

Periodic Safety Review

**ONR Assessment of the Hinkley Point 'A' Site Periodic Safety Review 2015-25
Submission**

Project Assessment Report ONR-DFW-PAR-14-021
Revision 0
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EXECUTIVE SUMMARY

Title

ONR Assessment of the Hinkley Point 'A' Site Periodic Safety Review (PSR) 2015-25 Submission.

Permission Requested

This report presents the ONR assessment of the Periodic Safety Review (PSR) for Hinkley Point A and sets out the regulatory justification for recommending the issue of an ONR Decision Letter to confirm that the Licensee, Magnox Limited (MxL) has carried out an adequate PSR of the Hinkley Point A Site Safety Case for the period 2015-25.

Background

A periodic and systematic review and reassessment of safety cases is carried out to comply with Nuclear Site Licence Condition (LC) 15: Periodic Review. The purpose of the review is to determine, by means of a comprehensive assessment:

- The degree to which the safety case conforms to modern standards and relevant good practices.
- The degree to which the safety documentation addresses the remnant life of the facility given changes in plant status through construction, commissioning, operations, post operations and decommissioning.
- The adequacy of the arrangements in place to maintain safety until the next PSR or end of life.
- Safety improvements to be implemented to resolve any identified safety issues.

This is achieved by reviewing the previous 10 year operation together with considering any changes in activities that may impact on nuclear safety over the next 10 years. The review takes into consideration conformance with modern standards and potential impact of ageing and obsolescence. MxL submitted their PSR documentation to ONR in February 2014 with an ONR Decision Date by 31 March 2015.

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

ONR carried out a compliance inspection to examine the licensee's arrangements necessary to comply with LC 15: Periodic Review, together with a detailed assessment of the Hinkley Point A PSR and underpinning assessments. The assessment was based on:

- Requirements set out in ONR's Nuclear Safety Technical Assessment Guide for Periodic Safety Review (NS-TAST-GD-50)
- Adherence to relevant good practice as set out in ONR's Safety Assessment Principles for Nuclear Facilities.

The scope of ONR's assessment was considered proportionate to the hazards and facilities remaining on site and the planned decommissioning activities over the next ten years.

Matters arising from ONR's work

ONR's assessment of the Hinkley Point A PSR and the underpinning technical assessments found that an adequate re-assessment of the site's safety case had been undertaken. The approach taken by MxL was structured, systematic and appropriate to the decommissioning state of the site.

No significant nuclear safety challenges were identified by either MxL or ONR in the assessments undertaken. The PSR review identifies safety shortfalls that are considered by ONR to have been appropriately categorised into findings and lower priority observations. MxL has given a commitment to address all of their findings by June 2016, which is consistent with ONR's expectations. ONR's assessment of the PSR submission has identified five issues that were not considered to have been adequately addressed, and from these only one was considered significant enough to warrant an ONR finding. MxL has committed to address

this finding by May 2015. The lower level issues, some relating to longer term decommissioning activities, will be monitored by routine regulatory activities.

Conclusions

ONR considers that MxL has carried out an adequate PSR of Hinkley Point A Site's Safety Case that justifies safe operation and continuing Care and Maintenance preparation activities for the period 2015-2025. This is based on the assessments and findings of both MxL and ONR. No significant nuclear safety issues have been identified and MxL has given a commitment to address safety shortfalls identified by its own and ONR's assessments by June 2016.

Recommendation

It is recommended that ONR issues a Decision Letter to MxL confirming that an adequate PSR of the Hinkley Point A site safety case has been undertaken and requiring MxL to address all their and ONR's findings, in accordance with their commitment, by June 2016.

LIST OF ABBREVIATIONS

BSC	Baseline Safety Case
C&M	Care and Maintenance
FED	Fuel Element Debris
HF	Human Factors
HPA	Hinkley Point A
HPC	Hinkley Point C
IAEA	International Atomic Energy Agency
IBC	Intermediate Bulk Container
ILW	Intermediate Level Waste
LC	Licence Condition
MxL	Magnox Limited
NSC	Nuclear Safety Committee
ONR	Office for Nuclear Regulation
PSR	Periodic Safety Review
SAP	Safety Assessment Principle(s) (HSE)
SENATE	Safety Case and Environmental Advisory Team
ST	Settling Tank
TAG	(ONR) Technical Assessment Guide
TR	Technical Report

