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Civil Nuclear Reactor Programme

LC18 Workstream Assessment - Licensing of Hinkley Point C

Assessment Report: ONR-CNRP-AR-12101
Revision 1
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ASSESSMENT REPORT

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EXECUTIVE SUMMARY

Background

NNB Generation Company (NNB GenCo) has submitted its formal application for a nuclear site licence to install and operate two EPR units at Hinkley Point C. ONR's approach to licensing is informed by interventions that consider the adequacy of NNB GenCo's organisation capability, licence condition compliance arrangements, safety report and associated substantiation, and licensing documentation.

ONR technical topic leads were required to carry out an assessment in their topic area in accordance with ONR's Hinkley Point C licensing intervention strategy. This assessment report summarises the outcome of the LC18 Radiological Protection assessment.

Assessment and inspection work carried out by ONR

This assessment has been focused primarily on NNB GenCo's arrangements for the management of radiological protection (RP) during construction, and their corporate capability in the RP technical area. It has not considered the Generic Design PCSR submitted by the Requesting Parties, however due account has been taken of NNB GenCo's ongoing work in developing the case for HPC.

The areas considered were, NNB GenCo competence and capability, safety report development, Company Procedure. Given that physical work has not yet commenced, and that it will be several years before nuclear fuel is brought on site, there has been no scope for carrying out any worthwhile inspection of radiological control. The primary interactions with NNB GenCo have been through a series of level 4 meetings, enabling a view on NNB GenCo's competence, capability and resourcing.

Although a site specific PCSR is not required for licensing, work has been proceeding on its production and assessment of this has enabled a judgement on NNB GenCo's ability to produce a site specific safety report and relevant design substantiation. A number of supporting references (in draft form) were sampled, and queries raised with NNB GenCo were addressed.

NNB GenCo have issued a Company Procedure for Management of Radiological Protection During Construction. For the LC18 Radiological Protection Workstream only nominally developed arrangements are required by the ONR strategy.

Matters arising from ONR's work

No significant problems or shortcomings were identified

Conclusions

This report presents the findings of the ONR LC18 Radiological Protection workstream assessment of NNB GenCo's application, supporting information and arrangements for a nuclear site licence at Hinkley Point C. This assessment supports ONR's decision whether to grant a nuclear site licence or not for NNB GenCo to install and operate two EPR units at Hinkley Point C. and has been produced in line with ONR's overall licensing strategy. The following areas have been considered: NNB GenCo competence and capability, safety report development, and Company Procedure. I conclude that there is no impediment from a LC18 Radiological Protection workstream perspective to issuing the licence.

Recommendation

From the perspective of the LC18 workstream, I recommend that ONR should grant a Nuclear Site Licence to NNB GenCo to install and operate two EPR units at Hinkley Point C.

LIST OF ABBREVIATIONS

ALARP	As Low As Reasonably Practicable
BMS	(ONR) How2 Business Management System
CNRP	Civil Nuclear Reactor Programme
GDA	Generic Design Assessment
HPC	Hinkley Point C
HSE	Health and Safety Executive
IAEA	International Atomic Energy Agency
IPR	Intervention Project Record
LC	Licence Condition
LOOP	Loss Of Off-site Power
LUHS	Loss of Ultimate Heat Sink
NGL	EDF Energy Nuclear Generation Ltd
NNB GenCo	NNB Generation Company
ONR	Office for Nuclear Regulation (an agency of HSE)
PCSR	Pre-construction Safety Report
PCSR2	Second Pre Construction Safety Report
PSA	Probabilistic Safety Analysis
PSR	Preliminary Safety Report
SAP	Safety Assessment Principle(s) (HSE)
SFAIRP	So far as is reasonably practicable
SQEP	Suitably Qualified and Experienced Personnel
SSC	System, Structure and Component
SSG	Specific Safety Guide
TAG	Technical Assessment Guide(s) (ONR)
TSC	Technical Support Contractor
WENRA	Western European Nuclear Regulators' Association

TABLE OF CONTENTS

Tables

1 INTRODUCTION

1.1 Background

1 NNB Generation Company (NNB GenCo) has submitted its formal application for a nuclear site licence to install and operate two EPR units at Hinkley Point C. The Office for Nuclear Regulation's (ONR) intervention strategy to inform a decision on whether or not a nuclear site licence should be granted to NNB GenCo in respect of Hinkley Point C is set out in Ref. 6.

2 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.

3 As part of the safety report and associated substantiation intervention ONR technical topic leads were required to carry out an assessment in their topic area in accordance with ONR's Hinkley Point C licensing intervention strategy (Ref. 6). This assessment report summarises the outcome of the LC18 Radiological Protection assessment.

