NNB GenCo proposal to modify the design of Hinkley Point C

Request for agreement under Licence Condition 20 of Nuclear Site Licence No. 97A: Reflective Metal Insulation Replacements and Fibre Removal from the Reactor Building

Project Assessment Report ONR-NR-PAR-22-002
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EXECUTIVE SUMMARY

Permission Requested

NNB Generation Company (HPC) Ltd (NNB GenCo), for the purposes of arrangements made under Condition 20(1) of Schedule 2 attached to Nuclear Site Licence No. 97A to control any modification to the design of the Hinkley Point C (HPC) nuclear installation, currently under construction in Somerset, has requested ONR's agreement to, or acknowledgment of, implementation of a modification described in the Licence Summary Statement (LSS) titled "*RMI Replacements and Fibre Removal from HRA: RC2 Position*", HPC-NNBOSL-AU-000-LSS-100004, Revision 02, dated January 2020.

Background

In response to ONR's findings in its Generic Design Assessment (GDA) of the UK EPR™, NNB GenCo has developed the HPC design from the GDA design that contained significant fibrous insulation, to one where almost all potential sources of fibrous debris in the reactor building have been replaced by alternatives. The proposed design change, which is the subject of NNB GenCo's request, would replace most of the fibrous insulation in the reactor building with reflective metal insulation (RMI). The key safety argument for this modification is that it would significantly reduce the risk of the containment and core cooling systems being blocked by insulation debris in the event of a severe accident.

Assessment and inspection work carried out by ONR in consideration of this request

ONR fault studies, mechanical engineering, essential electrical, chemistry and internal hazards inspectors have carried out an assessment of the safety justification for the modifications set out in the LSS.

Conclusions

The ONR assessments are all supportive of ONR giving its agreement to this design change. Having sampled the basis for the findings of ONR's inspectors, and considered the licensee's governance of this proposal, I am satisfied with NNB GenCo's case for ONR issuing an agreement under LC20(1) for this design change to go ahead.

Recommendation

I recommend that ONR issues Licence Instrument LI 521 giving its Agreement under LC20(1) to NNB GenCo's proposed modification to the design of HPC.

LIST OF ABBREVIATIONS

AF	Assessment Finding
ALARP	As Low As Reasonably Practicable
AR	Assessment Report
CTW	Cable Tray Wrapping
DST	Debris Source Term
EPR™	The reactor design employed at Hinkley Point C
EVR	Containment Cooling Ventilation System
EVU	Containment Heat Removal System
FFA	Fibre-Free Accident
FFZ	Fibre-Free Zone
GDA	Generic Design Assessment
HOW2	(ONR) Business Management System
HPC	Hinkley Point C
HRA	Reactor Building
HVAC	Heating, Ventilation and Air Conditioning
IRWST	In-containment Refuelling Water Storage Tank
ITA	Independent Technical Assessment (NNB GenCo)
LC	Licence Condition
LI	Licence Instrument
LOCA	Loss of Coolant Accident
LSS	Licence Summary Statement
NSC	Nuclear Safety Committee (NNB GenCo)
OPEX	Operating Experience
PAR	Project Assessment Report (ONR)
PWR	Pressurised Water Reactor
RD	Responsible Designer
RGP	Relevant Good Practice
RIS	Safety Injection System
RMI	Reflective Metal Insulation
SAP	Safety Assessment Principle(s)
SCR	Safety Case Report
SDCC	Safety Design Change Committee (NNB GenCo)
SFAIRP	So Far As Is Reasonably Practicable
SSC	Structures, Systems and Components

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1 PERMISSION REQUESTED

1. NNB Generation Company (HPC) Ltd (NNB GenCo), for the purposes of arrangements made under Condition 20(1) of Schedule 2 attached to Nuclear Site Licence No. 97A to control any modification to the design of the Hinkley Point C (HPC) nuclear installation, currently under construction in Somerset, has requested (Ref. 1) ONR's agreement to, or acknowledgment, of implementation of the modification as described in the licensee's Licence Summary Statement (LSS): *"RMI Replacements and Fibre Removal from HRA: RC2 Position*", HPC-NNBOSL-AU-000-LSS-100004, Revision 02, January 2020 (Ref. 2). A subsequent letter from NNB GenCo (Ref. 23) amended the scope of the design changes covered by the original request. This amendment is detailed in Section 2.2 below.

