Office for Nuclear Regulation

Periodic Safety Review

ONR Assessment of the Oldbury Site Periodic Safety Review on Completion of Defuelling Submission

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EXECUTIVE SUMMARY

Title

ONR Assessment of the Oldbury Site Periodic Safety Review on Completion of Defuelling.

Permission Requested

This report presents the ONR assessment of the Periodic Safety Review (PSR) for Oldbury on Completion of Defuelling and sets out the regulatory justification for recommending the issue of an ONR Decision Letter to confirm that Magnox Limited (ML), the Licensee, has carried out an adequate PSR of the Oldbury Site Safety Case upon completion of defuelling.

Background

It is a requirement for licensees to carry out a periodic and systematic review and reassessment of safety cases 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 remaining life of the facility, taking into account changes in plant status through construction, commissioning, operations, post operations and decommissioning.
- The adequacy of arrangements in place to maintain safety until the next PSR or final site clearance.
- Safety improvements to be implemented to resolve any identified safety issues.

This is achieved by the licensee reviewing the previous ten years of its operations together with considering any changes in activities that may impact on nuclear safety over the next ten years. The review takes into consideration conformance with modern standards and potential impact of ageing and obsolescence. ML submitted their PSR documentation to ONR on 12 June 2017 and requested that ONR make a decision of the adequacy of the PSR by 31 March 2018.

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

ONR carried out a detailed assessment of the Oldbury PSR and the licensee's underpinning assessments. The ONR 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.

Individual specialist assessments were carried out on the following topic areas:

- Mechanical Engineering
- Civil Engineering and Structures
- Structural Integrity
- Electrical, Control and Instrumentation
- Radiological Protection
- Radiological Waste

The scope of ONR's assessment was proportionate to the hazards as for all faults assessed in the PSR, the radiological consequences to the public are shown to be extremely low and the most hazardous worker fault has a maximum consequence of 2.5 mSv, which is significantly below the annual dose limit (20 mSv).

Matters arising from ONR's work

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

The Periodic Safety Review (PSR) Outcome Report considered changes to the Reference Safety Case during the ten year period, 2008 to 2018, covered by the previous PSR, and their implications for the period until the planned start of Care and Maintenance (C&M) in 2018 through to 2027, with a further period of five years to 2032 to confirm the absence of any cliff-edge effects. The outcome from the PSR is reported in a series of Topic Reports (TR1 to TR6) following the standard ML approach.

No significant nuclear safety challenges were identified by either the licensee or ONR in the assessments undertaken for the PSR. The licensee's PSR identified no safety shortfalls or findings, however 22 observations were made and the licensee has committed to close these out by the end of May 2018. During ONR's assessment, the licensee responded to questions to adequately close out queries raised by ONR, in some cases this required additional dialogue and explanation of the licensee's safety case process. Five recommendations have been raised although none are significant enough to warrant findings, but nevertheless, these recommendations should be fed back to ML for discussion and agreement on way forward. Closure of this action will be monitored by the by routine regulatory activities.

Conclusions

ONR considers that the licensee has carried out an adequate PSR of Oldbury Site's Safety Case that justifies continued safe operation and Care and Maintenance preparation activities for the period 2018-2032. This is based on the assessments and findings of both ML and ONR. No significant nuclear safety issues have been identified and ML has given a commitment to address safety shortfalls identified by its own assessments by May 2018.

Recommendations

ONR issues a Decision Letter confirming the adequacy of ML's Oldbury PSR submission to justify continued operations on the site for the period up to 2027.

That ONR agrees timescales to address the outstanding ML PSR observations and to give consideration to the PSR recommendations through routine regulatory interactions.

