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EXECUTIVE SUMMARY

Title

NNB Genco: Hinkley Point C Licence Condition 14 Report for Licensing.

Background

This assessment report (AR) reviews work by the New Nuclear Build Generation Company (NNB Genco) to develop arrangements to comply with Licence Condition 14 'Safety Documentation' (LC14) for the proposed Hinkley Point C (HPC) nuclear Power Station. The arrangements must cover the production and assessment of safety cases consisting of documentation to justify safety during the design, construction, manufacture, commissioning, operation and decommissioning phases of the installation. This AR has been written to support another AR that addresses whether the Licence Condition compliance arrangements are adequate to support issue of a Nuclear Site Licence (NSL) for the Hinkley Point C site to NNB Genco.

Assessment and Inspection work carried out by ONR

An ONR Inspector has reviewed the documentation available to date on work to develop LC14 compliance arrangements for HPC. The Inspector has also participated in several level 4 meetings to discuss progress on the arrangements and carried out a 'shadow inspection' of the application of the arrangements to the fault studies work area.

This report draws together material gathered from the documentation, level 4 meetings and the shadow inspection. The report then gives an overall judgement on the adequacy of progress on the Licence Condition 14 arrangements to support nuclear site licensing.

Matters arising from ONR's work

The proposed categorisation system for nuclear safety related modifications was found to leave the question of whether there would be an ONR hold on implementation unresolved. In particular it does not provide any secondary powers to ONR to freeze NNB Genco documentation. However the AR on compliance arrangements for LC20 concluded that NNB GenCo's arrangements for compliance with LC20(1) give the Executive the necessary derived powers to permission the implementation of modifications to the design of a plant under construction.

In addition some potential improvements to the NNB Licence Compliance Matrix for LC14 were identified.

NNB Genco's Nuclear Safety Design Assessment Principles (NSDAPs) to be used for the assessment of safety cases, although not assessed in detail, have been judged to form an adequate basis for licensing on the grounds that they have been developed from an existing international standard. In order to aid future assessment activity, I recommend that ONR carry out or commission a comparison report between the ONR Safety Assessment Principles (SAPs) and the NSDAPs.

Conclusions

The arrangements for the production and assessment of Safety Reports were judged to provide an adequate basis for LC14(1) compliance. NNB Genco's position with respect to the other clauses in LC14 of having identified a post-holder to respond should ONR exercise its powers under those clauses, was also found to be adequate.

The report concludes that sampling of progress on the Licence Condition 14 arrangements has not revealed any reason not to grant a Licence for the proposed Hinkley Point C Power Station. Accordingly, this report concludes that from the perspective of LC14 arrangements, there is no impediment to Licence issue.

Recommendations

The author of the AR addressing whether the Licence Condition compliance arrangements are adequate to support issue of a Nuclear Site Licence for the Hinkley Point C site to NNB Genco should note that that from the perspective of LC14 arrangements progress, there is no impediment to Licence issue.

ONR should carry out or commission a comparison report between the ONR SAPs and the NSDAPs.

LIST OF ABBREVIATIONS

AGR	Advanced Gas-cooled Reactor
ALARP	As low as is reasonably practicable
AR	Assessment Report (ONR)
BSL	Basic Safety level (in SAPs)
BSO	Basic Safety Objective (in SAPs)
BMS	(ONR) How2 Business Management System
DAC	Design Acceptance Confirmation
DR&A	Design Review and Acceptance
EDF	Electricite de France
FWP	Forward Work Plan
HPC	Hinkley Point C
HSE	Health and Safety Executive
IACO	Independent Assessment Challenge and Oversight (NNB Genco)
IAEA	International Atomic Energy Agency
INSA	Independent Nuclear Safety Assessment
IPR	Independent Peer Review
LC	Licence Condition
LWR	Light Water Reactor
NGL	Nuclear Generation Limited (as in EDF NGL, owner/operator of the AGRs and Sizewell B)
NNB Genco	New Nuclear Build Generation Company – the Licence applicant company
NSC	Nuclear Safety Committee
NSDAPs	Nuclear Safety Design Assessment Principles (NNB Genco)
NSL	Nuclear Site Licence
OCC	Operational Control Committee (NNB Genco)
ONR	Office for Nuclear Regulation (an agency of HSE)
PAR	Project Assessment Report (ONR)
PCER	Pre-construction Environment Report
PCSR	Pre-construction Safety Report
PCmSR	Pre-Commissioning Safety Report
POSR	Pre-Operation Safety Report
PID	Project Initiation Document

LIST OF ABBREVIATIONS

PSA	Probabilistic Safety Assessment
PSR	Preliminary Safety Report
RGP	Relevant Good Practice
SAP	Safety Assessment Principle(s) (HSE/ONR)
SCUGs	Safety Case User Guides (at Sizewell B Power Station)
SCSD	Safety Case Summary Documents
SFAIRP	So far as is reasonably practicable
SQEP	Suitably Qualified and Experienced
SSC	System, Structure and Component
SSR	Station Safety Report
TAG	Technical Assessment Guide(s) (ONR)
TIG	Technical Inspection Guide (ONR)
TSC	Technical Support Contractor
WENRA	Western European Nuclear Regulators' Association

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Table 1: Relevant Safety Assessment Principles Considered During the Assessment

Table 2: Interventions carried out related to LC14 Safety Documentation Compliance

Annex

Annex 1 Licence Condition 14 Safety Documentation

1 INTRODUCTION

1.1 Background

1 ONR's approach to licensing is informed by interventions that considered the adequacy of NNB GenCo's:

- organisation capability;
- licence condition compliance arrangements;
- safety report and associated substantiation; and
- licensing documentation and ONR's associated legal and statutory consultation due process.

2 This assessment report (AR) addresses NNB Genco's progress on developing Licence Condition 14 (LC14) Safety Documentation arrangements, i.e. arrangements for "the production and assessment of safety cases consisting of documentation to justify safety during the design, construction, manufacture, commissioning, operation and decommissioning phases of the installation" (LC 14(1), Ref. 1) and also compliance with LC14(2) to LC14(4) inclusive. Note that for ease of reference LC 14 is reproduced in full as Annex 1.