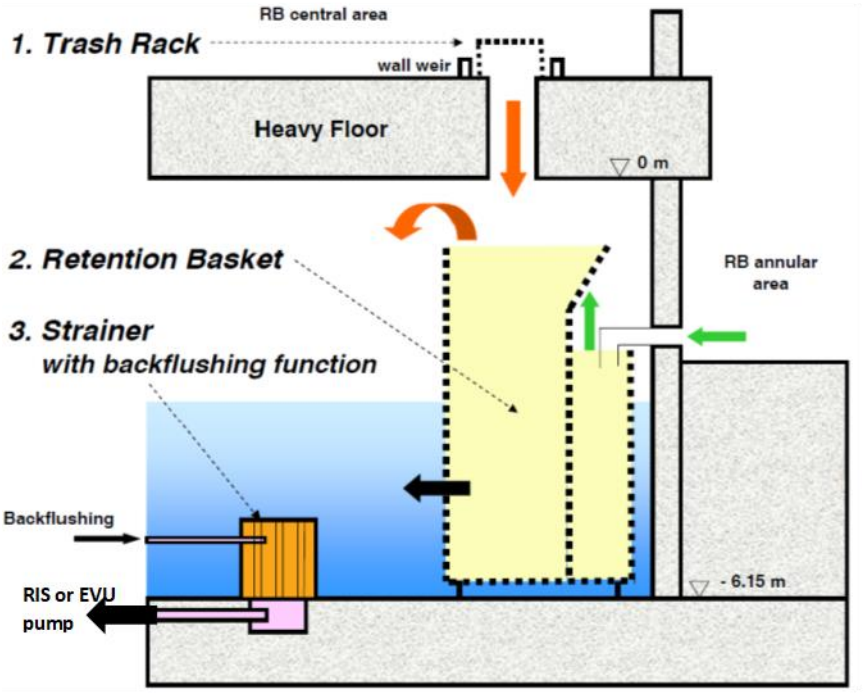
2. This project assessment report (PAR) summarises ONR's assessment of NNB GenCo's proposal to modify the HPC design; records ONR's judgement of the impact of the modification upon nuclear safety; and responds to NNB GenCo's amended request. It has been produced in accordance with ONR HOW2 guidance (Ref. 3).

2 BACKGROUND

2.1 In-Containment Refuelling Water Storage Tank (IRWST)

3. The In-containment Re-fuelling Water Storage Tank (IRWST) is situated at the bottom of the reactor building, between the vessel pit and the wall enclosing the lower-level internal structures. The IRWST is a reservoir containing a large quantity of borated water. It serves to collect water which is discharged into the reactor containment in the event of an accident. The IRWST pool also acts as a water reservoir for the Safety Injection System (RIS), the Containment Heat Removal System (EVU), the Fuel Pool Cooling (and Purification) System, and the Chemical and Volume Control System. The IRWST also ensures that the area of the containment floor provided for corium spreading and cooling is flooded in the event of a severe accident.

4. Filtering grills and filters are installed to prevent debris flowing from the containment to the IRWST during postulated accident conditions and to protect EVU and RIS pumps respectively. See the figure below.



5. The RIS system is the main line of defence for core cooling following a Loss of Coolant Accident (LOCA). Therefore, debris produced as a result of the LOCA that could be transported to the IRWST must not risk either clogging filters or compromising the RIS system and core.

6. In a severe accident the EVU system is required to cool the containment using water from the IRWST. Over time, degradation of paint and concrete in the containment and corium aerosols can create a significant debris source which will be washed down to the IRWST by sprayed water. There may also be debris produced by the initiating fault.

