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Consolidated Hazards Safety Case for Hunterston B

**Application for Agreement under LC 22(1) arrangements to implement the modification
described in NP/SC 7647, Consolidated Hazards Safety Case for Hunterston B**

Project Assessment Report ONR-HNB-PAR-15-007
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EXECUTIVE SUMMARY

Application for Agreement under LC 22(1) arrangements to implement the modification described in NP/SC 7647, Consolidated Hazards Safety Case for Hunterston B

Permission requested

EDF Energy Nuclear Generation Limited (NGL), the licensee of Hunterston B (HNB) power station, has applied for Agreement or Acknowledgment from the Office for Nuclear Regulation (ONR) to implement safety case NP/SC 7467, Revision 000, which presents the reactor-based safety case for all hazards considered to pose a credible threat to Hunterston B Power Station.

Background

The need for a consolidated hazards safety case arose from a finding from ONR assessment of the second periodic safety review (PSR2). The safety case submission, for which a licence instrument was requested, presents the reactor-based safety case for all hazards which are considered to pose a credible threat to Hunterston B (HNB); this submission demonstrates how the licensee has addressed this finding.

The safety submission is a top-level summary report, which draws on some key references that provide detailed reviews against each of the hazards.

The licensee invested significant effort in the production of the safety case and its key supporting references, and involved a wide range of suitably qualified and experienced persons (SQEPs) at Station and in the licensee's Central Technical Organisation (CTO).

The safety submission is constructed around a claims-argument-evidence structure. The scope of the consolidated hazards safety case includes consideration of the interactions between many different individual safety cases. It provides a holistic perspective across the hazards, and demonstrates that the individual hazards safety cases are comprehensive and consistent with one another and also with the plant-based faults safety cases. The interfaces between this reactor-based hazards safety case and the hazard safety cases for fuel route and radioactive waste are also considered. This safety submission takes an overview of the issues raised by the supporting head document and the additional commitments raised, and it reviews the overall ALARP position for hazards.

As part of the implementation of the safety case, the licensee has identified additional actions including revisions to the living safety case documents, hazard awareness training, and additional commitments to progress some plant enhancements and improvements to operations and maintenance.

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

ONR has closely monitored the progress of the consolidated hazards safety case project over the duration of the project.

ONR is satisfied that the consolidated hazards safety case submission has duly completed the licensee's due process. ONR is further satisfied that the licensee's internal independent nuclear assurance function has undertaken a satisfactory independent nuclear safety assessment of the submission and issued approval. ONR notes that the independent nuclear assurance function supports implementation of the safety case.

The licensee's staged submission safety case has been assessed by ONR specialist inspectors in the areas of external and internal hazards.

Matters arising from ONR's work

The work undertaken by ONR inspectors associated with this request has not identified any regulatory issues or concerns that would prevent ONR issuing Agreement for the licensee to

implement the consolidated hazards safety case, and both inspectors recommended issuing an appropriate licence instrument.

Both specialist assessors have identified some items to be incorporated into existing work programmes of regulatory interactions with the licensee, but do not prevent implementation of the safety case.

Conclusion

Following assessment of the safety case associated with this request, ONR is satisfied that the licensee has presented an adequate consolidated hazards safety case submission for implementation.

Recommendation

It was recommended that the Civil Nuclear Reactor Programme operating reactor sub-programme Superintending Inspector should:

- Sign this Project Assessment Report (PAR) to confirm acceptance of the regulatory arguments in favour of issuing Licence Instrument 547.
- Sign this PAR approving its release for publication, after redaction where appropriate.
- Sign Licence Instrument 547, an agreement under LC 22(1) arrangements to implement this modification.

LIST OF ABBREVIATIONS

ALARP	As low as reasonably practicable
BSL	Basic Safety level (in SAPs)
BSO	Basic Safety Objective (in SAPs)
CAE	Claims-Argument-Evidence
CHSC	Consolidated hazards safety case
CNS	Civil Nuclear Security (ONR)
CTO	Central technical organisation (of EDF NGL)
EDF	Electricity de France
EMI/RFI	Electromagnetic interference/Radio frequency interference
HNB	Hunterston B power station
HOW2	(Office for Nuclear Regulation) Business Management System
HSE	The Health and Safety Executive
IAEA	The International Atomic Energy Agency
INA	Independent nuclear assurance (a function within NGL)
INSA	Independent nuclear safety assurance
LC 22	Licence Condition 22
NGL	EDF Energy Nuclear Generation Limited
NSC	Nuclear Safety Committee
ONR	Office for Nuclear Regulation
PAR	Project assessment report
PSA	Probabilistic Safety Assessment
PSR	Preliminary Safety Report
RGP	Relevant Good Practice
SAP	Safety Assessment Principle(s)
SEPA	Scottish Environment Protection Agency
SFAIRP	So far as is reasonably practicable
SQEP	Suitably qualified and experienced persons
SSC	Structure, System and Component
TAG	Technical Assessment Guide (ONR)

