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**HEALTH AND SAFETY EXECUTIVE
NUCLEAR SAFETY ADVISORY COMMITTEE
REVIEW GROUP 6 (RESEARCH)**

22ND APRIL 2008

BRITISH ENERGY GENERATION:

**2008/9 PROGRAMME OF NUCLEAR REACTOR SAFETY RELATED
RESEARCH**

PAPER BY BEG

BACKGROUND

- 1 British Energy Generation (BEG) operates fourteen advanced gas cooled reactors (AGR) and one pressurised water reactor (PWR), Sizewell B. The AGR and PWR are mature technologies, but the approach to research is different. AGR technology is unique to the UK and supporting nuclear safety research capability is predominantly based in the UK. PWR technology is utilised worldwide and there is a large overseas nuclear safety research capability that can be called upon to support Sizewell B.
- 2 BEG are required to prepare an annual Nuclear Research Schedule (NRS) which describes the current research strategies and provides details of the research projects that are to be undertaken. BEG published Issue 1 of the 2008/9 NRS⁽¹⁾ in October 2007. Issue 2⁽²⁾ was published, following discussions on Issue 1 with HSE and internal business planning discussions, in February 2008.
- 3 This paper provides a brief summary of the BEG research proposals for 2008/9, as detailed in the NRS. NUSAC/RG6/08/1⁽³⁾ also summarises the proposed spend and number of projects to be undertaken and provides the HSE perspective on the adequacy and balance of the proposed BEG 2008/9 programme.

BEG RESEARCH STRATEGY

- 4 The requirement for research undertaken by BEG is that it contributes to the safe reliable operation of BEG plant. It can do this in a number of ways, as noted below:
 - It contributes to the development and maintenance of the infrastructure required to support BEG nuclear stations.
 - It addresses a generic issue that is applicable to a number of stations.
 - It addresses a specific issue at an individual operating station.
 - It addresses an issue raised by HSE in their Nuclear Research Index.
- 5 In the past, research requirements have been identified through the preparation of Periodic Safety Reviews (PSR), which are carried out every ten years for the individual stations. Research requirements identified in the first AGR PSR series have now been completed. Activities have been initiated for the second AGR PSR series, but no new research requirements have yet been identified. The initial Sizewell B PSR has recently been completed, but no additional research requirements to those already being addressed were identified.
- 6 A revised approach has been adopted in preparing the 2008/9 Programme. Within BEG, in each technical areas 'unconstrained' work proposals were requested to take account of:
 - An AGR fleet which is subject to significant ageing, degradation and obsolescence
 - Plant life extension, with the desire to keep the AGR fleet operating to 2020 and beyond
 - The top 20 risks in the BEG risk log
 - Previous major emergent work items which have identified gaps in full understanding or the need for the application of new technology
 - Maintenance of adequate expertise
 - Maintenance and development of key underlying codes
 - High priority issues in the NII's Nuclear Research Index.
- 7 The unconstrained proposals were prioritised, challenged and peer reviewed within BEG and resulted in a proposed programme consistent with the aims outlined in paragraphs 4 and 6. This was then set out in Issue 1 of the 2008/9 NRS⁽¹⁾. The final programme then took account of discussions with HSE and internal discussions as part of the BEG business planning round. The planned programme is summarised below and represents a significant increase from the size of the programme in 2007/8.

CHANGES IN THE BEG RESEARCH PROGRAMME

- 8 The arrangement of the BEG research into 9 technical areas within the NRS remains the same as in 2007/8⁽⁴⁾. Within each technical area a new format for the work was adopted in 2007/8. This specified the work to be performed, linked it with the relevant item in the Nuclear Research Index and/or the BE Risk Log, and defined the expected outcome. This format has been retained in 2008/9.
- 9 → ←
- 10 BEG continues to develop strategic use of universities for carrying out parts of the programme as described previously⁽⁵⁾. In 2008/9, the university alliances will additionally be used to provide research on high temperature materials.

SUMMARY OF THE BEG RESEARCH PROGRAMME

- 11 → ← BEG believe that they are supporting a nuclear safety research programme that is addressing the high priority NRI issues relevant to BE.

ESSENTIAL RESEARCH CAPABILITY

- 12 The NRS reviews the requirements for 'Essential Research Capability' (ERC) and in some technical areas declares some research teams and facilities as ERC. Proactive ERC support is provided in circumstances when a future research requirement is identified and, unless some proactive measure is taken now, there is a significant risk that the team or facility will not be available when required. Almost all of the areas reviewed were judged to be adequately supported, required no additional proactive funding, and were not declared as ERC. The need for proactive support was only identified in the C&I and Chemistry technical areas. In the C&I area support is being provided for Reactor Protection and Nucleonics capabilities. In Chemistry, support is being provided for Radiation Chemistry capabilities and for steel oxidation testing facilities. These teams and facilities are being maintained partly to ensure a capability to support operation as well as research. The establishment of a Research Alliance between BE and Manchester University has strengthened ERC in the Graphite area.
- 13 In 2004/05 the responsibility for maintaining ERC was transferred from the HSE Levy to the Licensees. BEG is therefore placing contracts to support ERC, in the areas described above.

TECHNICAL EXCHANGES

14 Arrangements are in place to allow technical exchanges between BEG, HSE and other Licensees, in particular British Nuclear Group. The effectiveness of these arrangements was reviewed in NUSAC/SCR/04/1⁽⁶⁾. NUSAC RG6 members are also becoming involved in these technical exchanges. BEG are committed to ensuring the continuing effectiveness of these exchanges. This will be progressed through continuation of the regular meetings of the NII, BEG, British Nuclear Group and BNFL technical co-ordinators.

FUTURE DEVELOPMENTS

15 BEG nuclear safety research requirements have not been significantly affected by the creation of the NDA. Similarly, the prospect of new nuclear build has not had a significant impact, although as noted in paragraph 8 this may lead to a reduction in the costs to BEG of the HSE Levy programme. The second AGR PSR series will be monitored to progress any identified research requirements

CONCLUSIONS

16 It can be concluded that

- The BEG 2008/9 research commitments provide a nuclear safety related research programme, which addresses the relevant high priority NII NRI issues.
- ERC requirements have been identified and are adequately supported by the programme.
- The planned BEG 2008/9 research programme is a significant increase in size from the 2007/8 programme and is judged to be the correct balance to provide BEG with protection in the future, and in particular to address the major challenge associated with ageing plant.
- A significant proportion of the research projects involve technical collaboration with other Licensees, in particular British Nuclear Group - Reactor Sites.
- The arrangements for technical exchanges that were implemented in the past are continuing to facilitate continued collaboration with both other Licensees and HSE. Wider collaboration arrangements have been sought, in particular through the setting up of university alliances.⁽⁵⁾

ACTION REQUIRED

17 The review group is invited to note and comment on the paper.

REFERENCES

1. BEG Nuclear Research Schedule 2008/9 Issue 1, October 2007.
2. BEG Nuclear Research Schedule 2008/9 Issue 2, February 2008.
3. NuSAC/RG6/08/1, UK Reactor safety research programme: update on 2007/2008 programme and proposed programme for 2008/2009.
4. NUSAC/SCR/07/3, BEG 2007/8 Programme of Nuclear Reactor Safety Related Research, February 2007.
5. NuSAC/SCR/06/10, British Energy Generation Nuclear Reactor Safety Related Research at Universities, April 2006.
6. NuSAC/SCR/04/1, HSC Coordinated Programme of Nuclear Safety Research: Review of New Arrangements.

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