7. To ensure that entrained debris cannot prevent the RIS and EVU systems from performing their safety duties, it is necessary to show that: (a) the core, RIS, and EVU systems are tolerant to potential debris that can enter the sumps in the IRWST i.e., the Debris Source Term (DST), and (b) the sump strainers/filters will not become clogged by debris to the extent that it would prevent achievement of the safety function.

2.2 Reason for modification

8. The GDA Step 4 *Containment and Severe Accident Assessment* of the UKEPR design (Ref. 4), identified potential sump blockage as a concern, as captured in an assessment finding (AF):

> ***AF-UKEPR-CSA-07*** *The licensee shall demonstrate that the design of insulation and the strainer structures associated with the safety injection system is such that the risk of sump blockage has been reduced to the lowest level reasonably practicable. In particular, the licensee should produce an analysis of the options and justify the choice of insulating technology.*

9. In addition, the mechanical engineering GDA Step 4 assessment (Ref. 5) raised a related AF that required the future licensee to complete testing of the IRWST strainers to qualify their performance:

> ***AF-UKEPR-ME-032*** *The licensee shall ensure that the IRWST filtration system tests are satisfactorily completed to qualify the performance of the UKEPR design.*

10. NNB GenCo has developed the HPC design from the GDA design that contained significant fibrous insulation, to one where almost all potential sources of fibrous debris in the containment have been replaced by alternatives. NNB GenCo's current safety justification proposes the replacement of fibrous insulation within areas of containment that include a pipe whose breach may lead to activation of the safety injection system. This is described as a 'fibre-free accident' (FFA) approach that aims to minimise the potential fibrous debris source term, thereby eliminating the hazard so far as is reasonably practicable (SFAIRP).

11. The proposed modifications that formed the original LC20 request (Ref. 1) performed the following changes:

- replacement fibrous insulation by RMI
- change of strainer design on RIS and EVU systems
- removal of the backflushing function for the new filters
- removal of Debris Retention Baskets

12. The amended request (Ref. 23) asked ONR to consider only the proposal to replace fibrous insulation in the reactor building by RMI. The changes to the strainer design, filter backflushing and the removal of the debris retention baskets are now expected to be subject to a future Category 2 LSS.

13. Specifically, NNB GenCo's revised request (Ref. 23) states:

> "*NNB request that the scope of [the original request] is revised to seek agreement of or acknowledge those modifications that are identified on pages 9*

to 11 of the LSS which remove fibre and add RMI (CANP0350UK Rev A; CMA5011UK Rev A; GBR001-TCN-0961 Rev A; GBR-TCN-0889 Rev A; CMA5015 Rev A; T1EIB-UK-10614; T1EIB-UK-10892 Rev A, GBR001-TCN-0962 Rev B). The justification for these modifications is not impacted by the exclusion of the related sump strainers/filters modifications, because the only impacts on the strainers are the removal of large quantities of fibre, debris from which is a recognised potential hazard to the operation of the strainers; and the addition of steel insulation which is assessed to have negligible potential for impact on the strainers".

14. The original set of modifications are described and supported by a Category 1 LSS (Ref. 2), with the overall safety justification documented in a stand-alone safety case report (SCR) (Ref. 6). The SCR provides further information on some of the open points identified in the LSS and is intended to support planned future LSSs related to the remaining aspects, including cable tray wrapping, filtration design, and insulation solutions for some challenging areas, such as the reactor pressure vessel head. The SCR is not a reference to the LSS, and does not support a permissioning decision, but will ultimately support production of the pre-commissioning safety report. Any shortfalls identified in the SCR are decoupled from this permissioning assessment and can be followed up by ONR as part of routine regulatory engagements within the relevant topic streams.

15. Despite the changed scope of the proposed design changes, NNB GenCo has requested (Ref. 23) that ONR considers the parts of the original Category 1 LSS relevant to the replacement of fibrous insulation with RMI, and ignores the parts relating to the strainers, baskets, and filter backflushing.