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1 PERMISSION REQUESTED

1. EDF Energy Nuclear Generation Limited (NGL), the licensee of Hunterston B (HNB) power station, has applied for Agreement or Acknowledgment from the Office for Nuclear Regulation (ONR) to NP/SC 7467, Revision 000, which presents the reactor-based safety case for all hazards considered to pose a credible threat to Hunterston B Power Station.

2 DETAILS OF REQUEST

2.1 BACKGROUND

2. EDF Energy Nuclear Generation Limited (EDF NGL) has submitted a safety submission relating to Hunterston B (HNB) to its Nuclear Safety Committee (NSC), describing a revised and “consolidated” hazards safety case (CHSC) for HNB (Ref.1). This has been prepared as a Category 1 safety submission. The CHSC is a revision and a refresh of the station safety cases for both internal and external hazards.
3. As required under its arrangements to comply with LC22(1), EDF NGL has requested that ONR agrees to the implementation of this safety case (Ref.2). ONR responded with a letter in which it advises that NP/SC 7647 is to be subject of assessment (Ref.3).

2.2 LICENSEE’S SAFETY CASE

4. The safety submission is a top-level summary report, which draws on some key references (Ref.4 and Ref.5) that provide detailed reviews against each of the hazards.
5. The safety submission is constructed around a claims-argument-evidence structure. The scope of the consolidated hazards safety case includes consideration of the interactions between many different individual safety cases. The safety submission provides a holistic perspective across the hazards, and demonstrates that the individual hazards safety cases are comprehensive and consistent with one another and also with the plant-based faults safety cases. The interfaces between this reactor-based hazards safety case and the hazard safety cases for fuel route and radioactive waste are also considered. This safety submission takes an overview of the issues raised by the supporting head document and the additional commitments raised, and it reviews the overall ALARP position for hazards.
6. As part of the implementation of the safety case additional actions will take place including revisions to the living safety case documents, hazard awareness training, and additional commitments to progress some plant enhancements and improvements to operations or maintenance.

2.3 LICENSEE’S INDEPENDENT NUCLEAR ASSURANCE CHALLENGE

7. Within the licensee’s arrangements, the independent nuclear assurance (INA) organisation provides an independent challenge to safety cases. The consolidated hazards safety case was subject to independent nuclear safety assurance (INSA) approval as part of the licensee’s due process for implementing the modification.
8. INA issued the INSA approval statement (Ref.6) for NP/SC 7647. The INSA Engineer had no caveats on his approval. In the approval statement, he described the scope of his assessment and the basis for INSA acceptance.
9. The main focus of the INSA was been on the arguments and evidence supporting the claims listed in NP/SC 7647. INSA followed a ‘risk-informed approach’:

- An in-depth INSA was carried out on 'new cases' - lightning, drought and biological fouling.
 - EMI/RFI (electromagnetic interference/radio frequency interference) as a hazard is being addressed at a fleet basis, and the station specific case for Hunterston B is not yet complete, so INSA reviewed the 'interim position' for this hazard in the supporting reference, which includes the current management arrangements to manage EMI/RFUI sources on site.
 - INSA followed a 'lighter assessment' for hazard cases which were subject to significant update, concentrating on the changes proposed to the previous case, these being fire, seismic, internal flooding and corrosive release.
 - The remainder of the hazards (i.e. those with minor update only) were assessed on a 'sample basis', because INSA could place reliance on verification for these.
10. The INSA engineer noted a number of areas of agreement with the safety case approach of NP/SC 7647, and identified some areas where commitments have been made, or where further work will be carried out. In some cases, this will lead to further INSA reviews as cases are developed further, but in all cases INSA viewed the current position as acceptable.