3 In particular, this AR reviews NNB Genco's documentation available to date, Level 4 meeting discussions and the results of a shadow inspection of operation of the arrangements in the fault studies work area. It has been written to support an AR that addresses whether the Licence Condition compliance arrangements are adequate to support issue of a Nuclear Site Licence (NSL) for the Hinkley Point C (HPC) site. That AR in turn informs a Project Assessment Report (PAR) that addresses whether to issue an NSL to NNB Genco for the Hinkley Point C site.

1.2 Scope

4 The scope of this report covers the LC 14 compliance arrangements being developed for HPC, i.e. those on the production and assessment of safety cases for all stages of the project from design through to decommissioning.

1.3 Methodology

5 The methodology for the assessment is that laid down on the Office for Nuclear Regulation (ONR) How2 Business Management System (Ref. 2, nb. the methodology was formerly published as ONR BMS document AST/001, Assessment Process).

2 ASSESSMENT STRATEGY

6 The assessment strategy for the Hinkley Point C Licence Condition 14 Safety Documentation pre-Licensing review is set out in this section. The strategy identifies the scope of the assessment and the standards and criteria that have been applied.

2.1 Standards and Criteria

7 The relevant standards and criteria adopted within this assessment are principally the Safety Assessment Principles (SAP), Ref. 3, the internal ONR Technical Inspection Guide (TIG) relating to LC14, Ref. 4, relevant national and international standards and relevant good practice informed from existing practices adopted on UK nuclear licensed sites. The key SAPs and relevant TIG are detailed within this section. National and international standards and guidance have been referenced where appropriate within the assessment report. Relevant good practice, where applicable, has also been cited within the body of the assessment.

8 An ONR guide, 'Licensing Nuclear Installations', published on the ONR website (www.hse.gov.uk/nuclear), sets the scene for site licence applications (Ref.5). It states (para 61) that "A licence may be granted when ONR is satisfied that the licence applicant's safety documentation provides assurance that the site will be suitable for the proposed activities if the plant is adequately designed, constructed and operated. A full Pre-Construction Safety Report (PCSR) is not necessary at this stage". The Licensing Guide also addresses the development of licence condition compliance arrangements (paras 84 and 85), noting that effective arrangements may be necessary for some conditions as soon as the nuclear site licence comes into force. LC14 is one of the conditions for which arrangements will be needed on NSL issue.

9 As noted in para 2 above, Licence Condition 14(1) requires adequate arrangements for the production and assessment of safety cases (Ref. 1). More specifically, the ONR Intervention Strategy to address NNB Genco's application to install and operate two EPR reactor units at Hinkley Point (Ref. 6) imposes requirements on NNB GenCo at the point of NSL granting, including that it must have fully developed LC14 arrangements (see Appendix B, Ref. 6). The Intervention strategy also requires that NNB Genco

- demonstrate its competence
- provide assurance of the robustness of the arrangements for controlling development of a safety case compliant design and
- provide assurance of the robustness of the arrangements for controlling the procurement, manufacture, construction and installation of safety related structures systems and components.

2.2 Safety Assessment Principles

10 The 'Licensing Nuclear Installations' guide (Ref. 5, para 97) cites SAPs SC1 to SC8 as being relevant to assessment of safety cases (see Table 1 of this report). Some of the Fundamental Principle and Fault Analysis SAPs are also relevant as detailed in Table 1.

2.2.1 Technical Inspection Guide

11 The following Technical Inspection Guide details ONR expectations regarding LC14 compliance in general:

- T/INS/014 Issue 1 LC14 Safety Documentation (Ref. 4).

2.2.2 National and International Standards and Guidance

12 No international standards or guidance have been used as part of this assessment.

2.3 Use of Technical Support Contractors

13 There has been no use of Technical Support Contractors.

2.4 Integration with other Assessment Topics

14 This assessment addresses LC14 compliance arrangements, i.e. arrangements for the production and assessment of safety cases. It has been written to support an AR that addresses whether the Licence Condition compliance arrangements are adequate to support issue of a Nuclear Site Licence (NSL), see para 1 above. Hence it is distinct from the ONR assessment of the content of the current version of the station safety case (the safety report AR, Ref. 7). There is a close link with the safety report AR however as the success or otherwise of NNB Genco in following the LC14 compliance arrangements is relevant to both reports. To avoid repetition, this report refers out to the safety report AR for treatment of the arrangements made for the production and assessment of the second issue of the Pre-Construction Safety Report (PCSR2).

15 This report may be used to inform assessment of organisational capability (see para 1).

2.5 Out-of-scope Items

16 No items have been identified as lying outside the scope of the assessment.

3 INFORMATION ON WHICH THE ASSESSMENT IS BASED

3.1 Information Gathered at Level 4 Meetings

17 Level 4 meetings have been the source of information regarding LC14 compliance work. A list of level 4 interventions is given in Table 2.

3.2 Documentation specifically targeted to LC14 Compliance

3.2.1 Documentation Available

18 In early engagement NNB Genco provided a Safety Documentation Strategy document (Ref. 8) and two presentations on LC14 arrangements (Refs. 9 and 10). As might be expected, greater detail is available on arrangements for the early forms of the station safety report such as the Pre-Construction Safety Report (PCSR) than for later ones, e.g. the Pre-Operational Safety Report (POSR).

19 NNB Genco now maintain a register of Procedures against Licence Conditions (position at May 2012 is Ref. 11). The register lists 3 procedures against LC14:-

- Management of Safety Reports (Ref. 12)
- Procedure for Control of Modifications During Construction and Commissioning (Ref. 13)
- Nuclear Site Licence Compliance Matrix: HPC (Ref. 14)

3.2.2 Production and Assessment of Safety Reports

20 The Management of Safety Reports Procedure (Ref. 12) defines the activities to manage safety reports, including their production, review and approval. As such, it is the primary means of compliance with LC14. Note that the term safety report is used here for the whole site safety case to distinguish it from its constituent safety cases which might apply to a particular area of plant or against a particular risk.

