

NO PROTECTIVE MARKING

Office for Nuclear Regulation

An agency of HSE

ASSESSMENT REPORT

Civil Nuclear Reactors Programme

NNB GenCo: Hinkley Point C Pre-Construction Safety Report 2012 – Assessment Report for Equipment Qualification Work Stream (B3)

Assessment Report: ONR-CNRP-AR-13-101

Revision 0

Version 2

March 2014

NO PROTECTIVE MARKING

COPYRIGHT

© Crown copyright 2014

You may reuse this information (excluding logos) free of charge in any format or medium, under the terms of the Open Government Licence. To view the licence visit www.nationalarchives.gov.uk/doc/open-government-licence/, write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or email psi@nationalarchives.gsi.gov.uk.

Some images and illustrations may not be owned by the Crown so cannot be reproduced without permission of the copyright owner. Enquiries should be sent to copyright@hse.gsi.gov.uk.

Unless otherwise stated, all corporate names, logos, and Registered® and Trademark™ products mentioned in this Web site belong to one or more of the respective Companies or their respective licensors. They may not be used or reproduced in any manner without the prior written agreement of the owner(s).

For published documents, the electronic copy on the ONR website remains the most current publically available version and copying or printing renders this document uncontrolled.

EXECUTIVE SUMMARY

This assessment report (AR) reviews that portion of the Hinkley Point C Pre-Construction Safety Report 2012 (HPC PCSR2012) that falls within the scope of Work Stream B3 'Equipment Qualification'. Most of this material lies in HPC PCSR2012 sub-Chapter 3.6, but other material found in sub-Chapters 3.1, 3.2 and 13.1 has also been reviewed.

A final version of the Generic Design Assessment (GDA) Pre-Construction Safety Report (PCSR) issued in November 2012 formed the basis for issue by the Office for Nuclear Regulation (ONR) on 13 December 2012 of a Design Acceptance Confirmation (DAC) for the UK EPR™ design. The GDA PCSR addressed only the key elements of the design of a single UK EPR™ unit (the generic features on "the nuclear island") and excluded ancillary installations that a potential purchaser of the design could choose after taking the site location into account. Certain matters were also deemed to be outside the scope of the GDA PCSR.

In contrast HPC PCSR2012 addresses the whole Hinkley Point C (HPC) licensed site comprising the proposed twin UK EPR™ units and all ancillary installations. Some matters that were outside the scope of GDA PCSR are also addressed in HPC PCSR2012. As the generic features were addressed in the GDA process, my focus is on site-specific documentation that has not been formally assessed by ONR previously. The remaining, generic documentation has been copied into PCSR2012 from an earlier March 2011 GDA PCSR but this has now been superseded by the November 2012 GDA PCSR report.

It is important to note that HPC PCSR2012 alone is not sufficient to inform a future ONR decision on whether to permission construction of HPC. New Nuclear Build Generation Company Limited (NNB GenCo) intends to submit a major revision to HPC PCSR2012 before seeking consent for Nuclear Island construction which will fully integrate the final GDA PCSR and will be supported by other documentation.

The majority of the changes to sub-Chapter 3.6 affect the detailed environmental conditions for equipment qualification. I have not looked at these changes in any detail since the HPC specific environmental conditions are still to be finalised as part of the PCSR forward work programme. I am satisfied that the remainder of the changes do not alter the general approach to qualification described at the time of GDA.

I have identified a number of aspects of equipment qualification that are not specifically mentioned in sub-Chapter 3.6. These will be progressed as matters of routine regulatory business during future level 4 meetings with NNB GenCo and included in a future update to the HPC PCSR as appropriate.

I am satisfied that both NNB GenCo's Design Authority equipment qualification engineer and the equipment qualification working group are having the appropriate input to the resolution plans for those GDA assessment findings of relevance to qualification. As part of my ongoing intervention I will be seeking evidence that the working group continues to provide oversight of both the preparation and implementation of the various plans.

Regular level 4 meetings have been held with NNB GenCo since the granting of the HPC site license. As a result I consider that NNB GenCo has put in place the means by which it can provide oversight of the equipment qualification aspects of the HPC project. There is also evidence that

key decisions are being made at the appropriate level within the project to address lessons learned from the Flamanville 3 project.