2.4 LICENSEE'S NUCLEAR SAFETY COMMITTEE

11. The consolidated hazards safety case, NP/SC 7647 was discussed at a Nuclear Safety Committee (NSC) meeting held at Hartlepool Power Station on 08/09 October 2014 (Ref.7). At that stage the INSA was not completed, but the version of the safety case submission was identical to that for which was reviewed. The safety case was presented by the Station Director and the Case Officer.
12. The comments and discussion were generally positive about the case. NSC members asked questions about a variety of topics including:
- The potential to extend the safety case to include other operational and refuelling modes.
 - Whether 'pandemic' as a hazard should be included?
The Case Officer replied that the Company had a few years earlier looked at the challenges across the fleet that would be brought on by a pandemic situation.
[Note: This licensee review was at the time of UK national concern about a potential influenza pandemic. The licensee looked at contingency measures at a corporate level, and each site looked at the robustness of their own management arrangements and contingencies. Within ONR, pandemic was considered to be an issue for Site Inspection, Emergency Preparedness and the Leadership Management for Safety technical disciplines – not as a hazard to plant.]
 - The programme to close out commitments, and how these will be tracked to completion.
 - Human factors within the case, and the relationship with operator training.
 - Options for enhancing isolation provisions or seismic qualification for some pipework systems.
 - The options for enhancing the existing equipment qualification schemes and making them more manageable.
 - Combinations of hazards and consequential hazards, and in particular seismically induced fires.
 - The importance of staff training and maintenance of hazard awareness into the future.
13. The NSC had been requested to consider and advise on the safety case, safety case principles and the implementation arrangements set out in NP/SC 7647. The record of

the NSC discussions confirms that NP/SC 7647 was duly considered by the nuclear safety committee in accordance with the licensee's arrangements. Members gave advice, as described above, and no objection was raised to the implementation of the modification.

3 ASSESSMENT AND INSPECTION WORK CARRIED OUT BY ONR IN CONSIDERATION OF THIS REQUEST

14. I have considered NGL's request to ONR for agreement to implement the Consolidated Hazards Safety Case for HNB in the role of an ONR project inspector assigned to the project. I have followed ONR procedures for delivering a permissioning project, as detailed in HOW2, ONR's business management system.
15. I have taken note of the work undertaken by NGL's internal regulator, INA, who has been involved throughout the project. His INSA certificate confirmed that INA have been engaged with the project throughout its development and have carried out a number of reviews, and that detailed modification proposals for changes to living safety case documents or to station technical specifications will also be reviewed by INA as part of the safety management process before these are implemented (see section 2.3 for more details). He also noted some commitments from the safety case and that INA expected to review these on completion. I judge that NP/SC 7647 has adequately completed this aspect of its due company process.
16. I have also taken account of the discussions of the nuclear safety committee (see section 2.4 for more details). I have looked at the comments and queries from NSC members and judge that none should prevent implementation of the modification.
17. ONR has also carried out detailed assessment in the two specialist disciplines of internal hazards and external hazards.

3.1 INTERNAL HAZARDS (IH)

18. As a specialist assessor for internal hazards within ONR, I undertook an assessment of the consolidated hazards safety case for HNB. Over the period of the project I have also attended level 4 (working level) meetings with the licensee to monitor progress.
19. The scope of my assessment included an examination of the submission (NP/SC 7647) in its entirety, and also those parts of the supporting references that cover either internal hazards, or issues of general interest to both internal and external hazards. In addition, two internal hazards were examined in more detail; fire, and internal flooding. I have justified this scope in the assessment report.
20. I have written an assessment report (Ref.8) which presents the results of my assessment. I confirmed my views on several aspects of the safety case:
 - I consider that the following are the major advantages to the company in having carried out the hazard safety case reviews and updates within the CHSC project
 - there is now an improved understanding and visibility of the safety cases,
 - the new safety case will be rolled out, along with hazard awareness training,
 - the improved understanding will be used in PSR3 and other future review processes.
 - I view NP/SC 7647 as providing an adequate summary of a considerable amount of review work, and an adequate summary of the importance of the safety case updates, the process by which they will be implemented, and the issues arising from the reviews
 - I am content with the approach followed following the identification of issues/findings.