21 The procedure requires that documentation be prepared and assessed to justify safety during design, procurement, construction, manufacture, commissioning, operation and decommissioning. Accordingly the procedure applies to all the main stages of Station Safety Report evolution, i.e. to the Pre-Construction Safety Report (PCSR), Pre-Commissioning Safety Report (PCmSR), Pre-Operational Safety Report (POSR) and Station Safety Report (SSR). It applies whenever a new evolution of the Safety Report is required or when an aggregation of design or safety case changes necessitates the production or update of a safety report (see Section 4.1, Ref. 12).

3.2.3 Categorisation System for Modifications

22 The Procedure for Control of Modifications during Construction and Commissioning (Ref. 13) introduces a graded categorisation and clearance process dependent on the risk posed by the modification. The principal purpose of this procedure is to ensure compliance with LC20 Modifications to Design of Plant during Construction but it will also be used in conjunction with NNB Genco Arrangements for other LCs including LC14. It is intended that the arrangements will be used until superseded by compliance arrangements for LC22 on modification or experiment on existing plant.

- 23 Four categories of design or safety case modification are defined, termed Category 1 (highest nuclear safety significance) to Category 4.
- 24 A Category 1 modification is one “which results in an alteration to a fundamental principle, basic safety requirement or that could result in a serious increase in risk of a radiological hazard if inadequately conceived or implemented.” A modification that could require a revision to NNB Genco’s Forward Work Plan (FWP) also falls in Category 1. Category 1 modifications will be subject to the Design Review & Acceptance process (DR&A, explained in Section 3.4) and will be sent to the Nuclear Safety Committee (NSC) for consideration and advice. Also the Independent Assessment Challenge and Oversight (IACO) function within NNB Genco will specify the scope of the Independent Peer Review (IPR) and confirm the independence of the reviewer.
- 25 With regard to ONR permissioning, Ref. 13 Appendix A stipulates that there shall be early engagement with ONR once it is known that a Category 1 modification is being put through the NNB Genco approval route. Category 1 modifications will be sent to the ONR when due process within NNB Genco has been completed. ONR is to be asked to acknowledge receipt of a Category 1 modification within 28 days. There is no statement regarding whether ONR agreement or approval is necessary before the Category 1 design change is implemented or a Category 1 safety case modification comes into effect.
- 26 A Category 2 modification is one “affecting nuclear safety that could result in a significant but not serious increase in risk of a radiological hazard even if inadequately conceived or implemented.” Category 2 modifications will be subject to the DR&A process and the NSC are advised retrospectively as soon as practicable so that they can comment on the categorisation. IPR will only be carried out if the DR&A reviewer considers it necessary. ONR will be “advised of the existence of the Category 2 modification and asked to acknowledge within 28 days of receipt.”
- 27 A Category 3 modification is one that affects nuclear safety but could not result in a significant increase in radiological hazard even if inadequately conceived or implemented. A Category 4 modification could not affect nuclear safety or lead to a hazard, even if inadequately conceived or implemented. For Category 2, 3 and 4 modifications a derived power is provided to ONR as ONR may specify that ONR permission is required before implementation.

3.2.4 Assigning Compliance Documentation

- 28 The Compliance Matrix document (Ref. 14) states that LC14 is one of the ‘Group 1’ licence conditions that NNB Genco intend to meet ‘fully, or proportionately’ at the time of licence granting. For LC14(1), the Compliance Matrix cites the Management of Safety Reports Procedure (Ref. 12) and Procedure for control of modifications (Ref. 13). For LC14(2) to LC14(4), the Matrix document itself is the only one listed. The Head of Design Authority is identified as the person responsible for ensuring compliance for each clause within LC14.

3.3 Arrangements for Issue 2 of the Pre-Construction Safety Report

- 29 Detailed arrangements for the production of Issue 2 of the Pre-Construction Safety Report (PCSR2) took the form of a Specification (Ref. 15) and a Work Instruction (Ref. 16). The PCSR2 Specification states the purpose and objectives of the HPC PCSR and details the

structure of the report, i.e. a head document that is the top level summary of the safety case and 116 sub-chapters (each a separate approved document), grouped into 21 chapter subject areas (chapters are not separate approved documents).

30 The titles of the chapters and sub-chapters are set down in the 'HPC PCSR2 Master List' (a living document, snapshot at March 2012 is Ref. 17). The Master List shows which sub-chapters have been adopted verbatim from the generic PCSR and those site-specific documents that are necessary. For clarity, the chapter and sub-chapter numbering scheme follows that in the generic PCSR, e.g. Chapter 4 is on Reactor and Core Design and sub-chapter 4.2 is on Fuel system design in both reports. Site-specific sub-chapters that simply replace a generic sub-chapter that was not adopted for HPC are allocated the number of the replaced generic sub-chapter. Other site-specific sub-chapters are given a letter, e.g. 2U, addressing the implications of the twin-reactor design in Chapter 2 on "Site Data and Bounding Character of the GDA Site Envelope". The HPC PCSR2 Master List also shows that a chapter summary document (designated document A, so that for example the summary for Ch 4 is document 4A) is to be prepared for each Chapter.

31 Ref. 16, the PCSR2 Work Instruction, defines the activities necessary to achieve delivery of PCSR2 including the interactions with the Architect Engineer and other contractors.

32 PCSR2 is based on the March 2011 version of the generic EPR PCSR. It is anticipated that there will be a further issue of the PCSR, PCSR3, which will fold in amendments to the generic PCSR that were necessary to allow issue of a full Design Acceptance Confirmation (DAC) for the UK EPR design. Full issue of PCSR2 under the revised title of PCSR 2012 took place in December 2012.

3.4 Other Documentation relevant to LC14 Compliance

3.4.1 Development of the Station Safety Report through Station Life

33 NNB Genco have also provided a presentation on the development of the Station Safety Report beyond PCSR (Ref. 18). Ref. 18 gives confirmation that a Pre-Commissioning Safety Report (PCmSR) will be produced to justify bringing fuel to site and carrying out commissioning. Initial start-up and operation will be justified by a Pre-Operation Safety Report (POSR) and once operation at power has become well established the Station Safety Report (SSR) will be prepared.