The lack of intelligent customer capability along with the need to develop the organisational arrangements to deliver the equipment qualification strategy is recognised by the project. However, in recognition of the importance of these shortfalls I will be raising them as issues within ONR's Issues database.

My assessment concludes that the ongoing work within the equipment qualification area demonstrates suitable progress towards meeting ONR's requirement for an adequate PCSR to be available to support nuclear island construction.

No recommendations have arisen from my assessment; the need for future updates of the HPC PCSR as described in this report will be progressed as routine regulatory business.

LIST OF ABBREVIATIONS

AF	Assessment Finding
AR	Assessment Report
BDR	Basic Design Reference
BMS	(ONR) How2 Business Management System
DA	Design Authority
DAC	Design Acceptance Confirmation
DQP	Design Quality Plan
EPRPP™	The generic design of pressurised water reactor submitted for GDA
EQWG	Equipment Qualification Working Group
FA3	Flamanville 3
GDA	Generic Design Assessment
HPC	Hinkley Point C
HPC PCSR2012	Hinkley Point C Pre-Construction Safety Report 2012
HSE	Health and Safety Executive
IAEA	International Atomic Energy Agency
IC	Intelligent Customer
IPR	Intervention Project Record
IIS	Integrated Intervention Strategy (Rating) – an ONR metric on submission quality
LC	Licence Condition
MDEP	Multinational Design Evaluation Programme
MODEM	Monitoring and Decision Making
NNB GenCo	New Nuclear Build Generation Company Limited
ONR	Office for Nuclear Regulation (an agency of HSE)
OPEX	Operating Experience
PCSR	Pre-construction Safety Report
RD	Responsible Designer
RIS [SIS]	Safety Injection System
SAP	Safety Assessment Principle(s) (HSE)
TAG	Technical Assessment Guide(s) (ONR)

TABLE OF CONTENTS

1	INTRODUCTION.....	6
	1.1 Background.....	6
	1.2 Scope.....	6
	1.3 Methodology	7
2	ASSESSMENT STRATEGY	8
	2.1 Standards and Criteria	8
	2.1.1 Safety Assessment Principles	8
	2.1.2 Technical Assessment Guides	8
	2.1.3 National and International Standards and Guidance.....	8
	2.2 Use of Technical Support Contractors	8
	2.3 Integration with other Assessment Topics	8
	2.4 Out-of-scope Items	8
3	LICENSEE’S SAFETY CASE	10
	3.1 HPC PCSR2012 Material Assessed	10
4	ONR ASSESSMENT.....	11
	4.1 Scope of Assessment Undertaken.....	11
	4.2 Assessment	11
	4.2.1 HPC PCSR2012 sub-Chapter 3.6	11
	4.2.2 GDA Assessment Findings.....	13
	4.2.3 Further Development and Implementation of HPC PCSR	14
5	CONCLUSIONS AND RECOMMENDATIONS	17
	5.1 Conclusions	17
	5.2 Recommendations	17
6	REFERENCES.....	18

Tables

Table 1: Relevant Safety Assessment Principles Considered During the Assessment

Annexes:

Annex A Issues Raised During Assessment of HPC PCSR2012 Equipment Qualification Material

1 INTRODUCTION

1.1 Background

1 This report presents the findings of the assessment of that portion of the Hinkley Point C Pre-Construction Safety Report 2012 (HPC PCSR2012, Ref.1) that falls within the scope of Work Stream B3 'Equipment Qualification'.

2 Assessment was undertaken in accordance with the requirements of the Office for Nuclear Regulation (ONR) How2 Business Management System (BMS) procedure AST/003 (Ref. 2). The ONR Safety Assessment Principles (SAP), Ref. 3, together with supporting Technical Assessment Guides (TAGs), Ref. 4, have been used as the basis for this assessment.

3 This Assessment Report (AR) has been written to support a Summary Assessment Report that addresses whether HPC PCSR2012 demonstrates suitable progress towards meeting ONR's requirement for an adequate Pre-Construction Safety Report (PCSR).

1.2 Scope

4 The scope of this report covers Work Stream B3 'Equipment Qualification'. Most of this material lies in HPC PCSR2012 Chapter 3.6, but other material found in sub-Chapters 3.1, 3.2 and 13.1 has also been reviewed.