LIST OF ABBREVIATIONS

ALARP	As Low As is Reasonably Practicable
CBA	Cost Benefit Analysis
C&M	Care and Maintenance
DSRSS	Decommissioning Schedule of Reference Safety Statements
IAEA	International Atomic Energy Agency
ILW	Intermediate Level Waste
INSA	Independent Nuclear Safety Assessment
LC	Licence Condition
MAC	Miscellaneous Activated Components
ML	Magnox Limited
NSC	Nuclear Safety Committee
ONR	Office for Nuclear Regulation
PCPV	Pre-stressed Concrete Pressure Vessel
RPDSC	Rebaselined Post Defuelling Safety Case
RWMC	Radioactive Waste Management Case
PSR	Periodic Safety Review
RSC	Reference Safety Case
SAP	Safety Assessment Principles
SCC	Structures, Systems and Components
SFAIRP	So Far As Is Reasonably Practicable
TAG	Technical Assessment Guide

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1 PERMISSION REQUESTED

1. This report presents the Office for Nuclear Regulation (ONR) assessment of the Periodic Safety Review (PSR) for Oldbury and sets out the regulatory justification for recommending the issue of an ONR Decision Letter to confirm that the Licensee, Magnox Limited (ML) has carried out an adequate PSR of the Oldbury Site Safety Case for the period 2018-2032.

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 scope of the Oldbury PSR (Ref. 2) submitted to ONR by ML covers the period covering 2018-27 with consideration given to a further five years to 2032 to confirm the absence of any cliff edge effects. The date of 2027 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. Oldbury was one of the UK's early nuclear power stations to be built for commercial electricity generation and comprised two Magnox-type reactors with associated generating and ancillary facilities. The first reactor went critical in 1967 allowing the site to begin generating electricity, with the second a year later. Reactor 2 ceased operation in June 2011 and Reactor 1 in February 2012. Defuelling commenced immediately and the Site was formally declared fuel free in March 2016.

6. The site is currently in the decommissioning stage of C&M Preparations with activities underway to prepare the site for a period of C&M prior to Final Site Clearance. The Magnox Limited Integrated Decommissioning and Waste Management Strategy (Ref. 4) stated that during the C&M period from 2027, Oldbury will be left with its reactor safe stores, with their boilers, ponds and reactor void MAC left in-situ with some risk based de-planting. Contaminated land, non-active drains and tunnels will also to remain in situ. The turbine hall and some redundant contaminated structures will be

demolished to slab level and any voids filled in with spoil from the construction of the Oldbury B station. ILW would be packaged and sent for storage at the Berkeley Interim Storage Facility.

7. The PSR submission for Oldbury was submitted to ONR in June 2017 for assessment with the Decision Letter due by 31 March 2018.

8. The ONR assessment of the PSR involved open and transparent engagement with ML across a number of disciplines with an initial presentation and discipline specific meetings to enable ONR to provide feedback on its assessment and to provide ML an opportunity to present responses to ONR queries. A physical site inspection was also carried out to observe the condition of civil structures, review structural integrity and review maintenance arrangements (Ref.5).

9. The Oldbury Decommissioning Schedule of Reference Safety Statements (DSRSS) (Ref. 6) is a listing of all safety case documentation that form the baseline Reference Safety Case (RSC) for Oldbury at any one time. The schedule includes the Re-baselined Post-Defuelling Safety Case (RPDSC) (Ref. 7) which was implemented in December 2015 and covers operational activities until the site enters a period of Care and Maintenance (C&M). The ML PSR Outcome Report (Ref. 2) summaries the outcome of a PSR which included a review of the adequacy of the RPDSC and a number of topics which were not covered in the RPDSC. These reviews are presented in a series of Technical Reports for each topic.

10. The PSR supported all routine site operations in the period from 1 April 2018 to C&M entry in September 2027 and that no cliff-edge effects had been identified for operations in the five year period beyond 2027 to 2032.

11. ML's Nuclear Safety Committee (NSC) reviewed and endorsed the PSR scope (Ref. 8, & 9) before work commenced on the production of the PSR. The PSR was produced in line with the ML arrangements for LC15, benefiting from the experience with the Sizewell A PSR, and comprises the PSR Outcome Report, the six Topic Reports (see Appendix 1), and 16 other primary references.