3.4.2 Arrangements for the Station Safety Case to be Living and Visible

34 NNB Genco's strategy for ensuring that the Station safety case will be living and visible was set out in Ref. 19 and supporting documentation (Ref. 20). The strategy took account of experience with the differing living and visible safety case arrangements within EDF's Nuclear Generation Limited subsidiary and at other UK Licensees. The approach adopted took key benefits from two well-established schemes, use of Safety Case User Guides (SCUGs) at Sizewell B Power Station and the living safety case documents with tabular system-based and fault-based views used at Hinkley Point B and other AGRs.

35 Safety Case Summary Documents (SCSDs) will be prepared (Ref. 19). SCSDs are to have system, fault and function-based views of the safety case. The system-based views will specify the safety case requirements under normal and fault conditions in tabular form. The SCSDs will

- summarise the relevant safety case claims
- include all relevant safety categorisation and classification data,
- include a summary description of the plant or approach used,
- be maintained up to date along with the Station Safety Report at all times as a requirement of the NNB Genco modifications process
- will exclude detailed PSA information, instead referencing the relevant part of the PSA section of the Station Safety Report.

A full suite of SCSDs is anticipated to be in place at the completion of the POSR (Ref. 19).

3.4.3 Assessment Principles

36 NNB Genco has developed its own Nuclear Safety Design Assessment Principles (NSDAPs, Ref. 21). The NSDAPs are stated to be based on the "Safety Requirements" chapter of the European Utility Requirements for LWR Power Plants document (Ref. 22) with suitable adaptation for UK use. Ref. 22 was prepared by a group of 12 major European electricity generation companies that shared an aim to standardise their approaches.

3.4.4 Design Acceptability Review

37 A Design Review and Acceptance (DR&A) Procedure (Ref. 23) has been developed to set out the mechanism for clearance of design deliverables provided by the Architect Engineer and other contracted suppliers. Design work carried out by NNB Genco staff is covered by an alternative procedure (Ref. 24).

3.5 Shadow Inspection of Use of LC14 Arrangements in the Fault Studies Work Area

38 An ONR Inspector carried out a shadow inspection of compliance with the LC14 arrangements in the fault studies work carried out as part of PCSR2 production (Ref. 25). The broad objectives were to see if NNB staff at working level were following the arrangements adequately and if use of the arrangements revealed any deficiencies. Sampling covered

- Working level understanding of the LC14 arrangements
- Acceptance of technical work prepared outside NNB Genco
- Authorship of contributions to the HPC PCSR2 head document.
- Integrity of links from high-level LC compliance matrix documents to working-level documents
- Compliance with ONR guidance on safety documentation (Ref 4).

39 The shadow inspection concluded that in general there was good compliance with the LC14 arrangements that NNB Genco have developed. For example the NNB fault studies specialist had a good understanding of the arrangements developed for LC14 compliance and of the working-level documentation. However Ref. 25 reported that the high-level and working-level documentation was not currently linked together by suitable referencing.

- 40 For PCSR2 sub-chapters adopted verbatim from the generic PCSR, the approach for document production had been set down by the Requesting Parties and not questioned by NNB Genco. A review of the generic material against NNB Genco's Nuclear Safety Design Assessment Principles had been carried out. NNB Genco had addressed the suitability of each of the generic PCSR sub-chapters via a gap analysis. The output from the gap analysis was the identification of a number of work items for inclusion in Forward Work Plans (FWP). Details of the new work items and the FWP would be included in the summary of each HPC PCSR2 chapter to be included in the HPC PCSR2 head document. The specialist said that Design Acceptance Records (DARs) had not been produced for these sub-chapters in apparent contradiction to the requirements of the PCSR2 Work Instruction (Ref. 16) and a presentations made at the May 2012 Level 4 meeting (see Table 2).
- 41 For PCSR2 sub-chapters and associated substantiation with site-specific content, the question of whether LC14 arrangements had been followed adequately could not be tested because no site-specific design basis analysis was available yet. The fault studies specialist could not provide any details of whether a key report addressing the effect on risk of having two EPR units on site (rather than one as considered in the generic PCSR) was subjected to the Design, Review and Acceptance (DRA) procedure or whether any surveillances were carried out during its production.
- 42 The shadow inspection report (Ref. 25) concluded that the identified deficiencies in compliance with LC14 arrangements for work prepared outside NNB Genco should be addressed by discussion at the next Level 4 meeting on LC14 arrangements.
- 43 The fault studies specialist had no knowledge of what Independent Peer Review (IPR) or Independent Technical Assessment (ITA) might be carried out on the summary of the Chapter 14 sub-chapters prepared for inclusion in the HPC PCSR2 head document.

4 ONR ASSESSMENT

44 This assessment has been carried out in accordance with ONR How2 BMS policy (Ref. 2). Information from documentation, Level 4 meetings and the shadow inspection is considered together in determining how well NNB Genco's arrangements meet ONR expectations.

4.1 Early Assessment covering period April 2010 to September 2011

45 Ref. 26 presents ONR assessment of NNB Genco's early work towards LC14 compliance. It was found that there had been satisfactory progress in developing compliance arrangements and that the proposals for Station Safety Report development were acceptable.

4.2 Documentation specifically addressing LC14 Compliance

4.2.1 Production and Assessment of Safety Reports

46 The Management of Safety Reports Procedure (Ref. 12) was still in draft and hence it was not assessed in detail. Although not explicitly stated, the procedure requires that each of the main project safety reports, such as the PCSR, PCmSR, POSR and SSR, be treated as a safety submission of the highest safety significance, i.e. in a similar manner to a Category 1 submission. Thus the report must first be subject to Independent Peer Review (IPR). Revision to the safety report is required if the report as submitted is rejected by IPR. Once IPR is cleared, the report is sent to the Nuclear Safety Committee (NSC). After any re-work required by the NSC is complete, the report is sent back for further IPR clearance and then back to the NSC.