5 A final version of the Generic Design Assessment (GDA) PCSR issued in November 2012 formed the basis for issue by ONR on 13 December 2012 of a Design Acceptance Confirmation (DAC) for the UK EPR™ design. The GDA PCSR addressed only the key elements of the design of a single UK EPR™ unit (the generic features on "the nuclear island") and excluded ancillary installations that a potential purchaser of the design could choose after taking the site location into account. Certain matters were also deemed to be outside the scope of the GDA PCSR.

6 In contrast HPC PCSR2012 addresses the whole HPC licensed site comprising the proposed twin UK EPR™ units and all ancillary installations. Some matters that were outside the scope of GDA PCSR are addressed in HPC PCSR2012. As the generic features were addressed in the GDA process, attention has been concentrated here on site-specific documentation that has not been formally assessed by ONR previously. The remaining, generic documentation has been copied into the HPC PCSR2012 from an earlier March 2011 GDA PCSR but this has now been superseded by the November 2012 GDA report. The generic documentation has only been revisited if recent developments have materially affected the case being made.

7 It is important to note that HPC PCSR2012 alone is not sufficient to inform a future ONR decision on whether to permission construction of HPC and New Nuclear Build Generation Company Limited (NNB GenCo) intends to submit other supporting documentation. Note also that HPC PCSR2012 will be superseded by a further site-specific revision intended to fully reflect the final GDA PCSR and other design changes from Flamanville 3 (FA3) which is the reference design for HPC.

8 It should also be noted the approach to safety function categorisation and safety system classification agreed during GDA is not fully reflected in HPC PCSR2012 which largely uses the approach employed on FA3. The integration of the methodology agreed during GDA will be demonstrated in the next revision of HPC PCSR.

1.3 Methodology

- 9 The methodology for the assessment follows the requirements of the ONR How2 BMS 'produce assessments' step in the nuclear safety permissioning process and Ref. 2 in particular in relation to mechanics of assessment.
- 10 My equipment qualification Intervention Project Record (IPR) (Ref. 5) to support the overarching ONR intervention for the permissioning of the construction phase of the HPC project includes the requirement to review the development of the HPC PCSR to establish whether it adequately supports nuclear island construction.
- 11 In addition to considering HPC PCSR2012 sub-Chapter 3.6, my assessment has also considered NNB GenCo's ongoing work and organisational capability to further develop the PCSR and the general arrangements being developed to support the implementation of equipment qualification for the project. This has been achieved by holding a number of level 4 meetings with NNB GenCo.

2 ASSESSMENT STRATEGY

12 My assessment strategy 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

13 The relevant standards and criteria adopted within this assessment are principally the ONR SAPs, Ref. 3, internal ONR TAGs, 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 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

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

2.1.2 Technical Assessment Guides

15 The following TAGs mention equipment qualification and have been referred to as part of the assessment (Ref. 4):

- TAST/057: Design Safety Assurance, Issue 2, November 2010
- TAST/003: Safety Systems, Issue 6, July 2011

2.1.3 National and International Standards and Guidance

16 The following international standards and guidance have been used as part of this assessment:

- IEC 60780 (1998) – Nuclear Power Plants – Electrical Equipment of the Safety System – Qualification
- International Atomic Energy Agency (IAEA) Safety Standard SSR-2/1 (2012) – Safety of Nuclear Power Plants: Design

2.2 Use of Technical Support Contractors

17 Technical Support Contractors have not been used in undertaking this assessment.

2.3 Integration with other Assessment Topics

18 HPC PCSR 2012 sub-Chapter 3.6 relies on the deterministic risk assessment and severe accident studies to define the bounding environmental conditions during accidents. The seismic spectra to be included in the qualification of equipment are addressed as part of the external hazards studies. These aspects of equipment qualification have not been considered in my assessment.

2.4 Out-of-scope Items

19 The following items are outside the scope of my assessment:

- the material presented in sub-Chapter 13.1 relating to seismic hazards and the methodologies used for deriving the spectra for qualification;
- the various references to sub-Chapter 3.6 that derive the bounding qualification environmental conditions for the range of accident conditions considered within Chapter 14 and sub-chapters 16.1 and 16.2, and

- the derivation of the ambient temperature conditions during normal operation presented in sub-chapter 9.4.