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1 PERMISSION REQUESTED

1. This report presents the ONR assessment of the Periodic Safety Review (PSR) for Hinkley Point A and sets out the regulatory justification for recommending the issue of an ONR Decision Letter to confirm that the Licensee, Magnox Limited (MxL) has carried out an adequate PSR of the Hinkley Point A Site Safety Case for the period 2015-25.
2. The requirement to carry out a PSR is set out under License Condition (LC) 15: Periodic Review. International standards (Ref 1) recommend that the periodicity between PSRs should be 10 years. The Hinkley Point A PSR (Ref 2) submitted to ONR by MxL is for the period covering 2015-25 with consideration given to a further 7 years of operations to 2032. The date of 2032 is the current milestone date for entry into Care and Maintenance (C&M), the interim phase that precedes final dismantling and site clearance in line with Nuclear Decommissioning Authority strategy. The review sought to provide assurance that facilities that will remain in existence will be capable of fulfilling their operational and safety functions until they enter the C&M phase.
3. ONR's guidance (Ref 3) states that the purpose of the PSR is to consider all factors that may affect the safety of the plant over its lifetime and can be summarised under the following bullet points:
 - The degree to which the safety case conforms to modern standards and relevant good practices.
 - The degree to which the safety documentation addresses the remnant life of the facility given changes in plant status through construction, commissioning, operations, post operations and decommissioning.
 - The adequacy of the arrangements in place to maintain safety until the next PSR or end of life.
 - Safety improvements to be implemented to resolve any identified safety issues.
4. The regulatory process set out in Ref. 3 requires ONR to issue a statement in writing (a "Decision Letter") confirming its position on the adequacy of the Licensee's PSR submission. The Decision Letter is normally issued one year after the submission of the PSR. The duration of one year between PSR submission and issuing a Decision Letter is considered reasonable time to allow the Licensee to address significant safety findings identified in their review and to allow ONR to assess the submission in sufficient depth. The Decision Letter sets out any regulatory requirements from the assessment of the PSR.

2 BACKGROUND

5. Hinkley Point A was the former Central Electricity Generating Board's forth nuclear power station to be built for commercial electricity generation and comprised two Magnox-type reactors and associated generating and ancillary facilities. The site started electricity generation in 1965 and ceased to be operational in 2000. Defuelling commenced in 2001 and completed in 2004. The Site was formally declared fuel free in 2010.
6. The site is currently in the C&M Preparations phase with decommissioning activities underway preparing for a period of C&M prior to Final Site Clearance. The current Magnox decommissioning strategy (Ref. 4) plans that during the C&M period, Hinkley Point A is left with three main structures, comprising a new Interim Storage Facility for intermediate level waste (ILW) and the two reactor buildings as the safestore.

7. The PSR submission for Hinkley Point A was submitted ahead of schedule to ONR in February 2014 for assessment with the Decision Letter due by 31 March 2015. The assessment process involved open and transparent engagement with MxL across all topic disciplines with regular project meetings to enable ONR to provide feedback on its assessment and to provide MxL an opportunity to present progress of closing their observations and findings.
8. The MxL PSR Outcome Report (Ref. 2) considered that no findings precluded the continued safety of operations beyond 2015 and that subject to the resolution of findings, a modern standards safety case will be produced to justify on-going activities up to 2025.
9. MxL's Nuclear Safety Committee (NSC) reviewed and endorsed the PSR scope (Ref. 5, 6) before work commenced on the production of the PSR. The PSR was produced in line with the MxL arrangements for LC15 and comprises 11 technical reports, see Appendix 1, and 54 other primary references.
10. MxL decided that for each of the technical reports; the current plant, operations and Baseline Safety Case (BSC) were systematically reviewed to identify any potential problems or issues that might challenge the validity of the BSC or the continued safe operation of the Site. The technical reports were supported by plant walk-downs to consider the plant and building configuration, its condition in relation to the demands made by current operations and the BSC, and to identify any shortfalls and potential hazards.
11. MxL conducted reviews to demonstrate the continuing validity of the existing BSC, taking account of modern standards and ageing mechanisms, and to identify any necessary plant, process and/or safety case modifications required to allow continued operation.
12. The MxL PSR Outcome Report (Ref. 2) identifies a total of 67 findings requiring resolution and final close out endorsement by the Safety Case and Environmental Advisory Team (SENATE). This report was reviewed by INSA (Ref. 7) who confirmed that the outcome of the PSR supports continuing operations on site until 2025 subject to the resolution of these findings. The Outcome Report was endorsed by the MxL Joint NSC (Ref. 8) with no caveats or actions.
13. The 67 findings were divided into three classifications based on their impact on the PSR objectives or timescale to be resolved; 50 priority 1 (highest significance), 4 priority 2 and 13 priority 3. The findings were also grouped in themes with the majority (45) relating to the shortfalls of the extant BSC against modern standards. These safety case findings are being progressively addressed and the overall updated safety case is scheduled to be completed by June 2016. The remaining 22 findings have all been addressed and have been closed and endorsed by the SENATE.
14. A further 371 issues were identified and sentenced as Observations and are being resolved by MxL through its existing arrangements under the Event Action Tracking System. To date 359 have been addressed with the remainder expected to be complete by the end of March 2015.