12. The principal purpose of the PSR is to review the safety case against modern standards, plant configuration and continued validity for the PSR period up to 2027, with an additional five years to 2032 to confirm the absence of any cliff-edge effects. However, these requirements were already addressed by ML during development of the PDSC, and ONR is content that these requirements had already been addressed through implementation of the new RPDSC which forms part of the site's Reference Safety Case (RSC) (Ref. 7). The PSR therefore focused on reviews of Operating Experience, Maintenance, Engineering Stewardship and effectiveness of site management arrangements.

13. ML systematically reviewed each of these topic areas to verify that there were no issues that might challenge the validity of the RSC or the continued safe operation of the Site. Each was reported in a technical report which was were supported by a plant walk-down to consider the plant and building configuration, its condition in relation to the demands made by current operations and the RSC, and to identify any shortfalls and potential hazards. These technical reports formed the basis underpinning the PSR outcome report.

14. The ML PSR Outcome Report (Ref. 2) identified no safety shortfalls requiring resolution and formal close out. However, 22 Observations were made and these will be allocated an 'Owner' who will have responsibility for satisfactory close-out of the Observation. The close-out of these observations will be monitored through the ML Company Action Tracking System and the licensee is aiming to close-out all of these

observations by the end of May 2018. This report was reviewed by ML's Independent Nuclear Safety Assessment (INSA) function (Ref. 10) who confirmed that the review had been carried out systematically, comprehensively and in accordance with due process, and that the absence of any findings was reflective of the recent site transition and implementation of the PDSC. The INSA review also confirmed that the outcome of the PSR supports continuing operations on site until 2027. The Outcome Report was endorsed by the ML Joint NSC (Ref. 11) with no caveats or actions.

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 Oldbury PSR which was proportionate with the remaining hazards present on the site and the risks associated with the on-going decommissioning activities.

16. At the start of the ONR PSR assessment process, a presentation and review was arranged between ML and ONR specialist inspectors. This was to review the approach taken by the licensee, and the key PSR outcomes (Ref. 12).

17. Due to the reduced hazards and decommissioning activities on site, ONR targeted the assessment on the following areas:

- Mechanical Engineering (Ref. 13) – Systems, structures and components required to fulfil a nuclear safety function and their degradation mechanisms, the maintenance regimes and the condition of facilities.
- Civil Engineering and External Hazards (Ref. 14) - Design life, 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. This also includes consideration of External Hazards and flooding hazards following on from post Fukushima assessments.
- Structural Integrity (Ref.15) - Integrity of metallic components containing / retaining nuclear materials, the hangers supporting the related ducts / pipework. Any active degradation mechanism, e.g. corrosion that may challenge the integrity.
- Electrical, Control and Instrumentation (Ref. 16) - Emergency Equipment, Ventilation Systems, Maintenance of electrical systems, Provision of back-up electrical power, Management of ageing and obsolescence.
- Radiation Protection (Ref. 17) - Radiological protection arrangements for planned operations, collective dose accrued during the review period, emergency arrangements, proposed future arrangements and ALARP Assessment.
- Radioactive Waste Management (Ref. 18) – 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.

18. An assessment of Leadership and Management for Safety was initially planned, however during the initial assessments of these areas it was judged that it would not be proportionate to conduct detailed specific assessment due to the low hazard and lack of any novel approaches to management and organisational design. This fact coupled with the good safety performance of the Site as confirmed through annual reviews of safety the decision was made not to asses this area further.

19. All internal hazards faults are of low consequence, and as fault studies assessment had been undertaken as part of the RPDSC it would not be proportionate to carry out further fault studies assessment for the PSR.

20. A site inspection and plant walk-down was conducted to observe the condition of the facilities, the civil structures and structural integrity of some of the key mechanical items (Ref. 5). This inspection adequately addressed a number of questions in support of the Civil and Structural Integrity assessments. The site inspection also reviewed the maintenance arrangements, which demonstrated the licensee has adequate

maintenance arrangements in place to ensure the continued safety of facilities and plant.