3 LICENSEE'S SAFETY CASE

3.1 HPC PCSR2012 Material Assessed

- 20 The majority of material relating to Work Steam B3 'Equipment Qualification' is located in Chapter 3, specifically in sub-Chapter 3.6. Other material is contained in sub-Chapters 3.1, 3.2 and 13.1.
- 21 The general principles of qualification are presented in sub-Chapter 3.1 and 3.2 where it is noted that all safety classified equipment is required to be qualified against the ambient conditions to which it may be subjected. The ambient conditions encompass:
- normal operation;
 - seismic loads, and
 - extreme conditions which result either from plant faults or hazards.
- 22 Sub-Chapter 3.6 deals with qualification of equipment for accident conditions, including severe accidents. In addition to presenting the bounding environmental conditions (pressure, temperature and irradiation) to be used for the qualification of electrical and mechanical equipment, the sub-Chapter sets out the requirements of qualification programmes, the arrangements for maintaining qualification during installation and operation, and documentation requirements.
- 23 The bounding environmental conditions for qualification are derived by examining the consequences of a limited number of design basis faults and severe accident situations presented in Chapter 14 and sub-Chapters 16.1 and 16.2. The qualification procedure takes account of the effects of ageing due to the cumulative effects of the environmental conditions (thermal and irradiation) during normal operation before the occurrence of the accident conditions.
- 24 The need to consider the effects of seismic stresses when qualifying equipment is recognised in sub-Chapters 3.2 and 3.6 with the seismic spectra to be defined in accordance with the methods defined in sub-Chapter 13.1.

4 ONR ASSESSMENT

25 This assessment has been carried out in accordance with ONR HOW2 BMS policy (Ref. 2).

4.1 Scope of Assessment Undertaken

26 My assessment has been limited to the changes presented in HPC PCSR2012 sub-Chapter 3.6, progress on relevant GDA Assessment Findings (AF) and NNB GenCo's ongoing work and organisational capability to further develop and implement the HPC PCSR to support Nuclear Island construction.

4.2 Assessment**4.2.1 HPC PCSR2012 sub-Chapter 3.6**

27 The two main GDA topic areas that considered equipment qualification were civil engineering (as a cross cutting topic) and mechanical engineering. The respective Step 4 reports concluded that the approach set out in the GDA PCSR and supporting documentation was broadly acceptable to ONR with the proposed qualification process aligning with the requirements of SAP EQU.1. It was also concluded that the various FA3 documents sampled would, if replicated for the UK EPR™ provide a sound basis for equipment qualification.

28 No objections were raised within the Step 4 reports in relation to the use of the qualification codes and standards as presented in the GDA PCSR; as such I have not revisited this aspect.

29 No GDA Issues were raised in relation to equipment qualification and as such the November 2012 GDA PCSR produced to support GDA closure is essentially the same as the earlier March 2011 GDA PCSR; the changes being limited to minor editorial changes. A number of AFs were raised in the Step 4 reports; these are considered in section 4.2.2 of this report.

30 HPC PCSR2012 sub-Chapter 3.6 is essentially the same as the GDA version with a relatively small number of changes. The majority of the changes are addressing the detailed environmental conditions for qualification. However, it is noted that section 3.4.3 of the HPC PCSR forward work activities report (Ref. 6) includes the following text:

The HPC site-specific accident conditions still need to be derived from the ongoing deterministic risk assessments and probabilistic safety studies identified in Consolidated GDA PCSR 2011 Chapters 14 and 16 and HPC PCSR Chapter 15. These accident conditions will need to be compared against those bounding conditions used in the GDA equipment qualification to ensure the generic UK EPR™ criteria are bounding. Hence the results of the equipment qualification will be confirmed in a future safety report when the HPC site-specific accident conditions have been confirmed.

31 Section 2.1.1 of the HPC PCSR 2012 Head Document notes that the extreme high air and sea water temperatures assumed in the GDA studies are exceeded by the HPC site specific values. The significance of these more onerous conditions will need to be considered in the studies referred to in the preceding paragraph to derive bounding environmental conditions for the qualification of HPC safety related equipment.