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

15. ONR has carried out a programme of work for the Hinkley Point A PSR which was commensurate with the remaining hazards present on the site and the risks associated with the on-going decommissioning activities.

16. The ONR Nominated Site Inspector undertook a routine planned LC 15 inspection (Ref. 9) at the start of the PSR process to review the adequacy of the Licensee's arrangements to deliver an effective PSR. These arrangements were considered good at the time of the inspection.
17. Throughout the PSR assessment process, regular meetings (Refs. 10, 11, 12 and 13) were held to review progress and monitor the delivery of commitments to close out their PSR findings and observations. The classification of the findings took into account the impact in meeting the PSR objectives as well as the expected duration to resolve.
18. Due to the reduced hazards and decommissioning activities on site, ONR targeted the assessment on the following areas:
 - Civil Engineering (Ref. 14) - Design life, structural reliability, seismic hazard and lateral loading on the main reactor buildings to meet the requirement for the long term reliability and integrity of the main structures to provide containment and weatherproof covering for the remaining radioactive hazards.
 - External Hazards (Ref. 14) – Wind, seismic and flooding hazards following on from post Fukushima assessments and the recent UK floods and storms of winter 2013/14.
 - Structural Integrity and Mechanical Engineering (Ref. 15) – Systems, structures and components required to fulfil a nuclear safety function and their age-related degradation mechanisms, the maintenance regimes, the condition of facilities and the condition of the site infrastructure.
 - Human Factors (Ref. 16) – Leadership and management of safety, in particular faults that were protected against / mitigated via operator actions.
 - Radioactive Waste Management (Ref. 17) – Management of existing and future arisings of low and intermediate level waste and the facilities involved in all stages of the waste lifecycle given that radioactive waste is now the primary hazard remaining on site.
19. Whilst a full fault studies assessment was originally planned, during the initial assessments it was identified that faults on the site were driven by radioactive waste management and it was agreed that the fault studies assessment would be subsumed into the radioactive waste management assessment.
20. A summary of ONR assessment views and findings are provided in Appendix 2. Regulatory issues were identified where MxL's assessment findings and further clarification could not reconcile queries raised by ONR and are detailed in Table 1

4 MATTERS ARISING FROM ONR'S WORK

21. From inspection and assessment of the Hinkley Point A 2015-25 PSR, ONR considers that an adequate review of safety has been carried out. This view is formed by:
 - The PSR assessment of the Hinkley Point A Site's safety case found no significant safety findings for the period of assessment (2015–25) that would preclude the continued safety of operations and the independent nuclear safety assessment review of the PSR supported this.
 - The ONR Hinkley Point A Site Inspector confirmed adequate arrangements for LC 15 compliance and that these had been followed in the production of the PSR.

- ONR's assessment of MxL's safety documentation from the Hinkley Point A 2015-25 PSR found no significant findings that could affect nuclear safety or could adversely impact on operations on site during the period of the PSR. (Refs. 14 - 17)
22. ONR Specialist Inspectors confirmed that a systematic approach has been undertaken in the areas assessed and that the conclusions made in the PSR Outcome Report were justified by evidence presented in the reviews undertaken and Technical and Walkdown reports compiled in support of the PSR.
 23. ONR assessment took into account MxL's identification of issues during its review phase. I consider MxL's classification of the issues into Findings and Observations, and the use of relevant works streams for resolution, reasonable with appropriate consideration given to their impact on nuclear safety and the objectives of the PSR.
 24. Although MxL had raised a finding relating to the long term integrity of Intermediate Bulk Containers (IBC) being used for the storage of ILW, this was also considered an area of concern by ONR in the radioactive waste management assessment report (Ref. 17). There was a loss of containment incident from an IBC on site (Ref. 18) in November 2014 which has been investigated by MxL (Ref. 19) who raised a number of recommendations. The resolution of these recommendations is now being monitored through routine regulatory activities and the MxL PSR finding of the substantiation of the long term integrity of the IBCs is being progressed.
 25. MxL is addressing the single ONR finding, raised in the civil engineering and external hazards assessment report (Ref. 14) relating to a review of seismic assessments to confirm the adequacy of the MxL assessments in relation to interactions between systems, eg. boilers and civil structures. MxL is currently conducting a review of their extant seismic assessments which should confirm if sufficient seismic withstand capability exists to support their current safety claims. This is expected to be completed by May 2015.
 26. MxL has made a commitment to close out all of MxL's and ONR's PSR Findings before June 2016, (Ref. 20). ONR will monitor the close out of the PSR findings through normal regulatory intervention. Attention will be given to ensure the adequacy of the response and the effectiveness of the implementation measure.

