Office for Nuclear Regulation

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Civil Nuclear Reactor Programme

Reactor Chemistry workstream assessment to inform nuclear site licensing of NNB GenCo Hinkley Point C

Assessment Report: ONR-CNRP-AR-12-108
Revision 1
17 January 2012

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ASSESSMENT REPORT

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† Where required in accordance with ONR How2 BMS Document AST/005 Issue 1.

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EXECUTIVE SUMMARY

Background

This report presents the findings of the Office for Nuclear Regulation (ONR) Reactor Chemistry workstream assessment of NNB Generation Company's (NNB GenCo) application, including supporting information and arrangements, for a nuclear site licence at Hinkley Point C (HPC). This assessment supports ONR's decision whether to grant a nuclear site licence for NNB GenCo to install and operate two UK EPR™ units at HPC.

This report has been produced in line with ONR's overall licensing strategy. It informs both ONR's organisational capability intervention and ONR's licensing strategy.

Assessment and inspection work carried out by ONR

ONR has engaged with NNB GenCo since March 2011 on the Reactor Chemistry workstream, through regular Level 4 technical meetings and assessment of relevant documentation (where available). Within the Reactor Chemistry workstream this engagement had the objective of verifying the following:

- NNB GenCo is able to demonstrate an adequate intelligent customer capability in the context of Reactor Chemistry;
- NNB GenCo has Suitably Qualified and Experienced Personnel (SQEP) to manage, implement and deliver the Reactor Chemistry aspects of the HPC programme; and
- NNB GenCo is developing suitable and sufficient arrangements to support the delivery of Reactor Chemistry aspects of the HPC programme.

Matters arising from ONR's work

No significant matters have been identified.

Conclusions

In terms of NNB GenCo's competence and capability in the Reactor Chemistry workstream area, no significant issues have been identified that prevent me recommending that ONR grant a nuclear site licence for NNB GenCo to install and operate two UK EPR™ units at HPC.

Recommendations

From the perspective of the Reactor Chemistry workstream, I recommend that ONR should grant a Nuclear Site Licence to NNB GenCo to install and operate two UK EPR™ units at HPC.

LIST OF ABBREVIATIONS

ALARP	As low as is reasonably practicable
BSL	Basic Safety level (in SAPs)
BSO	Basic Safety Objective (in SAPs)
BMS	(ONR) How2 Business Management System
HSE	Health and Safety Executive
IAEA	International Atomic Energy Agency
LC	Licence Condition
ONR	Office for Nuclear Regulation (an agency of HSE)
PCER	Pre-construction Environment Report
PCSR	Pre-construction Safety Report
PID	Project Initiation Document
PSA	Probabilistic Safety Assessment
PSR	Preliminary Safety Report
RGP	Relevant Good Practice
SAP	Safety Assessment Principle(s) (HSE)
SFAIRP	So far as is reasonably practicable
SSC	System, Structure and Component
TAG	Technical Assessment Guide(s) (ONR)
TSC	Technical Support Contractor
WENRA	Western European Nuclear Regulators' Association

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1 INTRODUCTION

1 This report presents the assessment findings of the ONR Reactor Chemistry Specialist Inspector regarding batch submissions in support of Hinkley Point C licensing.

1.1 Background

2 This report presents the findings of the assessment of reactor chemistry as presented in the Batch 5 submission (Reference 7) and supporting documentation provided by NNB. Assessment was undertaken in accordance with the requirements of the Office for Nuclear Regulation (ONR) How2 Business Management System (BMS) procedure AST/001 (Ref. 1). The ONR Safety Assessment Principles (SAP) (Ref. 2), together with supporting documents, have been used as the basis for this assessment.

1.2 Scope

3 The scope of this report covers the reactor chemistry aspects identified in the licensees Batch 5 submission and the Inspectors current view of the emerging strategy for organisational capability in reactor chemistry at HPC.

1.3 Methodology

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

5 This assessment has been focussed primarily on those Batch submissions where relevance to reactor chemistry could be identified and on the ongoing series of reactor chemistry progress meetings where the NNB strategy for organisational capability in relation to Reactor Chemistry at HPC continues to evolve.

2 ASSESSMENT STRATEGY

6 The intended assessment strategy for Hinkley Point C is set out in this section. This 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. 2, 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.

2.2 Safety Assessment Principles

8 There are no SAPs specific to reactor chemistry available at the time of this assessment. Relevant good practice together with the principles and methodologies laid out in the generic SAPs have been considered in forming this assessment.

2.2.1 Technical Assessment Guides

9 There are no technical assessment guides specific to reactor chemistry available at the time of this assessment. Relevant good practice together with the principles and methodologies laid out in related TAGs have been considered in forming this assessment.

2.2.2 National and International Standards and Guidance

10 The prospective Licensee has identified and cited INPO 06-007, Guidelines for the Conduct of Chemistry at Nuclear Power Stations, WANO GL 2001-08, Guidelines for Chemistry at Nuclear Power Plants, and IAEA DS388, Chemistry Programme for Water Cooled Nuclear Power Plants as relevant to, and being used to inform, the development of the forward strategy for reactor chemistry at HPC, relevant good practice informed from existing practices adopted on UK nuclear licensed sites has also been considered.

2.3 Use of Technical Support Contractors

11 No technical support contractors were used in production of this assessment.

2.4 Integration with other Assessment Topics

12 There was no direct integration with other topics during this assessment, however, the single question arising from the Inspectors review of the Batch 5 submission precipitated a number of civil engineering related questions that are captured elsewhere.