- I am also convinced that the CAE (Claims-Argument-Evidence) presentation of the case within the NP/SC 7647 generally provides additional “added value”:
 - The list of commitments in NP/SC 7647 represents the most significant findings from the review process of the HNB consolidated hazards safety case project.
 - I am content overall with the progress that the licensee has made against the commitments relating to internal hazards.
 - I view the treatment of combined and consequential hazards to be a useful review relative to HNB internal hazards.
 - I consider that the approach adopted towards disproportionate consequences or cliff-edges is adequate for the purpose of this revision to the extant hazard safety cases.
 - Overall I welcome the approach taken within NP/SC 7647 to equipment qualification although there are some fine details to be determined before HNB can adopt and implement an improvement programme for equipment qualification.
 - I am content with the way that hazard awareness has been covered within NP/SC 7647, and that the enhanced hazard awareness on site and increased visibility of the hazards safety cases should be beneficial for the residual life of the station.
 - Issues affecting more than one hazard have been adequately addressed in NP/SC 7647 and supporting references.
 - With respect to the fire aspects of the consolidated hazards safety case project, the revised safety case is sufficiently clear to be implemented and used for future reviews and as the basis of awareness training. This will then be subject to continuous improvement during the residual station life. I have reached the judgement that this is an acceptable outcome from the CHSC project, although issues from the reviews are still being addressed.
 - With respect to internal flooding, NP/SC 7647 and supporting references has given me additional confidence in the internal flooding safety case for the gas circulator halls and in the overall review of internal flooding hazards across the station.
21. An issue to be aware of is a problem of “currency” or “synchronism”. The review and improvement processes have not stopped at the date of preparing NP/SC 7647, and the additional work has continued on these safety cases. ONR is not actually agreeing to the implementation of safety cases in the exact form of the individual hazard appendices of the key references to NP/SC 7647, but rather the licensee will use these as the basis of preparing appropriate living safety case documents and implementing these through the EDF NGL safety management process. I am content with this, the information given in NP/SC 7647 gives me adequate confidence in the safety cases they are preparing and the improved shared understanding of hazards will help the company avoid some error traps in their subsequent development.
22. I had some items to take forward arising from my assessment, which I incorporate into my overall work programme of specialist assessment with the licensee, but I did not view any of these as blockers to allowing EDF NGL to implement the NP/SC 7647.
23. I concluded that, in my view, the safety case is suitable for implementation and overall, I rated the quality of the safety case in NP/SC 7647 as of Good Standard.
24. My recommendation was:
- On the basis of my assessment of the internal hazards aspects of NP/SC 7467 and its supporting references, I recommend that ONR issue a Licence Instrument (agreement) under LC22(1) to enable the licensee to implement the safety case and initiate the related work programme.

3.2 EXTERNAL HAZARDS (EH)

25. An ONR external hazards specialist undertook an assessment of the consolidated hazards safety case for HNB and also attended level 4 meetings with the licensee.
26. His report (Ref.9) presented the results of his assessment of the Hunterston B Consolidated Hazards Safety Case, NP/SC 7647, which included those parts of the main supporting reference (the Hunterston B Consolidated Hazards Safety Case Head Document) that cover external hazards. The scope of the assessment did not include assessment of the individual external hazards safety cases; some of which have undergone substantial update or are novel in nature – the assessment was carried out partly to identify areas where ONR assessment of individual hazards safety cases would be warranted in the future.
27. His assessment report concluded that the NSC paper provides a good overview of a considerable amount of review work. The head document provided a concise summary of the individual external hazards safety cases and the specialist assessor was generally content with all the areas. He also rated the quality of the safety case in NP/SC 7647 as of Good Standard.
28. This report also identifies external hazards items to be taken forward for further discussion with the licensee as part of a regulatory work programme in external hazards. Some of these items to take forward are fleet-wide, others are site-specific. Some have already been identified as part of the recent review of the Japanese earthquake and tsunami at Fukushima.
29. An example of these items to take forward is the methods that the licensee uses for the treatment of combined hazards (combined hazards include reasonably foreseeable combinations of independently occurring hazards, causally-related hazards and consequential events resulting from a common initiating event). As an example, this may include further consideration of interactions between metrological hazards.
30. The EH specialist assessor's recommendation was:
 - On the basis of my assessment of the external hazards aspects of NP/SC 7467 and its supporting reference, I recommend that ONR issue a Licence Instrument (agreement) under LC22(1) to enable the licensee to implement the safety case and initiate the related work programme.

4 MATTERS ARISING FROM ONR'S WORK

31. For this assessment, the permissioning strategy was that appropriate assessments should be carried out by specialist assessors for both internal and external hazards. In carrying out their assessment, they referred to modern expectations for hazards safety cases as described in ONR's Safety Assessment Principles and Technical Assessment Guidance. The strategy recognised that the modification represents a significant review and revision to the hazards safety case, and that these two technical disciplines cover the scope of the project. The CHSC was a licensee commitment from ONR assessment of the HNB PSR2, detailed assessment was appropriate to show that the issues from PSR2 had been properly taken forward.
32. In both cases, the assessors have confirmed that they view the safety case as of Good Standard, and have no objections to its implementation, and recommend that ONR gives agreement under powers derived from the licensee's LC22 arrangements.
33. Both specialist assessors have identified items for taking forward with the licensee, but have confirmed that these are not blockers to allowing the implementation of the safety case described in NP/SC 7647. At the moment, none of these items are at the level of

maturity to become “issues” in the ONR Risks and Issues database. Issues being taken forward include some which will be addressed by other specialist assessors, such as the continuing improvements in EMI/RFI safety cases.