32 In light of the forward work activity, I do not consider it appropriate at this stage for ONR to undertake a detailed assessment of the environmental conditions for qualification. When the HPC studies are complete it would be appropriate for the relevant ONR

specialist assessors (fault studies and severe accidents) to sample the output to confirm that the chosen bounding environmental conditions are appropriate.

33 In response to GDA cross-cutting Issue GI-UKEPR-CC-01 the requesting party developed a three-stage approach to the safety classification of equipment based on IAEA guidance, the ONR SAPs and the principles of IEC Standard 61226. NNB GenCo is currently implementing this approach for HPC and as such the classification information presented in HPC PCSR2012 is largely based on the approach employed for FA3. Since the list of equipment to be qualified is defined as including all safety related equipment the final list for HPC will not be available until the classification work is complete. As noted in section 4.2.3 of this report, this is included on the project risk register and I will revisit this aspect of the equipment qualification Work Stream as part of my ongoing intervention.

34 The following are examples of changes included in HPC PCSR2012 that clarify and/ or elaborate on the equipment qualification process:

- Section 0.4.1 includes the additional requirement to qualify instrumentation which may initiate actions to protect the public in severe accident situations;
- Section 0.4.1 includes the requirement to qualify equipment constituting the third barrier (containment building) and its extension for leaktightness (this was previously omitted from the list of functions to be qualified although addressed in section 1);
- Section 0.4.2.1.2.3 has been amended with respect to the equipment in the safeguard buildings that needs to be qualified for elevated irradiation levels as well as pressure, temperature and humidity. Particular attention is drawn to equipment necessary in case of passive failure of the Safety Injection System (SIS [RIS]) in an accident scenario with fuel clad failure;
- Section 1.1.1.1.3.1 includes additional text justifying the bounding nature of the reactor building pressure and temperature profiles provided for severe accidents;
- Section 1.1.1.1.3.2 has been added to clarify that for reactor building severe accidents it is permitted to determine pressure and temperature profiles for specific equipment that are less onerous than the bounding profile, and
- Section 1.1.1.1.3.3 has been added to take account of the fact that pressure and temperature in the reactor building may be harsh prior to severe accident conditions being reached and that equipment should be subjected to a pre- severe accident profile.

35 I am satisfied that the changes introduced to HPC PCSR2012 do not alter the general approach to qualification described at the time of GDA. The new/ amended text clarifies the intent of the qualification process and identifies additional aspects to be taken into account during the implementation of the process.

36 The following aspects of qualification are not specifically mentioned in sub-Chapter 3.6 and as such I shall be seeking further information from NNB GenCo as a matter of routine regulatory business:

- sub-Chapter 3.6 addresses environmental conditions during and following accident conditions, however certain equipment and components are also subjected to elevated system fluid temperatures and pressures during accidents. For example in the event of loss of cooling to the thermal barriers of the primary coolant pumps the standstill seal system is activated to protect against loss of primary circuit inventory resulting from over-heating and degradation of the main seals. The

standstill seals require nitrogen pressure to close and subsequently remain closed with the pressure being maintained by O-ring seals that will need to be qualified for the full primary circuit inventory temperature.

- section 1.3 of sub-Chapter 3.6 addresses the arrangements for maintaining qualification during manufacturing and operation, but the sub-Chapter omits any discussion as to the arrangements for undertaking the initial qualification testing. For example, the adequacy of the qualification testing facilities.
- the ageing of equipment as part of the qualification for accident conditions needs to consider the environmental conditions during commissioning and periodic testing as appropriate. For example, during the containment pressure testing non-vented equipment will be subject to higher pressure differences than experienced during normal operation.

4.2.2 GDA Assessment Findings

37 The GDA Step 4 reports for civil engineering and mechanical engineering noted that the documentation sampled in addition to the GDA PCSR was FA3 specific and as such the following AFs were raised:

- AF-UKEPR-ME-03: the licensee shall generate appropriate evidence that equipment qualification is adequately specified for all mechanical items important to safety, accounting for new suppliers and the overall UK context. Target milestone: inactive commissioning.
- AF-UKEPR-CE-61: the licensee shall develop a set of arrangements for the qualification of plant and equipment against the demands from internal and external hazards. Target milestone: ahead of installation of the polar crane.