5 CONCLUSIONS

27. I consider that MxL has carried out an adequate Periodic Safety Review of Hinkley Point A Site's safety case that justifies safe operations and continuing Care and Maintenance preparation activities for the period 2015-2025. This view is based on the following:
 - Hinkley Point A Site's arrangements for LC15 were found to be good and have been followed to deliver a systematic re-assessment of the Site's nuclear safety case. The PSR was subject to independent review via MxL's internal assurance process and Nuclear Safety Committee.
 - MxL's re-assessment did not identify any significant nuclear safety challenges that would impact on the site's activities for the period 2015-2025 and through to entry into Care and Maintenance in 2032. Safety shortfalls were identified through the PSR process and have been categorised based on their impact on safety. MxL has given a commitment for all PSR Findings to be addressed by June 2016 (Ref. 20).

- ONR's assessments of the PSR of the safety justification for continued operations and Care and Maintenance preparation activities until 2025 are considered to be thorough and systematic.
- ONR's assessment findings supported MxL's conclusion that no significant nuclear safety challenges existed in continued operations and Care and Maintenance preparation activities on the Hinkley Point A site. ONR identified a single Finding in its assessment work, which MxL has accepted and is addressing. A commitment has been given to close this Finding by May 2015, (Ref. 20), which is considered reasonable.

6 RECOMMENDATIONS

28. I recommend that ONR issues a Decision Letter confirming the adequacy of MxL's Hinkley Point A PSR submission to justify continued operations on the site for the period 2015-2025.
29. I recommend that conditions are included in the Decision Letter with timescales to address the outstanding MxL and ONR PSR findings.

7 REFERENCES

1. *Periodic Safety Review for Nuclear Power Plants*. International Atomic Energy Agency (IAEA). Specific Safety Guide SSG-25. IAEA. Vienna. 2013. - www.iaea.org.
2. Hinkley Point 'A' Site NP/SC 5120 Outcome of the Periodic Safety Review to Assess the Safety of Operations on the Site Beyond March 2015, Rev 1 Addendum 1. January 2014. TRIM 2014/79765
3. *Periodic Safety Review NS-TAST-GD-050 Revision 4*. ONR. April 2013
http://www.onr.org.uk/operational/tech_asst_guides/index.htm
4. Magnox Integrated Decommissioning and Waste Management Strategy, S-036 Issue 4. January 2013. TRIM 2014/79713.
5. Magnox Limited MXL32099N Minutes of Joint Nuclear Safety Committees held 19 Jan 2012. TRIM 2012/62040
6. Hinkley Point 'A' Site NP/SC 5210 Proposed Scope of the PSR to Assess the Safety of Operations on the Site Beyond March 2015, Rev 1. February 2012. TRIM 2012/107089
7. Hinkley Point A INSA Form 5B 2015 PRS Outcome Report. February 2014. TRIM 2015/22972
8. Magnox Limited MXL32178N Minutes of the Joint Nuclear Safety Committee held 23 Jan 2014. TRIM 2014/58527
9. Intervention Report ONR-HPA-IR-12-002 Routine LC 15 inspection 8-11 May 2012. TRIM 2012/221142
10. Contact Report ONR-DFW-CR-14-037 Hinkley Point A PSR Project Update Meeting and Site visit by PSR Technical Assessors - 29 April 2014. TRIM 2014/186864
11. Contact Record ONR-DFW-CR-14-124 Hinkley Point A PSR Project Update Meeting ONR Cheltenham Office - 15 July 2014. TRIM 2014/280276
12. Contact Record ONR-DFW-CR-14-209 Hinkley Point A PSR Project Update Meeting - 6 November 2014. TRIM 2014/420647
13. Contact Record ONR-DFW-CR-14-276 Hinkley Point A PSR Project Update Meeting - 29 January 2015. TRIM 2015/40854
14. Assessment Report – Hinkley Point A - ONR-DFW-AR-14-018 HPA PSR 2015 Civil Engineering & External Hazards Assessment Report. 18 March 2015. TRIM 2015/36446
15. Assessment Report – Hinkley Point A - ONR-DFW-AR-14-016 HPA PSR 2015 Structural Integrity Assessment Report. 17 March 2015. TRIM 2014/470309
16. Assessment Report – Hinkley Point A - ONR-DFW-AR-14-017 HPA PSR 2015 Human Factors Assessment Report. 16 March 2015. TRIM 2015/3710
17. Assessment Report – Hinkley Point A - ONR-DFW-AR-14-019 HPA PSR 2015 Radioactive Waste Management Assessment Report. 04 March 2015. TRIM 2015/88099

