the NDA's arrangements provided an inducement for its SLCs to identify its key capabilities and needs. The SCR asked for capability needs to become the main item for discussion at the next meeting (Action 07/4).

4.5.7 The SCR raised the issue of how the University Research Alliances could be used to develop capabilities. Neil Smart offered to give a presentation on this issue at the autumn meeting and ask one of his colleagues to make a presentation on skills (Action (07/5)). Peter Storey commented that if the National Nuclear Laboratory is truly national, it should perform its own capability mapping and advise the Government of UK needs. Paul Harston added that a discussion on capability needs should be broadened to include the MoD's needs. Peter Storey suggested that Graham Fairhall from the National Nuclear Laboratory would also like to attend the autumn meeting to make a contribution to the debate. The SCR Chair recommended that two hours be put aside at the autumn meeting for this discussion and that he should liaise with the rest of NuSAC (Action 07/6).

## **5 New Build Research**

5.1 Peter Storey reported that the potential for research would be based upon the assessment of new designs and would depend upon what research the prospective vendors make available to NSD. He suggested research might be necessary where a new build design differed significantly from proven technology, to test the vendors' performance claims and defence-in – depth. Nothing would be done however until the Energy White Paper was published (*at the time of the meeting, the end of March*).

5.2 NSD proposes to assess three designs. These three designs might be chosen in a pre-qualification round by the DTI if more than three designs are put forward. Peter added that NSD would establish a fifth division once the first design is submitted for assessment. Forty staff are expected to be moved eventually into Division 5 and the assessment of the three candidate designs will be undertaken in a staggered sequence, each by a dedicated Assessment Unit.

5.3 Familiarity of the new build designs to the UK was an issue and Peter Storey expected NSD to make use of research already undertaken by overseas regulators, particularly in the USA, France and Finland, to determine research needs. Dr Storey suggested that the arrangements for capturing research needs would be very similar to those already in place for British Energy, using an NRI. He added that the new build research programme would establish a potential for collaboration in EU Framework Programmes on Generation III+ and Generation IV and that the EPSRC would fund research programmes in universities. Peter Storey expected to be in a stronger position to say what NSD is doing at the next meeting. The SCR Chair asked that New Build Research be discussed again at the autumn meeting (Action 07/7).

## **6 Outcome from the NDA Research Board Meeting (No Paper)**

6.1 Although Neil Smart did not attend the NDA Research Board meeting, he reported that Brian Ensor had made a presentation to the Board on the new TBRD arrangements and Ian Hudson had given one on Nexia and the formation of the National Nuclear Laboratory. Under the TBRD presentation it was reported that the principle of all R&D being made available to all SLCs had been established, that the new arrangements required the SLCs to show the readiness levels of all of their technology and that the technical baseline should include nuclear safety requirements. He reported that techniques to manage the risks of major project activities varied across the SLCs. There is a requirement for identified risks to be placed on a Risk Register and managed, with contingencies in place for high-risk activities and the management of uncertainty where the risks were not fully understood.

6.2 The SCR remarked that staff would need to be allocated between the SLCs and the National Nuclear Laboratory in such a way as to make sure capability is retained in both. Peter Storey commended the requirement for SLCs to declare the maturity levels of their technology. He added a further question on whether the EA and SEPA's requirements were also included in the TBRDs before commenting that risks reside with the SLC but what would happen if the NDA were not able to provide the funds to mitigate the risks? Paul Harston replied that safety must take precedence over contractual obligations to NDA. Neil Smart added that there were some risks that the NDA SLCs could not be expected to pick up, such as uncertainty over the eventual availability of an ILW repository and the asset value of uranium and plutonium.

## **7 University Research Alliances and the Eng.D Programme**

7.1 No discussion took place because the author was not present at the meeting.

## **8 NDA Strategy and Capabilities needs (no paper)**

8.1 Neil Smart opened his presentation by pointing out that the Energy Act placed requirements on the NDA to invest in R&D to support its mission, co-ordinate clean-up activities across the UK, encourage innovation and to maintain skills in research areas to underpin its strategy. He then developed his presentation to explain the relationship between SLC Lifetime Plans and how they lead to a site strategy, which in turn leads to an implementation plan, a Technology Baseline that informs how the implementation plan can be realised and the outstanding R&D requirements. He added that business risks could be identified at any stage of this hierarchy and that whilst the Site Strategies, Implementation Plans, Technology Baselines and R&D needs are reviewed annually, SLCs are expected to update their risk registers on a day-to-day basis.

8.2 Neil Smart next explained the plans for the National Nuclear Laboratory. This Laboratory will be centred around the existing BNFL Technology Centre (BTC) on the Sellafield site. The Laboratory is expected to be established early in the 2007-08 financial year, will receive NDA support for activities related to the NDA's mission, in addition to a small pot of protected money to support strategic capability. The Laboratory will have to compete for the rest of its funding.