38 NNB GenCo have applied their own prioritisation to the AFs with ME-03 and CE-61 being assigned priority 1 (completion prior to first nuclear concrete) and priority 2 (completion post first nuclear concrete) respectively.

39 The resolution plan for ME-03 has been issued following review by the Equipment Qualification Working Group (EQWG). I judge the plan to be generally adequate in terms of meeting the intent of the AF; however it is not fully aligned with the current work scope discussed at level 4 equipment qualification meetings. I have provided a number of suggestions for improving the plan and NNB GenCo has agreed to amend accordingly; subject to agreement by the approving manager.

40 At a recent level 4 meeting I challenged the NNB GenCo prioritisation of CE-061 on the basis that the arrangements need to be in place to support the manufacturing programme so as to ensure that the procured equipment meets the safety case requirements. It is understood that there is a lack of clarity as to the scope of this particular AF; as such the EQWG has agreed to provide some material to include in the resolution plan. I will continue to pursue whether the prioritisation is appropriate as part of my ongoing intervention.

41 A number of other AFs have been identified by NNB GenCo as being of relevance to equipment qualification; all assigned to priority 2 which I consider to be reasonable. It is understood that the NNB GenCo AF topic lead has been made aware that EQWG input is required to the associated resolution plans.

42 I am satisfied that both the NNB GenCo Design Authority (DA) equipment qualification engineer and the EQWG are having the appropriate input to the resolution plans for AFs affecting qualification. As part of my ongoing intervention I will be seeking evidence that

the EQWG continues to provide oversight of both the preparation and implementation of the various plans.

4.2.3 Further Development and Implementation of HPC PCSR

43 Section 4.2.1 of this report has already mentioned the PCSR forward work activity relating to the finalisation of the HPC specific environmental conditions and the need for this to be reflected in future updates to the HPC PCSR.

44 Since the HPC site license was granted in December 2012 I have arranged a number of level 4 equipment qualification meetings with NNB GenCo DA to support my intervention in this area.

45 A key feature of these meetings is to give ONR the opportunity to gather evidence on the extent that NNB GenCo is fulfilling its Intelligent Customer (IC) role in the equipment qualification area. This IC capability being necessary to both ensure that the Responsible Designer's (RD) proposals are acceptable from a UK perspective and that the project has the ability to effectively implement the process detailed in the HPC PCSR to support equipment procurement.

46 The following are some of the key findings from the level 4 meetings:

- NNB GenCo's organisational capability:
 - the strengths of the RD's capability with respect to equipment qualification are recognised, however NNB GenCo's oversight to date has been limited due to the lack of suitable and experienced resource. A role profile exists for the DA equipment qualification engineer; however the post holder does not currently meet all of the required competencies.
 - I consider that NNB GenCo needs to be able to demonstrate that it has robust development plans and oversight in place to address the equipment qualification training needs across the project. The short term focus should be on the DA to fulfill the IC role required to support further development of the site specific HPC PCSR and equipment procurement activities.

This will be will be raised as an issue in ONR's Issues database and progressed as part of my ongoing intervention.
- HPC equipment qualification strategy document:
 - the ONR mechanical engineering topic report supporting the granting of the HPC nuclear site licence (Ref. 7) identified the lack of a HPC equipment qualification strategy as a key technical risk that had the potential to impact the procurement of safety related equipment.
 - NNB GenCo has now issued an equipment qualification strategy document which is likely to need amending in the coming months to reflect further developments in the project's approach to qualification. As well as reflecting the general qualification process outlined in HPC PCSR2012 sub-Chapter 3.6 the document also considers a number of implementation issues; I consider this demonstrates that the project is starting to address the practicalities of implementing the qualification process.
 - the document has been issued prior to completion of work to define the organisational arrangements in terms of the roles and responsibilities for delivering the strategy within both the RD and NNB GenCo. ONR needs to have visibility of these arrangements to be satisfied with the overall approach for the HPC project. I understand that the information will be provided in an

equipment qualification integrated organisational document. This document is to be produced by NNB GenCo in parallel with organisational documents from the RD (namely, the HPC adaptation of the FA3 document INS-EPR 336 'Qualification of Safety Related Equipment: Organisation and Distribution of Tasks' and a Design Quality Plan (DQP)). The purpose of the NNB GenCo document is to give an integrated description of the equipment qualification process in terms of deliverables (using inputs from the RD and suppliers), management by NNB GenCo of the interface with the RD (implementation of surveillances, IC role) and NNB GenCo's organisation (Engineering Directorate, Pre-Operations, etc). The INS-EPR 336 and DQP are understood to be within the RD's scope of work for delivering the Basic Design Reference (BDR) by the end of 2013.