18. Hinkley Point A - INF1 2014/468 - HKP-000854 - Intermediate Bulk Containers (IBC) containing Intermediate Level Waste (ILW) stored in the Pond cooler. 21 November 2014. TRIM 2014/437156
19. Hinkley Point A – HKP-000854 – Event Investigation Report - IBC leakage into protected, bunded area of PWTP. 19 January 2015. TRIM 2015/38617
20. Hinkley Point A – HPA60107N - Commitment and programme for the completion of outstanding PSR findings. 05 March 2015. TRIM 2015/84474

APPENDIX 1 – PSR TECHNICAL REPORT TOPICS

The following list identifies the Technical Reports produced by MxL in support of the Hinkley Point A PSR.

- TR/01 – Leadership and the Management of Safety and the Environment
- TR/02 – External Hazards
- TR/03 – Land Quality
- TR/04 – Reactors and Associated Plant
- TR/05 – Site Infrastructure
- TR/06 – Active Effluent Treatment Plant
- TR/07 – Low Level Waste Management Facilities
- TR/08 – Solid Intermediate Level Waste Storage Facilities
- TR/09 – Wet ILW Storage Facilities
- TR/10 – Fuel Cooling Ponds, including Pond Water Treatment Plant and Chemical Treatment Plant
- TR/11 – Plant Ageing

APPENDIX 2 – SUMMARY OF ONR ASSESSMENT TOPICS

30. This appendix gives an overview of the topics assessed by ONR within the Hinkley Point A (HPA) PSR submission and presents the conclusions and ONR findings (where applicable) for each of the topics.

External Hazards and Civil Engineering (Ref. 14)

31. Taking into account the remaining radiological inventory ONR is broadly satisfied with the extent and depth of the Periodic Safety Review, and considers that the Licensee has met the requirements of the relevant SAPs, TAGs and relevant good practice, and so has fulfilled its obligations under Licence Condition 15. ONR judges that subject to the resolution of the PSR findings and observations along with the finding and recommendations that ONR has raised in the assessment report, the overall risks to the site from Civil Engineering & External Hazards remain acceptable. Therefore, ONR does not have any objections to issuing a decision letter accepting this HPA PSR submission.
32. One ONR Finding and four recommendations were made in Ref. 14. The recommendations were not judged by the specialist assessor to be of sufficient concern to warrant an ONR Finding, however these will be followed up under normal regulatory business.

External Hazards

33. Following the recent extreme UK weather, winter 2013/14 floods and storms, and the sensitivity post Fukushima, ONR conducted a more in-depth review of the external hazards relating to Wind, Seismic, and Flooding and identified a shortfall relating to the existing seismic analysis. Due to advances in seismic analysis capabilities and methodologies; improved computing power and better finite element analysis models are now available, ONR has therefore raised a finding to ensure that interactions between systems, such as the Primary Circuit Boilers and Civil Structures, are adequately assessed.

ONR Finding HPA-PSR-01

The Licensee should review the existing seismic analysis to ensure that the interactions between systems e.g. Boilers & Civil Structures have been adequately assessed and that the claimed withstands are adequately substantiated. Cognisance should be taken of the learning at Bradwell on the boiler supports and primary circuit duct hangers.

34. The Licensee has committed to review the existing seismic analysis to check for gaps and vulnerabilities to address this finding. This is due for completion by May 2015.
35. The Licensee and ONR identified that assessments for a number of hazards; wind loading, snow loading and lightning were found to fall short of current standards. The Licensee has raised a number of PSR findings and observations to address these shortfalls. ONR considers that the proposed resolution the findings and observations should adequately address the shortfalls.
36. ONR considers that the external hazards included within the PSR based on the Magnox Decommissioning Safety Case Handbook are in accordance with the requirements of SAP EHA.1. ONR has compared the list of hazards with relevant IAEA guidance and based on this, ONR judges that the list of hazards included is appropriate. However, it is worthy of note here that a new hazard that has not been covered explicitly in the PSR is Capable Faulting, seismic events resulting in a surface

fault causing uneven displacement of the ground, eg. heave or shear, on the nuclear site. ONR has therefore recommended that the significance of this new hazard be considered.