3 ASSESSMENT CARRIED OUT BY ONR IN CONSIDERATION OF THE AMENDED REQUEST

3.1 Scope

16. The proposed modification will only affect certain aspects of the safety case and therefore ONR's assessment has been limited to those technical areas concerned. The topic area assessments are reported in assessment reports and through technical specialist advice, as discussed below. These reports consider the impact of the changes on the safety case and whether the resulting changes to the design represent relevant good practice (RGP) and/or the contribution to overall plant risk from the components, systems or structures affected is as low as reasonably practicable (ALARP) and thus consistent with the UK context.

17. The LSS notes that a fibre-free solution for Cable Tray Wrapping (CTW) is not addressed in the proposed modifications. Similarly, the LSS notes open points for thermal insulation (pressuriser bottom, primary pumps, and instrumentation lines) where the best solution is not yet determined.

3.2 Assessment topic areas

18. ONR fault studies, mechanical engineering, fuel and core, internal hazards, and essential electrical inspectors have carried out assessments of the safety justification for the modifications.

19. In the fault studies assessment report (Ref. 7), the inspector draws on and summarises the assessments provided in the fuel and core and chemistry assessment reports (Refs. 8 and 9). The chemistry assessment focused on the risk of chemical effects that could lead to an increased risk of sump filter blockage (e.g., formation of gels, etc.). The supporting fuel and core assessment principally considered the expectations of ONR SAP ERC.3, which states that a reduction in coolant flow caused by unplanned addition of a substance to the core, should be prevented. Although fully taken into account in the

conclusions of the fault studies and severe accident inspector, for completeness the salient points from these two contributory reports are also summarised below.

20. The majority of the contributory assessment reports (AR) to this PAR were produced in response to the full set of proposed modifications set out in the licensee's LSS. In light of the changed scope of the modifications subject to the licensee's request (Ref. 23), views were sought from the authors of all the extant ARs on the applicability of their original conclusions. The essential electrical, chemistry and internal hazards inspectors all confirmed that their AR conclusions were still applicable to the reduced scope of modifications (Ref. 24). The mechanical engineering, and the fault studies and severe accident analysis inspectors provided ARs which took account of the changed scope of the licensee's request.

3.2.1 Fault studies and severe accident analysis assessment

21. In Ref 7, the ONR fault studies and severe accident analysis inspector focused on key fault studies aspects of the LSS, including the:

- hazard identification process
- selection of initiating events
- analysis methodology
- potential impact of residual fibre on fuel cooling in accident conditions; and
- residual risk, remaining open points and ALARP argument.

22. In addition, the inspector considered the potential impact of increased particulate debris as a result of the modification, on the operation of the RIS and EVU.

23. The inspector's assessment was supported by assessments undertaken by ONR fuel and core and chemistry inspectors. The inspector also reflected on the assessments undertaken by NNB GenCo's independent technical assurance (ITA) function of the LSS and SCR.

24. The inspector concluded, from both a fault studies and a severe accident analysis perspective, that:

- the proposed design modifications will significantly reduce the potential risk of IRWST sump strainer blockage and subsequent loss of the RIS and EVU systems, which could otherwise lead to a severe accident. The approach is considered to represent good practice.
- NNB GenCo has adopted a suitably conservative methodology to determine the quantity of fibrous debris (particularly latent debris) that may reach, and potentially bypass the IRWST sump strainers.
- although further work has been identified by NNB GenCo to address the remaining open points, resolution of these points is not expected to challenge the adopted strategy or rationale for the design modifications.

25. Based on this assessment, the inspector further concluded that ONR should agree to NNB GenCo's updated request to implement the modification described in the LSS and specified in its request letter (Ref. 23).

3.2.2 Fuel and core assessment

26. As referenced by the fault studies inspector, the ONR fuel and core assessment (Ref. 8) focuses on the potential loss of core cooling due to reactor building sump and core blockage by debris following a Loss of Cooling Accident (LOCA). The inspector notes that in the event of a LOCA, inadequate conception or implementation of the proposed design modification could lead to the risk of starving the core of cooling water due to clogging of strainers, damage to the RIS pumps or clogging of the core inlets. This could lead to fuel damage and potentially a severe accident.