47 The next level of scrutiny comes from the Operational Control Committee (OCC), which has a role overseeing safety, security and environmental matters in relation to NNB GenCo's operations (Ref. 27, para 70). Any rework requirement from the OCC sends the report back to the beginning, requiring further clearance from IPR and NSC before consideration and clearance from the OCC. If accepted by the OCC, the safety report is submitted to ONR. If ONR decline to accept the report, it is sent back to the beginning, with the amended report requiring clearance from IPR, NSC and OCC successively before re-submission to ONR. I judge that these arrangements provide an adequate basis for LC14(1) compliance in respect of site-wide safety reports.

4.2.2 Categorisation System for Nuclear Safety Related Modifications

48 It is instructive to compare NNB Genco's modification classification scheme as set out in Ref. 13 with that used by the existing Licensee EDF Nuclear Generation Limited (NGL) (Ref. 28), as NGL's scheme is clearly acceptable to ONR or amendments would have been sought. Four categories are used in each scheme and the definitions and clearance requirements are very similar.

49 A key difference concerns whether ONR has a hold on implementation of the modification. In the NGL scheme, ONR agreement is sought for Category 1 modifications to plant or Technical Specifications, implying that implementation will not take place until ONR agreement is received, whereas NNB Genco's scheme simply states that Category 1 modifications will be sent to ONR, leaving the question of whether there is an ONR hold on implementation unresolved.

- 50 A further important difference is that the NGL scheme recognises that ONR approval is required for changes to approved documents, such as the Nuclear Safety Requirements (NSR) Chapter of the AGR Technical Specifications (the NSRs are approved operating rules under LC23(4)). There is no corresponding recognition in the NNB Genco scheme that ONR may approve, and thereby freeze, NNB Genco documents such as those relating to safety documentation under LC14(2) and operating rules under LC23(4) and LC23(5). It is unclear if NNB Genco's intention is that the categorisation scheme will not provide secondary powers to ONR and that instead ONR would have to use its primary powers to freeze documents.
- 51 It must be recognised that the HPC project is in its early phases and the arrangements are still being refined and developed. In fact both these differences may be acceptable to ONR for the purposes of granting a Licence, e.g. the lack of hold on implementation may be unnecessary due to other controls being available to ONR via other Licence Conditions and there currently being no NNB Genco documents that are formally approved by ONR. The author of the AR on licence condition compliance arrangements is better placed to make this judgement as sufficient control may be applied via compliance arrangements for other conditions such as LC 20 'Modification to design of plant under construction' and LC 19 'Construction or Installation of New Plant'.
- 52 The AR on compliance arrangements for LC20 (Ref. 29) concluded that NNB GenCo's arrangements for compliance with LC20(1) give the Executive the necessary derived powers to permission the implementation of modifications to the design of a plant under construction.

4.2.3 Assigning Compliance Documentation to Meet LC14 Requirements

- 53 The Compliance Matrix document (Ref. 14) cites only itself, the Management of Safety Reports Procedure (Ref. 12) and the Procedure for control of modifications (Ref. 13). Thus it only refers to compliance documentation at the very highest level though Ref. 13 does refer on to lower level documentation such as the Design Review and Acceptance Procedure (Ref. 23). Responsibility for compliance is placed on the Head of Design Authority only.
- 54 It is arguable that at this early pre-licensing stage of the project, a brief high-level statement of compliance and allocation of responsibility only to the Head of Design Authority may be adequate. However it is instructive to compare the NNB Genco Compliance Matrix with that used by EDF NGL (Ref. 30) who have a fleet of operating Power Stations. In addition to the Head of Design Authority, the NGL matrix entry for LC14 assigns responsibilities to
- the head of their internal regulator to ensure an independent nuclear safety assessment of the safety case is carried out (INSA) by suitably qualified and experienced (SQEP) staff independent of those responsible for preparation, review and implementation and
 - to the Chairman of the Nuclear Safety Committee.
- 55 The NNB Genco matrix could be improved by introducing corresponding allocations of responsibility to the head of the NNB Genco Independent Assessment, Challenge and Oversight function (IACO) and to the Chairman of the NNB Genco NSC.

56 The NGL matrix also calls for schedules of safety documentation to identify the current nuclear safety case for new plant and for existing plant. This requirement is met for many AGR stations by the provision of visible safety case documentation in the form of plant-based and fault-based views (see Section 4.5 below on visible safety case arrangements). In my judgement the NNB Genco matrix could be improved by introducing allocation of responsibility for visible safety case arrangements to identify the current safety case.

4.3 Arrangements for Issue 2 of the Pre-Construction Safety Report (PCSR2)

57 The safety documentation arrangements for PCSR2 were judged to be acceptable. The basis of this judgement is set out in Ref 7.

4.4 Other Documentation relevant to LC14 Compliance

4.4.1 Development of the Station Safety Report through Station Life

58 NNB Genco's proposals for the development of the Station Safety Report through the life of the Station via issue of a PCmSR, POSR and SSR covering commissioned operation are judged to be acceptable. The grounds for this judgement are that this sequence of formal evolutions of the station safety report meets the requirement set out in the ONR expectation document "Licensing Nuclear Installations" (Ref. 5) for a station safety case that is updated regularly rather than a one-off set of documentation prepared to justify Licence issue.

4.4.2 Arrangements for the Station Safety Case to be Living and Visible - SCSDs

59 NNB Genco's arrangements for the Station Safety Case to be both living and visible, as set out in Refs. 19 and 20, call for the production of Safety Case Summary Documents (SCSDs, see Section 3.5).

60 Although no issued SCSDs have been received by ONR to date, I judge that NNB Genco's proposals are likely to lead to visible safety case documentation that is adequate. The basis for this judgement is that the proposals incorporate the best features of the two existing schemes used by EDF NGL – i.e. that the SSR is kept up to date and there are functional views taken from the Sizewell B SCUGs scheme and the system and fault-based views from the AGR scheme that experience has shown to be helpful.