37. The PSR identified that the gabion flood wall was in need of further assessment and remediation of corrosion of the baskets. ONR is aware that EDF NGL are currently looking into this on the Hinkley Point B site and recommends that the two sites collaborate where possible on what is in effect a common sea defence.
38. With the increasing construction activities at the neighbouring HPC site, HPA site staff have confirmed that formal liaison arrangements are in place to keep the implications of HPC activities for the HPA site under review and enable timely transfer of information and appropriate actions to be taken where nuclear safety on the HPA site may be challenged. The significance of these construction hazards was not discussed in great detail within the PSR documentation since their extent was not known at the time. They include but are not limited to:
 - Significantly increased offsite (to HPA site) personnel, road and shipping traffic.
 - The common cause aspect of natural external hazards may affect HPC as well as HPA simultaneously.
 - Some significant industrial hazards which can be expected during HPC construction, such as use of explosives and major dewatering activities for the HPC building foundations.
 - The flood protection arrangements for the HPC site which may significantly change the topography locally, and may affect the regional and local surface water drainage onto and around the HPA site. The potential for sea flooding onto the HPA site may also be affected.
39. Nevertheless, given the nature of HPC activities ONR has recommended that the ONR HPA site inspector should periodically confirm that HPA site staff are taking appropriate account of developing HPC activities and assessment work such that external hazard safety cases remain valid and robust.

Civil Engineering

40. From the assessment of the submitted documents, site visit and discussions with the Licensee's representatives, it is clear to ONR that the Licensee has taken its duty under Licence Condition 15 seriously and committed a significant resource to undertaking a thorough review employing suitably qualified staff and contractors as appropriate.
41. From the walkdown and review of the PSR ONR is content that the Licensee has thoroughly assessed ageing and degradation issues, and subject to resolution of the PSR findings and observations raised, generally relating to steel corrosion, defects to the weatherproof envelope, or concrete defects, ONR considers the site's arrangements to be adequate for managing these effects.
42. It is concerning to note the issues raised regarding the Licensee's LC28 arrangements, in particular compliance with its own company standard on inspection of the RPV supports and the Magnox Vault external walls. However, ONR is content that the PSR has captured the shortfall's adequately with the exception of the technical report relating to the Magnox Vaults, where ONR considers it necessary to raise a recommendation.
43. It is good to see the PSR raising issues regarding the need for future assessments applying modern standards which the Licensee will complete as part of the Safestore project. These assessments will offer longer term benefits beyond the PSR period

where the long term qualification of the building for C&M will require a thorough understanding of its robustness and vulnerable areas.

Structural Integrity (Ref. 15)

44. ONR has sampled the structural integrity aspects of the licensee's PSR safety case, concentrating on components that contain radioactive material. ONR is satisfied that the licensee has undertaken a systematic assessment of the current condition of the components and their fitness for continued use for the duration of this PSR. ONR considers that the work the licensee has undertaken extending the review period to 2032 is useful for identifying potential cliff edge effects and ONR agrees with its findings that no such effects have been identified.
45. From a structural integrity perspective, ONR judges there is no reason that would prevent ONR accepting the HPA PSR for the period up to 31 March 2025.
46. The components sampled during this assessment included:
 - Reactor vessels
 - Gas circuit ducts and duct hangers
 - Heat exchangers
 - Graphite cores
 - Active effluent treatment plant and tanks
 - Wet ILW settling tanks
 - Fuel cooling ponds including associated water and chemical treatment plants
47. Both reactors are defueled and depressurised and vented to atmosphere through an unfiltered vent. ONR considers that atmospheric corrosion is likely to be the most likely deterioration mechanism during the period of this PSR. The licensee has systems to monitor the reactor vessel bulk moisture and temperature so that moisture levels are sufficiently low that the rate of internal corrosion will be negligible. ONR consider this is a reasonable approach to minimising the likelihood of internal corrosion and consider that the preparations and arrangements for entering the C&M phase were generally adequate.
48. The thermal insulation has been removed from all the heat exchangers and gas circuit ducts as part of the asbestos removal programme. ONR considers this is beneficial as it eliminates the potential for corrosion under insulation and enables inspection the external condition of these components.
49. While reviewing the integrity of the duct support structures, it was found that the susceptibility of hanger supports to rapid sequential failure, cascade failure, had not been assessed for the PSR. The Licensee confirmed these faults are being considered in the update to the site baseline safety case. The Licensee has judged that the consequence of duct failure would most likely to be limited to a localised spread of contamination. ONR considers that cascade failure of the duct supports is a design basis fault mechanism that may lead to a spread of radioactive material from the primary circuit. However, it is judged that the likelihood of a cascade failure is low because the Licensee has a programme in place to inspect the duct hangers on a four year frequency, which ONR considers to be satisfactory. The duct inspections have not identified a significant shortfall in the condition or functionality of the hangers. For the purpose of this assessment, ONR is content with the licensee's statement that it has included duct and hanger faults within the extant safety case and has included duct failure in the site baseline safety case update.