27. Although the modifications described in the LSS significantly reduce the mass of fibre in the Debris Source Term (DST) they are also expected to increase the quantity of particulate debris that bypasses the strainers. This is because without the presence of the fibre to form a 'filter cake' on the surface of the strainers, a larger proportion of particulate debris is expected to be transmitted. NNB GenCo has argued that this increased particulate debris does not negatively impact core cooling, and the RIS and EVU systems will be suitably qualified for the revised DST. The ONR fuel and core inspector reviewed the validity of these claims and concludes that the potential impact of increased particulate debris on the fuel performance in the event of a LOCA (or other high energy pipe break) is benign. The fuel and core inspector also considered the effects of 'latent debris' (essentially dust plus, for example, human hairs and fibre from clothing that gathers on surfaces in the reactor building), the only significant remaining source of fibre in the DST.

28. Any fibre circulating in the primary circuit has the potential to deposit onto the fuel assembly components (e.g., spacer grids, cladding, bottom strainer) in such a way that the heat transfer capabilities could be significantly affected. The magnitude of this effect depends on the amount of fibre that deposits onto the fuel assemblies. It is therefore important to limit the amount of fibre entering the core to ensure that adequate flow to the core is maintained. NNB GenCo's justification of the applicability of the limit of 15g per fuel assembly to the HPC fuel design was a key consideration in ONR's fuel and core assessment.

29. The fuel and core inspector concluded that:

- the limits of fibrous debris (resulting from latent debris) proposed by NNB GenCo are adequate and applicable to the HPC fuel design; and
- the potential impact of increased particulate debris (as a result of the design change) on the fuel performance in the event of a LOCA (or other high energy pipe rupture) is benign, and the criteria for cladding integrity are satisfied where applicable.

3.2.3 Chemistry assessment

30. ONR's chemistry assessment (Ref. 9) focused on the risk of chemical effects that could lead to an increased risk of sump filter blockage (e.g., formation of gels, etc.). The inspector reviewed the licensee's key arguments (Ref.10) covering:

- relevance and applicability of operating experience (OPEX)
- results from pressurised water reactor (PWR) and EPR-specific test rigs; and
- NNB GenCo external consultant's expert assessment of the HPC design and supporting evidence on sump filter clogging.

31. The inspector's report concluded that there were shortfalls that would need to be addressed as part of ongoing engagement on this topic and within the then pending SCR. Subsequently, the inspector reviewed the approved SCR to check that the shortfalls had been addressed. The inspector noted (Ref. 11) that due to the FFA design, uncertainty over the risk of chemical effects had been significantly reduced. The inspector went on to conclude that the licensee had presented an adequate demonstration that the risk from chemical effects had been reduced to ALARP.

3.2.4 Essential electrical assessment

32. The ONR essential electrical inspector (Ref. 12) focused on the effects of a change in the material used for Cable Tray Wrapping (CTW) in the reactor building. Cable tray wrapping is provided to mitigate the consequences of fire.

33. The essential electrical inspector's assessment noted that:

- CTW is noted as an open point in Section 1 of the LSS and is excluded from the LSS as the stated ALARP position is to minimise fibre wherever possible. CTW sits within electrical scope and will continue to be an area of focus for ONR's electrical topic stream.
- the SCR (Ref. 6) sets out a forward action plan for testing of CTW debris, with an acknowledgement that fibrous material may not be completely removed from the reactor building. The action plan provides further information on the status and deadline for closure of this action.
- the action plan notes that there is good confidence that a fibre free cable tray wrapping solution can be procured for HPC.

34. The essential electrical inspector concluded that the approach to CTW is reasonable and that NNB GenCo has acknowledged that if a full fibre free approach cannot be achieved, then further mitigations will be required, and these are noted within the forward action plan (Ref. 13). The inspector was content to consider CTW via normal regulatory interactions moving forward and judged that the approach does not jeopardise nuclear safety.

3.2.5 Internal hazards assessment

35. The ONR internal hazards report (Ref. 14) notes that although NNB GenCo's LSS proposal is to remove the bulk of the fibrous wrapping from the reactor building, due to constraints on specific plant areas for which modifications are not yet ready, such as the reactor pressure vessel head and some primary pump insulation, complete removal of fibre is not yet possible.