4.4.3 Assessment Principles - NSDAPs

61 The NSDAPs adopted by NNB Genco are part of the arrangements for assessment of safety cases called for by LC14(1). The NSDAPs have not been assessed in detail but I judge that they form an adequate basis for licensing on the grounds that they have been developed from an existing document, i.e. the "Safety Requirements" chapter of the European Utility Requirements for LWR Power Plants, that was prepared by staff from a wide group of companies.

62 There is a long tradition of Licensees having their own assessment principles (e.g. the Nuclear Safety Principles used by EDF NGL) that are quite separate from the guidance provided to ONR Inspectors by the ONR Safety Assessment Principles (SAPs, Ref. 3). Indeed there is a widely held view that having separate sets of assessment principles

promotes a 'healthy tension' and a questioning attitude. In order to aid future assessment activity, I recommend that ONR carry out or commission a comparison report between the SAPs and the NSDAPs. In this way any major differences between the two sets of principles should be identified promptly, allowing early discussion to try to resolve the differences.

4.5 Review of Compliance against each Clause of LC14

63 For ease of reference, the 4 clauses of LC14 are reproduced as Annex 1. Note that all the clauses become effective at the date the Licence itself becomes effective and hence it is necessary to come to a view for the Licensing decision as to whether NNB Genco will be able to comply with each clause on granting.

64 LC14 (1) requires that the Licensee make and implement adequate arrangements for the production and assessment of safety cases consisting of documentation to justify safety during the design, construction, manufacture, commissioning, operation and decommissioning phases of the installation. Sections 4.2 to 4.4 above describe my assessment of NNB Genco's arrangements to comply with this clause. As I have identified no significant deficiencies with the arrangements, I have concluded that the arrangements will be adequate and that hence LC14(1) will be complied with.

65 LC14(2) and LC14(3) give ONR the power to require any part of the LC14(1) arrangements to be submitted for ONR approval and for any approved parts to be 'frozen', i.e. no change to those parts can be made by the Licensee without further ONR approval. This power is open to ONR from the moment of granting an NSL but gives no responsibilities to the Licensee unless and until it is used. The question of compliance with LC14(2) and LC14(3) will therefore only arise if ONR uses its powers under those clauses. The compliance matrix document (Ref. 14) shows that an individual post-holder has been nominated (Head of Design Authority) to respond if ONR does exercise its power. It should be noted that NNB Genco cannot know now what parts of the arrangements ONR may wish to specify at a future date. In my judgement the Head of Design Authority post-holder is a suitable person to respond to any specification and hence NNB Genco has taken adequate steps at this stage to comply with LC14(2) and LC14(3) should ONR exercise its power under those clauses in the future.

66 LC14(4) requires that the Licensee furnish to the Executive (i.e. to ONR) copies of any documentation that the Executive (ONR) may specify. The position is thus very similar to that for LC14(2) and LC14(3) in that the clause only becomes operative if ONR acts by specifying documentation and NNB Genco has nominated a post-holder (Head of Design Authority) to respond. Hence in my judgement NNB Genco has taken adequate steps at this stage to comply with LC14(4) should ONR exercise its power to specify documents in the future.

67 NNB Genco's position with respect to each of the Clauses in LC14 is thus judged to be satisfactory.

4.6 Addressing the Deficiencies Identified by the Shadow Inspection

68 The shadow inspection of LC14 arrangements in the fault studies area identified several deficiencies (see Section 3.5):-

- the high-level and working-level documentation was not currently linked together by suitable referencing
- Design Acceptance Records (DARs) had not been produced for the sub-chapters adopted verbatim from the generic PCSR in apparent contradiction to the requirements of the PCSR2 Work Instruction
- no information was available on whether a key report (the 'twin reactor report') addressing the effect on risk of having two EPR units on site (rather than one as considered in the generic PCSR) was subjected to the Design, Review and Acceptance (DRA) procedure or whether any surveillances were carried out during its production
- the interviewee had no knowledge of what Independent Peer Review (IPR) or Independent Technical Assessment (ITA) might be carried out on the summary of the Chapter 14 sub-chapters prepared for inclusion in the HPC PCSR2 head document.

69 None of the above deficiencies is judged to be sufficiently important to bring issue of a Site Licence into question. The grounds for this judgement are that each one can be rectified comparatively easily as part of normal regulatory interaction. In January 2013 NNB GenCo provided clarification and evidence (Ref. 31) that a DAR had been issued for the sub-chapters adopted verbatim from the generic PCSR, that the 'twin reactor report' had been subjected to the DRA procedure and that there had been an independent peer review of the PCSR2 head document.

5 CONCLUSIONS

70 This assessment report (AR) addresses NNB Genco's progress on developing Licence Condition 14 (LC14) Safety Documentation arrangements, i.e. arrangements for "the production and assessment of safety cases consisting of documentation to justify safety during the design, construction, manufacture, commissioning, operation and decommissioning phases of the installation" (LC 14(1)) and also compliance with LC14(2) to LC14(4) inclusive.

5.1 Key Findings from the Assessment

71 The arrangements for the management of site-wide safety reports such as the PCSR, PCmSR, POSR and SSR were judged to provide an adequate basis for LC14(1) compliance (arrangements for PCSR2 were judged to be acceptable in Ref 7). NNB Genco's proposals for the development of the site-wide safety report through the life of the Station were judged to be acceptable as they met the requirement set out in the ONR expectation document "Licensing Nuclear Installations" (Ref. 5) for a station safety case that is updated as required rather than a one-off set of documentation prepared to justify Licence issue.

72 The categorisation system for modifications was found to leave the question of whether there would be an ONR hold on implementation unresolved and not provide any secondary powers to ONR to freeze NNB Genco documentation. However the AR on compliance arrangements for LC20 concluded that NNB GenCo's arrangements for compliance with LC20(1) give the Executive the necessary derived powers to permission the implementation of modifications to the design of a plant under construction.

73 In my judgement the NNB Genco Licence condition matrix entry for LC14 could be improved by introducing allocation of responsibility for visible safety case arrangements to identify the current safety case and to the Chairman of the NSC to ensure the NSC carries out its role. Allocation of responsibility to the head of the NNB Genco Independent Assessment, Challenge and Oversight function (IACO) to ensure an independent nuclear safety assessment of the safety case is carried out (INSA) by suitably qualified and experienced (SQEP) staff independent of those responsible for preparation, review and implementation would also be appropriate.