5 CONCLUSIONS

34. The licensee has written to ONR and requested agreement under LC 22(1) arrangements to implement the consolidated hazards safety case described in NP/SC 7647 and commence a programme of work that will embed these into the processes at the site. The proposal has been presented to the licensee’s NSC for information. It has passed through the licensee’s due process and been found to be acceptable.
35. INA has undertaken an INSA statement for NP/SC 7647 that supports implementation of the consolidated hazards safety case. Additionally, the safety case has been presented at the company’s nuclear safety committee, and their comments are generally positive with no concerns that should prevent ONR agreement to this modification proposal.
36. Assessments of the licensee’s submission by the relevant ONR specialists found nothing that would prevent the issue of Licence Instrument 547 giving agreement to the licensee to implement the new consolidated hazards safety case for HNB, and commence the concomitant work programme identified in NP/SC 7647.
37. ONR has consulted with SEPA (Scottish Environment Protection Agency) on this permissioning decision. The SPEA site inspector for HNB was asked whether SEPA has any immediate objection to implementation of this new case, and an offer of further discussion with ONR specialists was also made. SEPA responded “*With regard to the proposed Consolidated Hazards Safety Case for Hunterston B, SEPA has no objections to ONR issuing an agreement to implement the document*” (Ref.10)
38. I have prepared Licence Instrument 547 for review in conjunction with this PAR. The Licence Instrument is a standard format given within ONR permissioning instructions and does not require review by the Treasury Solicitor’s Office.
39. To conclude, following assessment of the safety case associated with this request, I am satisfied that the licensee has presented an adequate consolidated hazards safety case submission for implementation and consequently Agreement should be granted.

6 RECOMMENDATIONS

40. The project assessment report recommends that the Civil Nuclear Reactor Programme operating reactor sub-programme Superintending Inspector should:
 - Sign this PAR to confirm acceptance of the regulatory arguments in favour of issuing Licence Instrument 457.
 - Sign this PAR approving its release for publication, after redaction where appropriate.
 - Sign Licence Instrument 547, an agreement under LC 22(1) arrangements to implement this modification.

7 REFERENCES

- 1 *Hunterston B Power Station: Consolidated Hazards Safety Case for Hunterston B, NP/SC 7647, EC No: 334237, Revision 000, October 2014* [TRIM 2014/395037]
- 2 LC 22(1) Agreement request letter. [TRIM 2015/24020]

- 3 Letter, *EDF NGL - Hunterston B - Licence Condition 22 - Intent to Assess EC 334237 Consolidated Hazards Safety Case*, 05 February 2015, Unique number HNB 71245 [TRIM 2015/45000]
- 4 *Consolidated Hazards Safety Case Head Document – Volume 1*, DAO/REP/JICC/049/HNB/12, Revision 000, August 2014 [Viewed from EDF Energy's CDMS system]
- 5 *Consolidated Hazards Safety Case Head Document – Volume 2*, DAO/REP/JICC/049/HNB/12/01, Revision 000, August 2014 [Viewed from EDF Energy's CDMS system]
- 6 EDF Energy Nuclear Generation Ltd, Milestone Full INSA Approval Statement, NP/SC No: 7647, Version No.: 01: *Consolidated Hazards Safety Case for Hunterston B* [TRIM 2015/89118]
- 7 EDF Energy Nuclear Generation Ltd. Nuclear Safety Committee, *Minutes of the Meeting held at Hartlepool Power Station in 8th and 9th October 2014* [TRIM 2014/395005]
- 8 Assessment Report, ONR-HNB-AR-15-001, Revision 0, *Assessment of Internal Hazards aspects of the Hunterston B Consolidated Hazards Safety Case*, NP/SC 7647, June 2015 [TRIM 2015/129179]
- 9 Assessment Report, ONR-HNB-AR-15-020, Revision 0, *Assessment of External Hazards aspects of the Hunterston B Consolidated Hazards Safety Case*, NP/SC 7647, July 2015 [TRIM 2015/200509]
- 10 email, Hunterston B - consolidated hazards safety case - response from SEPA, 01 July 2017 [TRIM 2015/245391]