36. The internal hazards inspector also notes that a change to the CTW material (see previous section) is excluded from the LSS change as it is another area where work is not yet complete and which Ref. 2 notes will be the subject of a future LSS.

37. The inspector's report states that from an internal hazards perspective, the only potential hazard identified is the presence of fibre or debris and the related residual risk of blockage of the sump strainers and subsequent flooding of the reactor building with knock-on effects on any structures, systems and components (SSCs).

38. The inspector therefore reviewed the LSS and SCR (and other parts of the existing HPC safety case) and focused on those claims which directly relate to the potential for a flood to be caused within the reactor building. This centred on the claim in the LSS that with RMI replacing the bulk of the fibrous insulation, the sump strainers will not become clogged by debris to the extent that it would prevent achievement of their safety functions.

39. Having considered the LSS arguments the internal hazards inspector concluded that they satisfactorily underpin the claim. The inspector concluded that with regard to the proposed modifications, NNB GenCo had adequately considered the potential internal hazards associated with the blockage of the sump strainers.

3.2.6 Mechanical engineering assessment

40. The ONR mechanical engineering assessment (Ref. 15) focused on the following aspects:

- the effectiveness of the sump strainers
- the mechanical equipment qualification
- containment cooling ventilation system heat loading
- pipework flexibility
- handling of RMI material during outages; and
- RMI surface temperatures.

41. The inspector concluded that:

- the design modifications proposed by the licensee to replace most of the fibrous insulation in the reactor building containment with RMI will significantly reduce the risk of sump strainer blockage. This approach was considered to represent relevant good practice.
- the LSS considers the wider implications of deploying RMI and a fibre-free accident strategy, for example the qualification of equipment downstream of the sump strainers, additional heat loading on the containment cooling ventilation system (EVR) and increased loads on the pipework.
- the design of the strainers is currently undergoing further development and will be the subject of a future modification and supporting LSS. However, the design and substantiation of the strainers can be decoupled from the other modifications in the current LSS, namely the removal of most of the fibrous insulation from containment. The removal of fibrous insulation helps to minimise the potential hazard, such that the risk of sump filter blockage is greatly reduced and is considered to be in the interest of nuclear safety regardless of the final solution regarding sump strainers.
- the current fibre-free accident strategy significantly reduces the claims on the strainers and reduces the challenges associated with providing an adequate strainer design. The likelihood of not being able to develop and substantiate an acceptable strainer design that fulfils the safety case claims is considered to be low. Furthermore, the provision has been made for additional anchor points in the IRWST floor, meaning that the likelihood of the civils work foreclosing future design changes to the strainers is low.
- NNB GenCo recognises that the current fibre-free accident strategy would need to be re-assessed should it prove not reasonably practicable to implement non-fibrous solutions for some of the remaining open points. The completion of this work is not expected to challenge the rationale for removal of the fibrous insulation covered by the current LSS.

42. Overall, the inspector was satisfied that, from a mechanical engineering perspective, the modifications proposed have been justified using an appropriate methodology; the claims, arguments and evidence laid down within the LSS are acceptable; and subject to successful implementation, the contribution to overall plant risk of the proposed modification is ALARP. It was recommended that ONR agrees to the design changes set out in the LSS and specified in NNB GenCo's letter (Ref. 23).

3.2.7 Open points and future intelligent customer activities

43. Section 9 of the LSS presents the forward action plan (Ref. 13) and LSS Appendices 1 and 2 provide information on remaining fibre within the containment fibre-free zones (FFZ). For these FFZs, either the detailed design of fibre replacement solutions was ongoing at the time of LSS production, or the fibre has been discounted due to low risk of release. NNB GenCo's future activities cover a wide range of topics including HVAC duct insulation, equipment qualification, arrangements for preventing future installation of fibre in an FFZ, review of the risk from latent fibre, and will provide an updated debris source term.