50. Early in the MxL PSR process it was identified that three carbon steel settling tanks (ST) could not be substantiated for the continued storage of ILW. This was raised as an issue by ONR, issue 1703, and added as a specific decommissioning milestone, no. 909. The emptying and post-operation-clean-out of these tanks has been managed through a separate project, with two tanks already emptied, and there is a commitment to complete by May 2015. Based on the Licensee's progress and the planned completion date, ONR considered it pragmatic to exclude these tanks from this PSR assessment.
51. Many of the vessels, tanks and pipework covered by this PSR will be removed from service in the near future, e.g. the majority of the pond water treatment plant is no longer required when pond drainage is complete, expected by the end of 2015. The Licensee has stated that it will justify in the baseline safety case the continued operation of those components that will remain in service. ONR has sampled the assessments of the main hazard-containing structures and is content with this proposal.

Human Factors (Ref. 16)

52. ONR concurs with the MxL view that the extant Human Factors (HF) assessments did not meet modern standards, and supports the work being conducted to address the PSR findings. Whilst the ONR assessment noted some weakness in the MxL substantiation of operator action and administrative control, given the small number of claims made on operator action, the relatively simplicity of the operator actions and the continued decommissioning of the site, ONR does not consider that significant safety benefit would result from requiring the Licensee to undertake additional analysis for the current PSR. ONR is therefore satisfied with the PSR subject to the satisfactory resolution of the PSR findings.
53. The Licensee acknowledges within the PSR that the extant BSC has shortfalls when compared with modern standards for HF. The ONR assessment of the PSR Outcome Report (Ref. 2) and associated Technical Reports (TR) supports the licensee's view. Whilst ONR has concerns regarding the absence of a specific HF TR and the consistency of HF review across the PSR submission, it is content that an HF Assessment 'Theme' is identified in the Outcome Report and there is a requirement to complete a wider ranging HF assessment in accordance with Licensee's current arrangements. ONR therefore supports the work MxL are committing to undertake to address the PSR findings.
54. An early draft copy of the BSC HF Review, initiated in response to the PSR HF Assessment 'Theme' was supplied and the ONR's review identified a number of potential concerns that have been discussed with the Licensee in order to gain assurance that the completed document will be of an appropriate quality to support HF substantiation. The final version of the HF review was received in March 2015 and found to have addressed some of the earlier concerns and ONR does not consider the remaining shortfall to be of sufficient significance to warrant further delay in supporting the PSR submission.
55. Overall, ONR is satisfied that the Licensee has presented sufficient evidence to support their argument that the procedural safeguards claimed against the remaining BSC "key hazards" can be substantiated from a HF perspective. ONR therefore concurs with their conclusion that there are no substantive HF issues that would negatively impact on the reliability of the claimed procedural safeguards.
56. ONR does not consider it proportionate to require the Licensee to undertake additional HF assessments in support of the PSR given the following:

- The estimated consequences associated with faults to be included within the HPA re-baselined safety case are generally low when compared to those of the extant BSC / elsewhere in the UK nuclear industry.
 - The remaining procedural safeguards required within HPA BSC are relatively simple and regular validation of these claims should not represent a significant challenge to the Licensee.
 - The re-baselined safety case, to be produced to justify on-going activities up to 31st March 2025, will be fully compliant with the Licensee's HF arrangements and include appropriate substantiation of operator claims. This will be in place by June 2016
 - The site is undergoing continual change and where significant activities are to be undertaken; HF consideration will be addressed via individual decommissioning safety cases, in-line with the Licensee arrangements.
57. ONR is therefore satisfied with the PSR subject to the satisfactory resolution of the PSR findings.

Radioactive Waste Management (Ref. 17)

58. ONR considers that overall, the PSR provides an adequate assessment of the radioactive waste management arrangements and requirements over the period of the PSR and appropriate work is underway to address remaining issues.
59. The most prominent issue is the site's significant inventory of unconditioned Intermediate Level Waste (ILW), principally Fuel Element Debris (FED), spent ion-exchange resins and sludge, which is currently stored in several vaults and containers (e.g. settling tanks (ST) and intermediate bulk containers (IBC)). The current ILW management programme envisages this ILW remaining in situ for a number of years, pending retrieval and packaging for longer-term storage in the Interim Storage Facility or disposal by other routes. The on-going adequacy of these storage arrangements has been considered through a number of specific PSR findings.
60. In general, the radioactive waste management arrangements were found to be adequate, although some further work is needed to fully close out all the relevant PSR findings and provide assurance that the waste is stored in a safe condition in adequate facilities.
61. A quantity of spent resin from operation of the pond water treatment plant is being held in a number of vented polymer IBCs, now stored in a bunded area of the active effluent treatment plant lower vault. The justification of the longer term use of IBC's was raised as a PSR finding and also queried by ONR during its assessments. Subsequent to this, a leak from an IBC was found following a failure of a gasket joint (Ref. 18). An investigation has been completed into the loss of containment from the IBC storing resin ILW (Ref. 19) and progress of the resulting recommendations is being monitored by the ONR site inspector. Given the on-going resolution of recommendations from the investigation, the PSR finding on the adequacy of the IBCs for continued storage of resin must remain open, subject to a robust justification for their continued adequacy, implementation of an appropriate regime of inspection to detect any early indications of deterioration in the integrity of the IBC, and availability of appropriate contingency measures.
62. There is limited storage capacity remaining in the STs for future resin discharges, recent tank dipping has indicated that ST7 and ST9 are now full to their normal operational capacity. This is not an immediate concern as there are credible options available to provide additional resin storage capacity which can be developed as required through routine licensee arrangements. Following a resin change at the end