8.3 The integration of Nirex into the NDA was being implemented. CoRWM recommended this integration. Whilst the integrated Nirex would have a broad waste management remit, 'ring fenced' funding would protect key safety-related capability within the organisation. Neil Smart ended his presentation, by explaining that the NDA wanted to see the RWDIG continue to develop into a forum, for sharing research output and best practice across all of its SLCs. RWDIG should become a sub-group of the NDA Research Board that could scrutinise research programmes in more detail than the parent NDA Research Board could. Although RWDIG could identify gaps in R&D activities, it would not have any financial endorsement powers.

8.4 The SCR asked how, under this strategy, people would be incentivised to go away and do things. Neil Smart explained that most of the SLCs as well as British Energy and the MoD found RWDIG a useful forum in which to share research. There are financial incentives from NDA for its SLCs to undertake research and share the outcome at the RWDIG.

## **9 HSE Plans to put Levy Reports on the HSE Website (No Paper)**

9.1 This was discussed under Matters Arising (Paragraphs 2.2 and 2.3).

## **10 Access to Independent Technical Capability NuSAC/SCR/07/9**

10.1 Haydn Starkie highlighted the developments in this area over the past year. These included reporting that the Graphite Team at Manchester was receiving enough nuclear safety support work from NSD that it was now viable without any intervention support from the Levy programme; That there were initiatives to enable the expertise of the two consultants that provide independent advice to NSD on reactor coolant chemistry to be transferred to younger engineers in Amec-NNC or Nexia Solutions; That there were plans to develop the Human Factors capability at HSL to include nuclear safety and to develop the Laboratory's Fire Modelling skills to include Fire Safety Engineering at nuclear installations.

10.2 The SCR raised the issue of how NSD would secure its access to ITC if new build meant that NSD would have to compete with the nuclear industry for access to scarce skills. Peter Storey answered that these supply-chain issues need to be included in the NSD Research Unit's future considerations of access to independent technical capability.

10.3 The SCR asked about continuing support for the University Research Alliances. Neil Smart explained that the NDA would support these alliances for five years. The first five-year agreement had ended with the radiochemistry unit at Manchester but NDA had agreed to support them for a further five years. The Immobilisation Science Laboratory at Sheffield will also be given further support to fund a Professorial Chair. The other two alliance support agreements, at Leeds (Particle Science) and Manchester (Materials) are ending. Dr. Smart added that it was the remit of the National Nuclear Laboratory to extend itself into these university departments. Bob Ainsworth added that British Energy had signed a five-year agreement to support the Manchester materials centre.

10.4 The SCR asked why NSD was not concerned about access to independent technical capability in the Nuclear Systems and Equipment technical area. Haydn Starkie explained that operational efficiency rather than safety was the principal research driver in this area.

## **11 UK Involvement in International Nuclear Safety Research Collaborative Projects Paper NuSAC/SCR/0710**

11.1 Haydn Starkie explained that the main developments over the past year were the launch of the Euratom Seventh Framework Programme and the DTI's withdrawal from the Generation IV International Forum. Neil Smart added that Nirex have a large international programme although this is seen as strategy rather than research driven. Peter Storey commented that there would be a rekindling of international technical exchanges if the UK were to progress to new build. He added that the UK should look out for suitable opportunities to use the Seventh Framework programme to gain access to work abroad and to look to collaborate with France and Finland on nuclear safety research programmes.

## **12 AoB**

12.1 The Chair announced that he would be retiring from the SCR and NuSAC at the end of March 2007. As from the first of April 2007, the SCR would be rebranded as NuSAC Review Group 6 and a new chairperson will be appointed. Peter Storey commented that the work of the SCR had become more sharply focussed under his leadership. The Licensee Research Coordinators also thanked the Chair for his leadership of the SCR.

## **13 Date of First Meeting of Review Group 6**

13.1 Tuesday 2<sup>nd</sup> October at Rose Court.

### **Actions**

06/9 SCR to prepare a paper on University research alliances from the universities' perspective for the next meeting.

06/17 NSD 4A to investigate the practicality of NDA contributing to SCR meetings by videoconference.

07/1 HSE Chief Scientist to be formally invited to the next meeting and asked to provide a position statement with respect to nuclear and new build research that included what he would like to see published and what he could do to help.

07/2 SCR Chair to notify the Chair of NuSAC that the SCR was happy with the minor revisions they had proposed to the SCR's Terms of Reference.

07/3 NSD Unit 4A to arrange a complete review and tidying up of the NRI.

07/4 SCR Secretary to enter capability needs as the main item for discussion at the next meeting and allocate two hours for this item.

07/5 NDA Research Coordinator to give a presentation on how the University Research Alliances could be used to develop capabilities to the autumn meeting and ask one of his colleagues to make a presentation on skills.

07/6 SCR Chair to liase with the rest of NuSAC on the issue of capability needs for discussion at the next meeting.

07/7 SCR Secretary to enter new-build research on to the agenda for the next meeting.