21. A summary of ONR assessment views and queries and findings are provided in Appendix 2. Regulatory issues or recommendations were identified where ML'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

22. From inspection and assessment of the Oldbury PSR, ONR considers that an adequate review of safety has been carried out. This view is formed by:

- The PSR assessment of the Oldbury Site's safety case found no significant safety findings for the period of assessment (2016–27) that would preclude the continued safety of operations and the independent nuclear safety assessment review of the PSR supported this.
- ONR's assessment of ML's safety documentation from the Oldbury 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. 13 - 18)
- A Site inspection and plant walk down undertaken to observe the condition of the facilities and key civil & mechanical structures helped to address questions raised to support the assessments. The inspection also confirmed adequate maintenance arrangements are in place to ensure the continued safety of the sampled facilities and plant.

23. 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 Reports compiled in support of the PSR.

24. ONR assessment took into account ML's review and assessment of issues during its review phase. I consider the absence of any issues identified by ML's assessment reasonable, given the recent completion of defuelling and implementation of the PDSC.

25. ML has made a commitment to close out all of ML's PSR observations before the end of May 2018, (Ref. 18).

26. Five recommendations have been raised by ONR specialist inspectors. Whilst none of these warrant the raising of a finding, they should be discussed with the licensee to determine what, if any action should be taken. Close out of these recommendations should be monitored through routine regulatory activity.

27. The date of the next PSR if carried out in ten years would be 2026, which would be one year before the site is planned to transition into Care and Maintenance phase, which will also include a significant revision to the Reference Safety Case. Assuming the licensee will meet those planned dates, it could potentially be more effective to delay the submission of the next PSR by one year until 2027, for submission after the Care & Maintenance Safety Case has been issued. The current PSR included an extended forward look to 2032 to eliminate any potential for cliff edge effects, so an extension to 2027 is considered acceptable. As this has not yet been discussed with the licensee, I recommend that ONR seeks clarification from ML of when it intends to submit the next PSR, and discuss whether such a delay until 2027 would be of interest to them (recommendation 6).

5 CONCLUSIONS

28. I consider that ML has carried out an adequate Periodic Safety Review of Oldbury Site's safety case that justifies safe operations and continuing Care and Maintenance preparation activities for the period up to 2027. This view is based on the following:

- The licensee's arrangements for LC15 have previously been found to be adequate to deliver a systematic re-assessment of the Site's nuclear safety case. The PSR was subject to independent review via ML's INSA assurance process and NSC.
- ML's re-assessment did not identify any significant nuclear safety challenges that would impact on the site's activities for the period 2008-2018 and through to entry into Care and Maintenance in 2027. No safety shortfalls were identified through the PSR process, although ML has still given a commitment to close out all of its own recommendations to by the end of May 2018 (Ref. 18).
- ONR's assessments of the PSR and the licensees' safety justification for continued operations and Care and Maintenance preparation activities until April 2027 are considered to be thorough and systematic.
- ONR's assessment findings supported ML's conclusion that no significant nuclear safety challenges existed in continued operations and Care and Maintenance preparation activities on the Oldbury site. ONR has not identified any significant findings as a result of its assessment, however recommendations have been made of a minor nature which are identified in Table 1.

6 RECOMMENDATIONS

29. That ONR issues a Decision Letter confirming the adequacy of ML's Oldbury PSR submission to justify continued operations on the site for the next period of decommissioning operations up to 2027.

30. That ONR agrees timescales to address the outstanding ML PSR observations and to give consideration to the PSR recommendations through routine regulatory interactions.