of last year there is sufficient useable resin for the completion of pond draining. ONR has confirmed that a formal action has been placed on the HPA Event and Action Tracking System to consider options for storage of resin arisings from future decommissioning activities. The progress of this action can be monitored through normal site inspection activity.

63. A PSR finding related to new research information on uranium hydride fires required a review of the extant safety case for the FED vaults. This research had also previously been reviewed by ONR. The conclusion is unchanged and remains that there is no credible potential for UH3 fires within the FED vaults and on this basis, ONR considers that the extant safety case for the FED vaults remains adequate for the vaults in their current quiescent state; a new assessment will be needed before any retrieval or other operations are carried out in the vaults.
64. The potential for flammable gases to be produced in STs by radiolysis or microbial activity (particularly in the presence of organic material) and accumulate to potentially form a flammable/explosive atmosphere has been previously recognised. The PSR found that the analysis underpinning this assessment on flammability / explosion risk could not be substantiated to inform on the adequacy of the extant flammable gas safety case and current arrangements for the STs. The risk is considered to be limited to cases where flammable gas could accumulate within the waste and be released as a pocket of gas when disturbed to form a flammable/explosive atmosphere. In the presence of an ignition source, for instance during retrieval operations, this could potentially lead to an explosion.
65. Of the operational STs, ST4 and 6 contain inorganic sludge and STs 7, 8 and 9 contain resin. Only hydrogen gas is expected to be generated in these tanks and only in relatively small amounts, perhaps a few litres per year, which should be readily removed by the ventilation. Therefore, the risk of flammability is considered to be very low. However, in discussions with the Licensee it was noted that the clay-like rheology of sludge in ST 4 and 6 could conceivably accumulate pockets of gas which could be released on disturbance of the waste. There are currently no plans to disturb the sludge until retrieval and so this is not an immediate concern. The Licensee gave assurance that the flammability hazard will be formally considered when developing retrieval procedures for these STs and flammability will be explicitly addressed in the new Wet ILW storage facilities Safety Case, expected in Q1 of 2016.
66. The PSR has identified the need for additional work which will underpin future decommissioning activities. The need to characterise the ILW waste streams and develop specific plans for retrieval, conditioning and packaging is evident. This will be taken forward in due course through the licensee's arrangements and assessed, and where appropriate permissioned, by ONR, through normal regulatory processes.
67. Subject to appropriate close out of the remaining PSR findings and observations, ONR considers that the PSR provides assurance that the ILW storage arrangements and facilities are adequate and should remain so until the waste is retrieved.

Table 1
ONR Findings and Recommendations

ONR Finding	Detail
HPA-PSR-01 External Hazards & Civil Engineering Issues Database Number: 3299	The Licensee should review the existing seismic analysis to ensure that the interactions between systems e.g. Boilers & Civil Structures have been adequately assessed and that the claimed withstands are adequately substantiated. Cognisance should be taken of the learning at Bradwell on the boiler supports and primary circuit duct hangers.
Recommendation	Detail
HPA-PSR-REC-01 External Hazards & Civil Engineering	The Licensee should consider the significance of Capable Faulting hazard at HPA.
HPA-PSR-REC-02 External Hazards & Civil Engineering	The Licensee should consider collaboration with EDF NGL regarding the assessment and remediation of the gabion baskets.
HPA-PSR-REC-03 External Hazards & Civil Engineering	ONR should note the Licensee's liaison arrangements with the HPC site and the HPA site inspector should periodically confirm that HPA site staff are taking appropriate account of developing HPC activities and assessment work such that external hazard safety cases remain valid and robust.
HPA-PSR-REC-04 External Hazards & Civil Engineering	The Licensee should review its LC28 arrangements for the Vaults to ensure they comply with its own Company Standard for inspecting civil structures.