4 The assessment was undertaken in accordance with the requirements of the ONR How2 Business Management System (BMS) procedure AST/001 (Ref. 1). The ONR Safety Assessment Principles (SAP) (Ref. 2), together with supporting Technical Assessment Guides (TAG) (Ref. 3) have been used as the basis for this assessment.

1.2 Scope

5 The scope of this report informs the organisational capability intervention, and the safety report and the associated substantiation intervention outlined in ONR's licensing intervention strategy (Ref. 6).

1.3 Methodology

6 The methodology for the assessment follows ONR BMS document AST/001, Assessment Process (Ref. 1), in relation to mechanics of assessment within ONR.

7 This assessment has been focused primarily on NNB GenCo's arrangements for the management of Radiological Protection during construction, and their corporate capability in the RP technical area. NNB GenCo do not intend to produce the site specific PCSR until post licensing and this position is accepted by ONR. This assessment has not considered the Generic Design PCSR submitted by the Requesting Parties, however due account has been taken of NNB GenCo's ongoing work in developing the case for HPC.

2 ASSESSMENT STRATEGY

8 The assessment strategy for the licensing of NNB GenCo with respect to Hinkley Point C for the LC18 Radiological Protection topic area is set out in this section. This identifies the standards and criteria that have been applied and the scope of the assessment.

2.1 Standards and Criteria

9 The relevant standards and criteria adopted within this assessment are principally the SAPs, Ref. 2, internal ONR Technical Assessment Guides, Ref. 3, relevant national and international standards, and relevant good practice informed from existing practices adopted on UK nuclear licensed sites. The key SAPs and relevant TAGs 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.

2.1.1 Safety Assessment Principles

10 The key SAPs applied within the assessment are included within Table 1 of this report.

2.1.2 Technical Assessment Guides

11 The following Technical Assessment Guides have been used as part of this assessment (Ref. 3):

- T/AST/04 Fundamental Principles
- T/AST/38 Radiological Protection.
- T/AST/43 Radiological Analysis – Normal Operation
- T/AST/045 Radiological analysis – fault conditions.

2.1.3 National and International Standards and Guidance

12 The principal statutory means of control of work with ionising radiation in the UK is the Ionising Radiations Regulations 1999. HSE publication 121 (Ref 4) contains these Regulations, an Approved Code of Practice, and very detailed and comprehensive guidance. HSE L121 was constructed such that by following the requirements and guidance it contains ensures that international standards and guidance, for example relevant EU Directives will also be complied with.

2.2 Assessment scope

13 The purpose of this assessment report is to summarise the outcome of the assessment of NNB GenCo's arrangements and capabilities in the area of Radiological Protection to support ONR's overall licensing strategy. The objectives of the intervention are to conclude whether, from the perspective of Radiological Protection,:

- NNB GenCo has demonstrated adequate arrangements to manage safety from the point in time at which the licence is to be granted;
- NNB GenCo has demonstrated that it is capable of producing a site specific safety report and relevant design substantiation.

14 Overall, the purpose is to recommend whether ONR should, or should not, grant a nuclear site licence.

2.2.1 LC18 Radiological Protection Intervention Strategy

15 To address the objectives of the assessment a number of level 4 meetings, assessment of ongoing work to develop the Site Specific PCSR, assessment of ongoing work to address Generic Design Assessment Findings, and documented arrangements prepared by NNB GenCo for the management of Radiation Protection during the Construction Phase, were used to gather evidence to form a judgement on NNB GenCo's deployment of Suitably Qualified and Experienced Personnel (SQEP) resource as well as the effectiveness of its arrangements and its ability to construct safety cases.

2.2.2 Use of Technical Support Contractors

16 No technical support contractors have been used to support this assessment.

2.3 Integration with other Assessment Topics

17 Radiological Protection has interactions with other technical areas in particular radiological consequences aspect of Fault Studies and with Level 3 Probabilistic Safety Analysis.

2.4 Out-of-scope Items

18 It is most important to note that the ONR Intervention Strategy defines areas where fully developed arrangements are required at point of granting of Nuclear Site Licence, and those areas where only nominally developed arrangements are required. FOR THE LC18 RADIOLOGICAL PROTECTION WORKSTREAM ONLY NOMINALLY DEVELOPED ARRANGEMENTS ARE REQUIRED. This assessment has therefore focused on arrangements for the construction phase and in consequence is of very limited size.

19 A single GDA Issue was raised in the RP area. This has been dealt with by others, and is out of scope of this assessment.