44. In the LSS it is assumed that follow-on design changes to eliminate fibre from CTW and the other excluded parts of the plant will be presented in a future LSS consistent with the existing strategy and safety case. The LSS notes that resolution of the CTW and RMI open points can be decoupled from this LSS because the ALARP position is to minimise fibre wherever possible, regardless of the final outcome of the open points decisions.

3.2.8 Progress with Assessment Findings

AF-UKEPR-CSA-07

45. As noted in section 2.2 of this report, the fibre removal programme was initiated in response to GDA assessment finding AF-UKEPR-CSA-07. As described in the fault studies and severe accident analysis AR, this AF has been the subject of a significant number of regulatory engagements since GDA, as part of a dedicated, multi-disciplinary workstream. Since GDA, NNB GenCo has developed its strategy, from relying on a build-up of a fibrous 'filter cake' and periodic back-flushing of the IRWST strainers, through replacement of thermal fibre insulation on the primary circuit, to the current fibre-free accident approach. Details of any proposed changes to the strainers are outside the scope of this modification request but are likely to be included in a future evidence pack for the closure of CSA-07.

AF-UKEPR-ME-32

46. As noted in the report from the mechanical engineering inspector (Ref. 15), NNB GenCo is progressing with a programme of work to further develop the design of the sump strainers which includes a programme of testing with a representative debris source term. Details of any design changes to the sump strainers are likely to feature in a future evidence pack for the closure of ME-32.

3.2.9 Conclusion on ONR assessments

47. Having reviewed each of the ONR assessment reports, and the bases for their conclusions, I am satisfied that these assessments support ONR giving its agreement to GenCo's request to implement the amended scope modification to the HPC EPR described in the LSS.

4 NNB GENCO INTERNAL ASSURANCE AND GOVERNANCE

48. NNB GenCo's control of modifications to the design of HPC uses the arrangements for compliance with LC20 described in the suite of procedures and associated guidance listed in the licensee's Nuclear Site Licence Compliance Matrix (Ref. 16). The arrangements involve activities within both the Responsible Designer (RD) and NNB GenCo. The proposed modification is categorised in accordance with NNB GenCo and RD procedures (Refs. 17 and 18). NNB GenCo's LC20 arrangements require it to review modification proposals raised by the RD and to confirm the nuclear safety categorisation. Modifications of nuclear safety Categories 1 or 2 are issued to NNB GenCo for acceptance. NNB GenCo's Independent Technical Assessment (ITA) function assesses all Category 1 modifications.

49. The licensee's Safety Design Change Committee (SDCC) assesses the adequacy of the technical information in the LSS and agrees to the categorisation. If approved by the SDCC (Ref. 19), a Category 1 LSS is presented to the HPC Nuclear Safety Committee (NSC) for 'Consideration and Advice' before being submitted to ONR for regulatory review. In accordance with its LC20 arrangements NNB GenCo cannot implement a Category 1 modification to the installation's design without ONR's acknowledgement or agreement.

4.1 Safety Design Change Committee

50. The LSS for the proposed modification was submitted to the November 2019 SDCC (Ref. 20) where following discussion the committee recommended the LSS for endorsement by the Nuclear Safety Committee, subject to the finalisation of the ITA report.

51. Having reviewed the minutes of the SDCC meeting, I am satisfied that the proposed modification was subject to a thorough consideration by the committee, as required by the licensee's LC20 arrangements, and that the SDCC's final acceptance statement was justified by those considerations.

4.2 Nuclear Safety Committee

52. Following acceptance by the SDCC, the LSS was submitted to the September 2020 Nuclear Safety Committee (NSC) for consideration and advice (Ref. 21). Specifically, the NSC was asked to consider and advise on:

- the acceptability of the US Nuclear Regulatory Committee core fibre limit of 15g/fuel assembly, which is set as a generic PWR conservative limit, but did not explicitly include the EPR design; and
- the adequacy of the overall case, giving confidence that there is no requirement for new core testing or new filter developments.

53. Following discussion of each of these questions, the committee:

- gave clear support for the use of the generic PWR value of 15g debris/fuel assembly; and
- gave broad support for the overall safety case, noting the case reduced the hazard by reducing the volume of fibre, and noting the adequacy of the margins presented.