74 NNB Genco's arrangements for the production of Safety Case Summary Documents (SCSDs) to ensure the Station Safety Case remains both living and visible were judged to be adequate on the grounds that the Station Safety Report will be kept up to date and will include functional, fault-based and system-based views.

75 NNB Genco's Nuclear Safety Design Assessment Principles (NSDAPs) to be used for the assessment of safety cases, although not assessed in detail, have been judged to form an adequate basis for licensing on the grounds that they have been developed from an existing international standard. In order to aid future assessment activity, I recommend that ONR carry out or commission a comparison report between the SAPs and the NSDAPs.

76 NNB Genco's position with respect to the other clauses in LC14 of having identified a post-holder to respond should ONR exercise its powers under those clauses, was found to be adequate.

5.2 Overall Conclusions

- 77 The arrangements for the production and assessment of Safety Reports were judged to provide an adequate basis for LC14(1) compliance. NNB Genco's position with respect to the other clauses in LC14 of having identified a post-holder to respond should ONR exercise its powers under those clauses, was also found to be adequate.
- 78 Following my sampling of the applicant's documentation, and my review of discipline-specific supporting assessment reports, I have no outstanding concerns that would preclude issue of a Nuclear Site Licence.
- 79 Hence, with regard to the station safety report and associated substantiation, NNB Genco's progress is judged to be adequate to justify issue of a Nuclear Site Licence.

6 RECOMMENDATIONS

- 80 The author of an Assessment Report addressing whether the Licence Condition compliance arrangements are adequate to support issue of a Nuclear Site Licence for the Hinkley Point C site to NNB Genco should note that from the perspective of LC14 compliance arrangements progress, there is no impediment to Licence issue.
- 81 ONR should carry out or commission a comparison report between the ONR SAPs and the NSDAPs (see para 62).

7 REFERENCES

- 1 *Office for Nuclear Regulation: Licence condition handbook*, October 2011, www.hse.gov.uk/nuclear/silicon.pdf
- 2 *ONR How2 Business Management System. Assessment Process* (formerly AST/001 Issue 4 HSE. April 2010.) www.hse.gov.uk/nuclear/operational/assessment/index.htm.
- 3 *Safety Assessment Principles for Nuclear Facilities*. 2006 Edition Revision 1. HSE. January 2008. www.hse.gov.uk/nuclear/SAP/SAP2006.pdf
- 4 ONR Document: *Guidance: LC14 Safety Documentation*, T/INS/014, Issue 1. http://www.hse.gov.uk/nuclear/operational/tech_insp_guides/tins014.pdf
- 5 *Office for Nuclear Regulation: Licencing Nuclear Installations*, www.hse.gov.uk/nuclear/licensing-nuclear-installations.pdf
- 6 NNB Genco Ltd's Application for a Nuclear Site Licence to Install and Operate Two EPR Reactor Units at Hinkley Point: ONR Intervention Strategy, TRIM 2012/61973.
- 7 NNB Genco: Hinkley Point C Safety Report Sub-PAR for Licensing, ONR-CNRP-AR-12-053, TRIM 2012/291971
- 8 Licence Condition 14 – Safety Documentation Strategy Document, M Potts, NSL/B/TECH/09/170 Draft F, February 2010, TRIM 2010/123057
- 9 Presentation on Development of Arrangements to Comply with LC14 – Safety Documentation, P Edwards to 12 July 2010 L4 meeting, TRIM 2010/314698
- 10 Presentation - Development of Arrangements to comply with LC14 – Safety Documentation, P Edwards, 2 February 2011, TRIM 2011/329305
- 11 NNB Genco Register 47 – list of Procedures against Licence Conditions, TRIM 2012/191234
- 12 Management of Safety Reports, NNB-OSL-PRO-000030, Version 1.4, 16 August 2012, TRIM 2012/326824
- 13 NNB Genco Company Procedure: Control of Modifications in Construction and Commissioning, V 2.0, 31 May 2011, NNB-OSL-PRO-000033, TRIM 2012/313234
- 14 NNB Genco Ltd Company Document Nuclear Site Licence Compliance Matrix: Hinkley Point C, Version 1.0, 21 July 2011, NNB-OSL-PRO-00046, TRIM 2012/314971
- 15 Specification for the Pre-Construction Safety Report PCSR2 for Hinkley Point C, Issue 2, 10 Feb 2012, HPC-NNBOSL-U0-000-SPE-000002, TRIM 2012/118830.
- 16 Work Instruction HPC PCSR2 Safety Case Production and Management, Version 2, 12 Jan 2012, HPC-NNBOSL-XX-000-WIN-000001, TRIM 2012/118830
- 17 HPC PCSR2 Master List update for information as at 12 March 2012, TRIM 2012/120160
- 18 Overview on Development of HPC Safety Case beyond PCSR, P Edwards, 20 May 2011,