20 ONR has agreed that NNB GenCo's Nuclear Site Licence application dossier need not include a site specific PCSR. Instead, in order to provide the necessary high level of confidence that the site is suitable for the construction and operation of a UK EPR, NNB GenCo is required to justify a number of key topics, for example that the site is of a sufficient size and can be connected to grid supplies. NNB has provided batches of early submission documents to cover these areas. None of the areas identified includes Radiological Protection sections of the PCSR, hence further restricting the scope of my assessment (but noting that progress in preparation of these has been used to inform judgement as to NNB's corporate capabilities in the LC18 Radiological Protection area.

21 None of the GDA Findings in the RP area fall within the key topics as explained above, and none is related to a milestone earlier than first nuclear safety related construction, and hence these are also outside the scope of my current assessment.

3 LICENSEE'S CASE

22 NNB GenCo formally applied for a nuclear site licence for Hinkley Point C in letter ONR-HPC-20143R, dated 29 July 2011 (Ref. 9). This was supported by an application dossier (Ref. 10) that supports NNB GenCo's application. ONR agreed (Ref. 12) that this dossier did not need to include a Hinkley Point C site specific PCSR. For the purposes of granting a nuclear site licence ONR indicated to NNB GenCo that it would accept a document that illustrates the structure of the Hinkley Point C site specific PCSR document.

23 Although no Radiological Protection deliverables are required on licensing timescales and therefore cannot explicitly support the case for a nuclear site licence, NNB GenCo's capability in the Radiological Protection area can be partly judged from their strategy for PCSR2, and the progress being made in this area.

24 NNB GenCo's specification for PCSR2 (Ref. 11) provides the scope, content and structure of the whole PCSR safety case. Included in this specification is an overview of the Radiological Protection approach for PCSR2. Various sections have been described and discussed at level 4 meetings (see section 4 below).

25 The principal documentation in relation to the LC18 Radiological Protection workstream is a Company Procedure for Management of Radiological Protection During Construction (ref 5).

4 ONR ASSESSMENT

26 This assessment has been carried out in accordance with ONR How2 BMS document AST/001, “Assessment Process” (Ref. 1).

4.1 Scope of Assessment Undertaken

27 The scope of the assessment has followed the strategy described in Section 2 of this report. The following areas have been considered and are discussed in Section 4.3 of this report:

- NNB GenCo competence and capability:
- Safety report development
- Company Procedure

4.2 Interventions with NNB GenCo

28 Given that physical work has not yet commenced, and that it will be several years before nuclear fuel is brought on site, there has been no scope for carrying out any worthwhile inspection of radiological control (an intervention may be carried out once industrial radiography has started but this cannot occur prior to licence granting).

4.3 Assessment

29 This section summarises ONR’s assessment and the conclusions and findings for each of the broad topic areas listed in Section 4.1.

4.3.1 NNB GenCo Competence and Capability

30 My primary interactions with NNB GenCo have been through a series of level 4 meetings. Some of these have been on the broad topic of Radiological Protection, and some more specifically on Radiological consequence assessment (both for fault studies and for level 3 PSA). In the course of this I have interacted with a large cross section of NNB GenCo staff and this has enabled me to form an overall view on NNB GenCo’s competence and capability. In particular I am content that NNB GenCo has sufficient SQEP staff in post to discharge its responsibilities. I have identified no resource issues in the LC 18 Radiological Protection workstream that preclude my recommending ONR granting of a nuclear site licence.

4.3.2 Safety report

31 Although a site specific PCSR is not required for licensing, work has been proceeding on its production and I have been appraised of developments at the series of Level 4 meetings described above. This has enabled me to form a judgement, as required by the ONR Strategy, on whether NNB GenCo is capable of producing a site specific safety report and relevant design substantiation to support the construction and installation of two EPR units at Hinkley Point C.

32 Agreed minutes of these meetings are on file (refs 7 & 8) together with the presentations made by NNB GenCo, and I do not therefore reproduce the detail here. I have also sampled a number of supporting references (in draft form). A number of queries have been raised with NNB GenCo that have been adequately addressed. No issues have been identified that preclude recommending granting a nuclear site licence.