54. Having reviewed the minutes of this NSC meeting, and the previous meeting which had discussed the draft LSS (Ref. 25), I am satisfied that, in line with the licensee's LC20 arrangements, the original set of proposed modifications was subject to a suitably thorough consideration by the committee, and that the committee's overall support for the modifications (which encompassed the replacement of fibrous insulation by RMI) was justified by those considerations.

4.3 Independent Technical Assessment

55. The Independent Technical Assessment (ITA) report from NNB GenCo's nuclear assurance function (Ref. 22) provides a very thorough assessment of the LSS. The report concluded that:

- the LSS for fibre removal and replacement by RMI is supported for implementation by ITA without conditions; and
- ITA will continue to engage with future developments in this topic, noting that a number of future intelligent customer activities have been identified in this LSS; and future LSSs will be required to cover additional related modifications to implement the FFA strategy.

4.4 Conclusions on NNB GenCo internal assurance and governance

56. This is an unusual modification proposal, insofar as the significant parts of the LSS being used to justify the safety aspects of the proposed modification are redundant as these related to the original set of proposed modifications, where changes to the design of the filter baskets were included. On the basis that the reduced scope modification was fully covered by the extant LSS, even though parts of it were no longer relevant, NNB GenCo decided not to rewrite the LSS and subject it to review and clearance through the SDCC, ITA or NSC. I discussed this with the ONR mechanical engineering inspector who confirmed that this did not have any material effect, and that the fibre-free strategy covered by the LSS remained NNB GenCo's intent (Ref. 26).

57. Following this discussion and having reviewed all the documents supporting the reduced scope modification, I am satisfied that the current LSS is adequate for the modification as specified in the licensee's revised request (Ref. 23).

58. I am satisfied that the original, wider scope modification has been satisfactorily progressed through NNB GenCo's rigorous due process, including reviews by the SDCC and the NSC, and engagement and sign-off by the NNB GenCo internal assurance function (ITA).

5 CONCLUSIONS

59. This PAR presents the findings from ONR's considerations of the amended request by NNB GenCo to implement a Category 1 modification to the design of HPC. Section 3 above sets out the findings of ONR's assessment of those technical topics relevant to the proposed modification. Section 4 examines the adequacy of NNB GenCo's application of its governance and assurance processes in its consideration and approval of the proposed modification.

60. Having considered the matters discussed above, I am satisfied that:

- NNB GenCo has completed its due process for the proposal; and
- the ONR technical assessments support ONR providing an Agreement to the proposed design change using our powers under LC20(1).

61. In accordance with ONR's guidance, I have prepared the Hinkley Point C Licence Instrument LI 521 which provides ONR's agreement to NNB GenCo implementing the modification.

6 RECOMMENDATIONS

62. I recommend that the Superintending Inspector:

- accepts this PAR to confirm support for the ONR technical and regulatory arguments that justify issuing Hinkley Point C Licence Instrument LI 521
- approves this PAR for publication, after redaction where appropriate; and
- signs Hinkley Point C Licence Instrument LI 521.

7 REFERENCES

1. NNB GenCo, "*Request for Agreement under Licence Condition 20 of Schedule 2 of Nuclear Site Licence No. 97A*", ONR-HPC-21486Y, Aug. 2020, CM9 2020/255775.
2. NNB GenCo, "*Licence Summary Statement - RMI Replacements and Fibre Removal from HRA: RC2 Position*", HPC-NNBOSL-AU-000-LSS-100004, Revision 02, January 2020, CM9 2020/65734.
3. ONR HOW2 Guide - *Purpose and Scope of Permissioning* - NS-PER-GD-014 Rev 4, July 2014, http://www.onr.org.uk/operational/assessment/index.htm.
4. ONR, "*Step 4 Fault Studies: Containment and Severe Accident Assessment of the EDF and* AREVA *UK EPR™ Reactor*", ONR-GDA-AR-11-020b, Revision 1, January 2014, CM9 2014/10289.
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