

HEALTH & SAFETY EXECUTIVE  
NUCLEAR SAFETY DIRECTORATE  
ASSESSMENT REPORT

Site : All operating gas-cooled graphite-moderated reactors  
Project : Strategic Review  
Title : NII Strategy to Secure Adequate and ALARP Graphite Core Safety Cases  
Licence No. : 51, 55, 57, 58, 59, 60, 61, 62, Sc10, Sc11  
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## SUMMARY

### Introduction

1. The Nuclear Installations Inspectorate (NII) is faced with significant regulatory issues and decisions to make between now and the end of generation for all of the remaining operating gas-cooled graphite-moderated reactors. This is due to:

- The continued observation of unpredicted cracking in the Advanced Gas-Cooled Reactors (AGRs).
- The prediction of further widespread cracking in the AGRs as a result of ageing processes.

2. Given these significant age-related phenomena NII need to decide whether graphite core safety cases are adequate and ALARP where there is significant uncertainty and core safety functions may be challenged. To enable NII to address these issues and to ensure that regulatory decisions are soundly based, proportionate to the risk, consistent, and transparent, NII undertook a strategic review of nuclear graphite technology. The first stage of this undertaking was to perform a review of nuclear graphite technology to identify its limitations. The output from this review and experience of recent assessments of graphite core safety cases were discussed with NII's graphite Nuclear Topic Group (NTG). The outcome of these discussions resulted in four strategic objectives:

- i. Develop a revised Technical Assessment Guide (TAG) to provide a clear framework for judging the adequacy of graphite core safety cases. This guide should ensure consistency in the assessment of safety cases and clarity of NII's expectations.
  - ii. Secure the maintenance and improvement of graphite core safety cases for operating reactors to ensure that risks remain As Low As Reasonably Practicable (ALARP).
  - iii. Develop and maintain a credible and cost effective graphite research programme for operating reactors to reduce uncertainty by improving knowledge and understanding.
  - iv. Ensure that NII is well informed on key technical issues through independent advice and independent peer review. This should enable NII to make sound regulatory decisions and improve understanding of the strengths and weaknesses of graphite core safety cases.
3. This report develops the strategy to achieve each of these objectives.

### Conclusions

4. I judge that there is significant uncertainty in the likelihood and consequences for core safety functionality posed by graphite component and core damage. As a result the assessor needs to assume worst case consequences of graphite component and core damage unless the licensee is able to provide robust arguments.

5. I judge that due to significant uncertainty that the Precautionary Principle should be adopted for assessment of graphite core safety cases.

6. Nine actions to secure achievement of the four strategic objectives are proposed. I judge that the strategic plan may be implemented without increasing current inspector resources. However, benefit may accrue from involvement of site inspectors, and fault studies assessors, on team inspections.

### **Recommendations**

7. I recommend implementation of the strategic plan to secure adequate and ALARP graphite core safety cases and propose a review in 12 months time to consider achievements and progress, and ensure that the strategy is still relevant and appropriate. In addition the strategy will be continuously monitored to ensure that it continues to be applicable and appropriate.

8. I recommend presentation of this strategy to licensees to secure transparency in our interactions.