4.3.3 Company Procedure

33 It is important to note that the 1999 Ionising Radiations Regulations (see above) apply across the UK, not just on nuclear sites. The primary duty holder under the regulations is the employer, regardless of whether they are a nuclear licensee. Thus the regulations already apply on the Hinkley Point C Site, and they already apply to NNB GenCo. Issuing of a nuclear site licence for Hinkley Point C to NNB GenCo will make virtually no difference to this position. The only additional Radiological Protection requirement (as opposed to nuclear safety requirements) arises from LC18: "*The licensee shall make and implement adequate arrangements for the assessment of the average effective dose (including any committed effective dose) to such class or classes of persons as may be specified in the aforesaid arrangements and the licensee shall forthwith notify the Executive if the average effective dose to such class or classes of persons exceeds such level as the Executive may specify."* Again, in practice, this is most unlikely to be of significance until there is nuclear fuel on site several years after licensing.

34 As explained in section 3 above, NNB GenCo have issued a a Company Procedure for Management of Radiological Protection During Construction (ref 5). Also, as explained in section 2.4 above, the ONR Intervention Strategy defines areas where fully developed arrangements are required at point of granting of Nuclear Site Licence, and those areas where only nominally developed arrangements are required. For the LC18 Radiological Protection Workstream only nominally developed arrangements are required.

35 Whilst the company procedure is a slim document, in the light of the matters highlighted above, I consider that it is fit for purpose within the required context.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

36 This report presents the findings of the ONR LC18 Radiological Protection workstream assessment of NNB GenCo's application, supporting information and arrangements for a nuclear site licence at Hinkley Point C. This assessment supports ONR's decision whether to grant a nuclear site licence or not for NNB GenCo to install and operate two EPR units at Hinkley Point C. and has been produced in line with ONR's overall licensing strategy. The following areas have been considered: NNB GenCo competence and capability, safety report development, and Company Procedure. I conclude that there is no impediment from a LC18 Radiological Protection workstream perspective to issuing the licence.

5.2 Recommendations

From the perspective of the LC18 Radiological Protection workstream I recommend that ONR should grant a Nuclear Site Licence to NNB GenCo to install and operate two EPR units at Hinkley Point C.

6 REFERENCES

1 *ONR How2 Business Management System. Assessment Process.* AST/001 Issue 4. HSE. April 2010. www.hse.gov.uk/nuclear/operational/assessment/index.htm.

2 *Safety Assessment Principles for Nuclear Facilities.* 2006 Edition Revision 1. HSE. January 2008. www.hse.gov.uk/nuclear/SAP/SAP2006.pdf.

3 *Technical Assessment Guides Series*. HSE 2006 et seq. www.hse.gov.uk/nuclear/operational/tech_asst_guides/index.htm.

4 *Work with Ionising Radiation, Ionising Radiations Regulations 1999, Approved Code of Practice and Guidance*. L121, HSE Books, 2000.

5 NNB GenCo Company Procedure: Management of Radiological Protection During Construction. NNB-OSL-PRO-000051 Version 1.0 15.3.2011

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*. ONR. February 2012. TRIM 2012/61973.

7 Level 4 Inaugural Radiation Protection Meeting - 9th December 2011 NNB-OSL-NOT-000173. TRIM 2012/120541

8 Level 4 Radiation Protection Meeting 2 - 19 April 2012 NNB-OSL-NOT-000274 TRIM 2012/234660

9 *Application for Nuclear Site Licence for Hinkley Point*. ONR-HPC-20143R. NNB GenCo. July 2011. TRIM 2011/503357.

10 *NNB GenCo Nuclear Site Licence Application Dossier*. NNB GenCo. July 2011. TRIM 2011/442090.

11 *Specification for the Pre-Construction Safety Report PCSR2 for Hinkley Point C*. HPC-NNBOSL-U0-000-SPE-000002 Issue 2. NNB GenCo. February 2012. TRIM 2012/118830.

12 *NNB GenCo Ltd's Application for a Nuclear Site Licence to Install and Operate two EPR Reactor Units at Hinkley Point, Specialist Assessment of Key Topics for NSL Granting*. ONR. February 2012. 2012/62323.

Table 1

Relevant Safety Assessment Principles Considered During the Assessment

SAP No.	SAP Title	Description
RP.1	Radiation Protection – Normal Operation	Adequate protection against exposure to radiation and radioactive substances in normal operation should be provided in those parts of the facility to which access needs to be gained.
RP.2	Radiation Protection – Accident Conditions	Adequate protection against exposure to radiation and radioactive contamination in accident conditions, should they occur, should be provided in those parts of the facility to which access needs to be gained. This should include prevention or mitigation of accident consequences.
NT.1	Numerical targets and legal limits - Assessment against targets	A safety case should be assessed against numerical targets and legal limits for normal operation, design basis faults, and radiological accident risks to people on and off the site.
NT.2	Numerical targets and legal limits – Time at risk	There should be sufficient control of radiological hazards at all times.