The lack of an integrated organisational document will be raised as an issue in ONR's Issues database and progressed as part of my ongoing intervention.

- the BDR scope of work includes a dedicated equipment qualification work stream with the overall objective of confirming that the qualification process used for FA3 is acceptable in the UK context. I consider this to be an appropriate objective at this stage of the project. In addition to the HPC adaptation of the FA3 document INS-EPR 336 referred to in the preceding paragraph, the equipment qualification work stream includes the following deliverables:
 - a design quality plan describing equipment qualification activities in terms of process (steps, inputs, outputs, entities in charge) from the RD's perspective;
 - the list of electrical and ventilation equipment qualified for FA3;
 - a FA3 feedback note (lessons learned);
 - the requirements for HPC containment leak tightness, and
 - a provisional list of HPC equipment to be qualified (recognising that this will need to be revised as equipment classification work progresses).

I consider that this work will assist the project in finalising the HPC specific qualification requirements in support of equipment procurement activities.

- The EQWG was established in early 2012 with representatives from both NNB GenCo and the RD. The group is a top level forum to ensure a common understanding on the topic of qualification, to develop and then implement the equipment qualification strategy for HPC and to oversee the production of material for the HPC PCSR. I consider this to be good practice as it provides the opportunity for NNB GenCo to influence and challenge the RD.
- NNB GenCo's Monitoring and Decision Making (MODEM) panel has endorsed the approach of qualifying all safety classified equipment whose requirement is one of 'operability'. However, the panel has requested an overall strategy covering the holistic equipment qualification process for HPC (operability, stability, integrity and UK context). To support this, the EQWG has requested that a separate working group be set up to confirm whether the FA3 existing requirements for addressing stability and integrity are adequate in the UK context. I consider that this work will provide increased confidence in the adequacy of the FA3 equipment qualification arrangements for the HPC project and should be reflected in future updates to the HPC PCSR.

The adequacy of the existing FA3 requirements will be raised as an issue in ONR's Issues database and progressed as part of my ongoing intervention.

- I am satisfied that the HPC project is taking due account of operational experience (OPEX) from other EPR projects, with a particular focus on FA3. NNB GenCo is also actively engaged with the Multinational Design Evaluation Programme (MDEP) with a representative attending the recent severe accident sub-group that discussed the issue of equipment qualification. The continuing use of OPEX will be reviewed at future level 4 meetings with NNB GenCo.
- A number of risks have been added to the project risk register to address the inadequate equipment qualification infrastructure, finalisation of the environmental conditions and finalisation of the list of HPC equipment to be qualified. I am satisfied that the identified project risks are appropriate and will continue to monitor the effectiveness of the corrective measures at future level 4 progress meetings.

47 I would not expect the general equipment qualification process presented in HPC PCSR2012 sub-Chapter 3.6 to change significantly in future updates to the PCSR as this is based on good practices developed over a number of years and is broadly in line with my expectations.

48 I consider that NNB GenCo has put in place the means by which it can provide oversight of the equipment qualification aspects of the HPC project and there is evidence that key decisions are being made at the appropriate level within the project. The lack of IC capability along with the need to develop the organisational arrangements to deliver the equipment qualification strategy is recognised by the project; these are areas that I will continue to monitor at future level 4 meetings.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

49 This report presents the findings of my assessment of sub-Chapter 3.6 of the HPC PCSR2012 that falls within the scope of Work Stream B3 'Equipment Qualification'. The assessment has focused on the changes made to sub-Chapter 3.6 that have not been formally assessed by ONR during GDA. I have also considered progress on relevant GDA AFs along with NNB GenCo's ongoing work and organisational capability to further develop and implement the equipment qualification aspects of the HPC PCSR to support nuclear island construction.