2.5 Out-of-scope Items

13 The following items are outside the scope of the assessment.

- All areas where direct relevance to strategy, delivery or organisational capability in reactor chemistry could not be established.
- The reactor chemistry operating regime and limits which are within the scope of the generic design assessment (GDA).

3 LICENSEE'S SAFETY CASE

14 The only aspect of the presented case found to have reactor chemistry relevance was the inclusion of chemical dosing for the control of biofouling, contained within batch submission 5 Heat Sink Summary Document (Reference 7).

4 ONR ASSESSMENT

15 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

16 The scope of the assessment is limited to those areas identified in the HPC batch submissions that refer or relate to reactor chemistry and the ongoing development of the HPC strategy for organisational capability in reactor chemistry.

4.2 Assessment

17 I considered the Batch submissions supplied and identified only one area with reactor chemistry significance as part of Batch 5 (Heat Sink Summary Document).

18 I noted that, similarly to the established practise at Hinkley Point B station, there was no intent to undertake dosing of abstracted seawater to control biofouling, yet a fundamental difference existed in that the sea water intakes for Hinkley Point C are some 3.5 km offshore.

19 I considered that this difference could give rise to different conditions from those seen at HPC and hence a different risk of biofouling, requiring different control measures to ensure availability of the heat sink.

20 I raised this as a question at the 3rd HPC reactor chemistry progress meeting (Reference 3) where it was accepted as action 1230-EDF and NNB responded at the 4th meeting (Reference 4) by referring to the BEEMS (British Energy Estuarine and Marine Studies) Report TR149 (Reference 5).

21 The report clarified that the estuarine tidal dynamics and high turbidity experienced at the HPB inlet are essentially identical to those found throughout that region of the estuary. NNB stated further that a number of geomorphologic scenarios had been considered that might impact this position and the only one with any significance was the construction of a tidal barrage as this would impact local bathymetry and tidal velocity.

22 NNB also confirmed that the possibility of a future emergent requirement for biofouling control was agreed and that as retrospective installation of dosing points would be challenging they would engineer dosing infrastructure into the HPC design and undertake monitoring to ensure the estuarine conditions were not changing.

23 These decisions were incorporated into project request HPC-NNBOSL-UO-CTE-TQY-000001 (Reference 6).

24 I, as the reactor chemistry specialist inspector, was satisfied with this response and agreed action 1230-EDF closed.

25 I consider that interactions with NNB over HPC reactor chemistry, although slow to develop initially, are now constructive, cooperative and of no cause for concern. The NNB reactor chemistry team have demonstrated that they are SQEP in their role and capable of acting as intelligent customer for Reactor Chemistry matters.

26 Development of the strategy for delivery of reactor chemistry is ongoing and will continue to be monitored and assessed through regular progress meetings with the prospective licensee at level 4.

27 The current position is that the outline structure for organisational capability for reactor chemistry delivery exists at draft status and the NNB reactor chemistry strategy team are firming up proposals for the best usage of laboratory real estate and resources, prior to submission of their final proposal for delivery of the reactor chemistry function.

28 Outline level documents for the conduct of chemistry and strategy for the development of operational chemistry exist at draft status and continue to advance, progress being reported at the reactor chemistry progress meetings.

4.3 Comparison with Standards, Guidance and Relevant Good Practice

29 The use of and learning from fleet experience, particularly that derived from SZB, is evident in the ongoing development of the strategy for reactor chemistry.

30 The inspector is confident that the relevant aspects of INPO 06-007, Guidelines for the Conduct of Chemistry at Nuclear Power Stations, WANO GL 2001-08, Guidelines for Chemistry at Nuclear Power Plants, and IAEA DS388, Chemistry Programme for Water Cooled Nuclear Power Plants are being given due cognisance in the development of the forward strategy for reactor chemistry at HPC.

5 CONCLUSIONS AND RECOMENDATIONS

5.1 Conclusions

31 This report presents the findings of the ONR reactor chemistry assessment of Batch submissions in support of HPC licensing and the developing organisational capability in support of reactor chemistry for HPC.

32 One item of reactor chemistry concern was identified in the batch 5 submission and adequately resolved.

33 Strategy and capability for delivery of reactor chemistry continue to evolve and ONR continue to be engaged in this process.

34 To conclude, I am broadly satisfied with the reactor chemistry claims, arguments and evidence laid down within the Licensee's safety case. I have identified no grounds for concern in the reactor chemistry area that might preclude ONR issuing a nuclear site license for HPC.

5.2 Recommendations

35 My recommendations are as follows.

- **Recommendation 1**: ONR Continue to engage with NNB through Reactor Chemistry Progress meetings to remain appraised of the developing strategy for delivery of reactor chemistry at HPC
- **Recommendation 2**: While established and adequate at this time, NNB intelligent customer status, SQEP resource and detailed arrangements for Reactor Chemistry continue to develop and ONR should continue to engage in these areas to maintain confidence in the ability of the prospective licensee to deliver Reactor Chemistry at HPC.
- **Recommendation 3**: I recommend that, in relation to the Reactor Chemistry workstream, ONR should grant a Nuclear Site Licence to NNB GenCo to install and operate two UK EPR™ units at HPC.

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 2012/210773 ONR-NNB-IR-12-022 3rd Reactor Chemistry Progress Meeting – QUBE – Feb 2012

4 2012/305351 ONR-NNB-IR-12-108 4th Reactor Chemistry Progress Meeting – QUBE – May 2012

5 2012/341513 HPC-NNBPEA-XX-000-RET-000180 BEEMS Report TR149 HPC

6 2012/341749 HPC-NNBOSL-U0-CTE-TQY-000001Project Request

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