TRIM 2011/326112

- 19 Presentation on NNB Strategy for Living and Visible Safety Case for UK EPRs, P Edwards, 2 Feb 2011, TRIM 2011/328941
- 20 Proposal for the NNB Operational Safety Cases, A Rudge and P Edwards, NNB-OSL-PAP-00004, NSRAC/10/12/083, Issue 1.0, November 2010, TRIM 2011/220664
- 21 Submission of NNB GenCo Nuclear Safety Design Assessment Principles – Revision 1 – for information, NNB-OSL-RIO-000207, ONR-NNB-20238N, 2 April 2012, TRIM 2012/144610
- 22 European Utility Requirements for LWR Power Plants (EUR document), www.europeanutilityrequirements.org/eur.htm. a document prepared by a group of 12 major European Electricity Generation Companies including British Energy and EDF
- 23 NNB Genco Company Procedure: Design Review and Acceptance, NNB-OSL-PRO-000035, Version 1.0, 25 March 2011, TRIM 2012/179799.
- 24 NNB Genco Ltd Work Instruction: Quality Arrangement for Technical Work within Design Authority, Version 1.0, November 2011, NNB-OSL-WIN-000022, TRIM 2012/314335
- 25 Shadow Inspection of Licence Condition 14 Safety Documentation Compliance, ONR-IR-12-180, Rev 0, TRIM 2012/320661
- 26 NNB Genco Workstream 3 Safety Case Production Management and Outputs Assessment – 1st Periodic Report TRIM 2011/117495
- 27 NNB GenCo Organisational Capability Arrangements – Workstreams 12 to 15, ONR-CNRP-AR-12-100, 5 October 2012, 2012/389494
- 28 British Energy Generation Company Specification Modification Process, BEG/SPEC/DAO/020, Rev 001, May 2011, TRIM 2012/328696
- 29 Hinkley Point C Nuclear Site Licensing Licence Condition 20 Modification to Design of Plant Under Construction, ONR-CNRP-1-113, 21 September 2012, TRIM 2012/359172
- 30 EDF Nuclear Generation Limited, Integrated Company Practice, Nuclear Site Licence Compliance Principles, BEG/ICP/SHE/008, Rev 010, February 2010.
- 31 Email covering evidence of Design Acceptance Review of the Twin Reactor Report, Independent Peer Review of PCSR2 and Design Acceptance Review of sub-chapters adopted verbatim from the generic PCSR, TRIM 2013/19892

Table 1

Relevant Safety Assessment Principles Considered During the Assessment

SAP No.	SAP Title	Description
FP1	Responsibility for Safety	The prime responsibility for safety must rest with the person or organisation responsible for the facilities and activities that give rise to radiation risks.
FP3	Optimisation of Protection	Protection must be optimized to provide the highest level of safety that is reasonably practicable
FP6	Prevention of accidents	All reasonably practicable steps must be taken to prevent and mitigate nuclear or radiation accidents
SC1	Safety Case Process	The process for producing safety cases should be designed and operated commensurate with the hazard, using concepts applied to high reliability engineered systems.
SC2	Safety Case Process	The safety case process should produce safety cases that facilitate safe operation
SC3	Safety Case Process	For each life-cycle stage, control of radiological hazards should be demonstrated by a valid safety case that takes into account the implications from previous stages and for future stages.
SC4	Safety Case Characteristics	A safety case should be accurate, objective and demonstrably complete for its intended purpose
SC5	Safety Case Characteristics	Safety cases should identify areas of optimism and uncertainty, together with their significance, in addition to strengths and any claimed conservatism.
SC6	Safety Case Characteristics	The safety case for a facility or site should identify the important aspects of operation and management required for maintaining safety
SC7	Safety Case Maintenance	A safety case should be actively maintained throughout each of the life-cycle stages.
SC8	Safety Case Ownership	Ownership of the safety case should reside within the dutyholder's organisation with those who have direct responsibility for safety.

Table 1

Relevant Safety Assessment Principles Considered During the Assessment

SAP No.	SAP Title	Description
FA1	Design basis analysis, PSA and severe accident analysis	Fault analysis should be carried out comprising design basis analysis, suitable and sufficient PSA, and suitable and sufficient severe accident analysis.
FA2	Identification of initiation faults	Fault analysis should identify all initiating faults having the potential to lead to any person receiving a significant dose of radiation, or to a significant quantity of radioactive material escaping from its designated place of residence or confinement.
FA3	Fault sequences	Fault sequences should be developed from the initiating faults and their potential consequences analysed
FA4	Fault tolerance	DBA should be carried out to provide a robust demonstration of the fault tolerance of the engineering design and the effectiveness of the safety measures.
FA5	Initiating faults	The safety case should list all initiating faults that are included within the design basis analysis of the facility.
FA6	Fault sequences	For each initiating fault in the design basis, the relevant design basis fault sequences should be identified.
FA7	Consequences	Analysis of design basis fault sequences should use appropriate tools and techniques, and be performed on a conservative basis to demonstrate that consequences are ALARP
FA8	Linking of initiating faults, fault sequences and safety measures	DBA should provide a clear and auditable linking of initiating faults, fault sequences and safety measures
FA9	Further use of DBA	DBA should provide an input into the safety classification and engineering requirements for systems, structures and components performing a safety function; the limits and conditions for safe operation; and identification of requirements for operator actions.

Table 1

Relevant Safety Assessment Principles Considered During the Assessment

SAP No.	SAP Title	Description
FA10	Need for PSA	Suitable and sufficient PSA should be performed as part of the fault analysis and design development and analysis.
FA15	Fault Sequences	Fault sequences beyond the design basis that have the potential to lead to a severe accident should be analysed.

Table 2

Interventions carried out related to LC14 Safety Documentation Compliance

Date	Topic	Contact or Intervention report number and TRIM reference
16 Mar 2010	Hinkley Point C LC14 and LC20 Compliance Strategy Review Meeting (Level 4)	CR10007 2010/153032
12 Jul 2010	Hinkley Point C LC14 Safety Documentation (Level 4)	CR 10055 2010/330932
2 Feb 2011	Hinkley Point C LC14 Arrangements	CR11022 2011/118791
20 May 2011	Hinkley Point C LC14 Safety Documentation Progress Meeting (Level 4)	CR11100 2011/325044
2 May 2012	Hinkley Point C LC14 and LC15 Compliance Meeting (Level 4)	IR-12-080 2012/225273
13 Jul 2012	Hinkley Point C LC14 Shadow Inspection of Fault Studies Work Area	IR-12-180 2012/320661

Annex 1 Licence Condition 14 Safety Documentation

Reproduced for ease of reference from Ref. 1.

1. Without prejudice to any other requirements of the conditions attached to this licence the licensee shall make and implement adequate arrangements for the production and assessment of safety cases consisting of documentation to justify safety during the design, construction, manufacture, commissioning, operation and decommissioning phases of the installation.
2. The licensee shall submit to the Executive for approval part or such parts of the aforesaid arrangements as the Executive may specify.
3. The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.
4. The licensee shall furnish to the Executive copies of any such documentation as the Executive may specify.