50 On the basis of my assessment of HPC PCSR2012 along with the earlier ONR assessment of the GDA PCSR I am satisfied with the material within sub-Chapter 3.6. It is recognised that NNB GenCo needs to finalise the HPC specific bounding environmental conditions for equipment qualification to support the procurement programme and for inclusion in the next revision to the PCSR.

51 A number of areas have been identified where further information is required to clarify certain aspects of the equipment qualification process and/ or where it is considered appropriate for additional material to be included in the next revision of the HPC PCSR. These will be progressed as matters of routine regulatory business during future level 4 meetings with NNB GenCo.

52 The lack of IC capability along with the need to develop the organisational arrangements to deliver the equipment qualification strategy is recognised by the project. However, in recognition of the importance of these shortfalls I will be raising them as issues within ONR's Issues database. The issues are listed in Annex A.

53 I consider that the ongoing work within the equipment qualification area demonstrates suitable progress towards meeting ONR's requirement for an adequate PCSR to be available to support nuclear island construction. An Integrated Intervention Strategy (IIS) rating (an ONR metric on submission quality) of 3 'Adequate' is judged to be appropriate.

5.2 Recommendations

54 No recommendations have arisen from my assessment; the need for future updates of the HPC PCSR as described in this report will be progressed as routine regulatory business.

6 REFERENCES

- 1 NNB GenCo Submission of HPC PCSR 2012, Letter NNB-OSL-RIO-000322, ONR-HPC-20337N, 6 December 2012, TRIM 2013/16143
- 2 *ONR How2 Business Management System*. Guidance on Production of Reports, AST/003 Revision 7, September 2013
- 3 *Safety Assessment Principles for Nuclear Facilities*. 2006 Edition Revision 1. HSE. January 2008. www.hse.gov.uk/nuclear/SAP/SAP2006.pdf
- 4 *Technical Assessment Guides (TAGs)*. www.hse.gov.uk/nuclear/tagsrevision.htm
- 5 NNB-HPC2-IPR045, Hinkley Point C Construction Intervention: 'Equipment Qualification' – B3, Issue 1, TRIM 2013/141014
- 6 NNB GenCo Hinkley Point C Pre-Construction Safety Report Forward Work Activities, Version 2, November 2012, TRIM 2013/16159
- 7 ONR, Hinkley Point C Nuclear Site Licensing – Mechanical Engineering Topic Report, August 2012, TRIM 2012/339862

Table 1
Relevant Safety Assessment Principles Considered During the Assessment

SAP No.	SAP Title	Description
EQU.1	Equipment qualification: qualification procedures	Qualification procedures should be in place to confirm that structures, systems and components that are important to safety will perform their required safety function(s) throughout their operational lives.
EAD.4	Ageing and degradation: periodic measurement of parameters	Where parameters relevant to the design of plant could change with time and affect safety, provision should be made for their periodic measurement.
EMT.3	Maintenance, inspection and testing: type testing	Structures, systems and components important to safety should be type tested before they are installed to conditions equal to, at least, the most severe expected in all modes of normal operational service.
EMT.4	Maintenance, inspection and testing: validity of equipment qualification	The validity of equipment qualification for structures, systems and components important to safety should not be unacceptably degraded by any modification or by the carrying out of any maintenance, inspection or testing activity.

Annex A

Issues Raised During Assessment of HPC PCSR2012 Equipment Qualification Material

Issue No.	Issue title	Issue	Milestone (by which this item should be addressed)
1	Fulfilment of equipment qualification intelligent customer role	NNB GenCo needs to be able to demonstrate that it has robust development plans and oversight in place to address the equipment qualification training needs across the project. The short term focus should be on the DA to fulfill the IC role required to support further development of the site specific HPC PCSR and equipment procurement activities.	HPC Financial Investment Decision
2	Integrated organisational document for delivering equipment qualification	NNB GenCo should document the integrated organisational arrangements for enabling the equipment qualification process in terms of deliverables (using inputs from the RD and suppliers), management by NNB GenCo of the interface with the RD (implementation of surveillances, IC role) and NNB GenCo's organisation (Engineering Directorate, Pre-Operations, etc).	HPC Financial Investment Decision