REFERENCES

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10. Oldbury Site, OBA/NSC/5305/A1/R1 - INSA Form 5B - PSR on Completion of Defuelling - Outcome Report. June 2017. TRIM 2017/286549

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13. Assessment Report – Oldbury - ONR-SDFW-AR-15-025 Assessment of Oldbury PSR: Mechanical Engineering Assessment Report. 11 March 2018. TRIM 2018/77267

14. Assessment Report – Oldbury - ONR-SDFW-AR-17-120. Revision 1, Civil Engineering and External Hazards. March 2018. TRIM 2018/52282.

15. Assessment Report – Oldbury - ONR-SDFW-AN-17-142. Periodic Safety Review - Structural Integrity Assessment. TRIM 2018/94968.

16. Assessment Report – Oldbury - ONR-SDFW-AR-17-139. Revision 1, Electrical, control and instrumentation assessment of a re-baselined safety case presented for the Oldbury Periodic Safety Review. March 2018. TRIM 2018/91790.

17. Assessment Note – Oldbury – Radiological protection Assessment of Oldbury PSR. March 2018. TRIM 2018/92534.

18. Assessment Report – Oldbury - ONR-SDFW-AR-17-083. Revision 1, Assessment of radioactive waste management. January 2018. TRIM 2018/5990.

19. Magnox Limited email re: Close-out of Observations. TRIM 2018/0105238

20. ONR Safety Assessment Principles for Nuclear Facilities, 2014 Edition, Revision 0. TRIM 2014/443919

21. TR1 – Review of the Reference Safety Case and Radioactive Land Contamination Arrangements. TRIM 2017/299661.

22. TR2 - Review of Operating Experience. TRIM 2017/299661.

23. TR3 - Review of Safety Case Record Management System and Configuration Control and Revisions to Company Standards. TRIM 2017/299661.

24. TR4 - Review of Maintenance and Engineering Stewardship Arrangements. TRIM 2017/299661.

25. TR5 - Review of Radiation Protection and Emergency Preparedness Arrangements. TRIM 2017/299661.

26. TR6 - Review of Leadership and Management for Safety. TRIM 2017/299661.

APPENDIX 1 – PSR TECHNICAL REPORT TOPICS

The following list identifies the Topic Reports produced by ML in support of the Oldbury PSR.

TR1 – Review of the Reference Safety Case and Radioactive Land Contamination Arrangements (Ref. 20)
TR2 – Review of Operating Experience (Ref. 21)
TR3 – Review of Safety Case Record Management System and Configuration Control and Revisions to Company Standards (Ref. 22)
TR4 – Review of Maintenance and Engineering Stewardship Arrangements (Ref. 23)
TR5 – Review of Radiation Protection and Emergency Preparedness Arrangements (Ref. 24)
TR6 – Review of Leadership and Management for Safety (Ref. 25)

APPENDIX 2 – SUMMARY OF ONR ASSESSMENT TOPICS

31. This appendix gives an overview of the topics assessed by ONR within the Oldbury PSR submission and presents the conclusions and ONR findings (where applicable) for each of the topics.

32. The PSR covers Oldbury's planned decommissioning phase from April 2018 to September 2027 and reflects the reduction in nuclear (radiological) hazard resulting from the site's fuel-free status. The scope of the RPDSC is based on a quiescent state and only covers routine operations for the storage of radioactive waste. ML will prepare specific safety justifications to support future specific decommissioning operations.

33. Each of the assessments involved a review of the relevant PSR documentation and sampling of relevant specific aspects of the safety case followed by a site walk down with the representatives. Each Specialist Inspector corresponded with ML to address queries and provide additional information in relation to their specific assessment.

Mechanical Engineering (Ref. 13)

34. The Mechanical Engineering assessment targeted the following key mechanical areas of interest:

- The mechanical SSCs which support the Active Waste Storage Building (AWSB) at the Oldbury site;
- Adequacy of the extant safety case to justify site operations for the PSR period;
- Gap analysis against modern standards;
- Adequacy of Magnox's arrangements to manage mechanical SSC maintenance, ageing and degradation during the PSR period.

35. The Specialist Inspector's initial assessment of the Oldbury site nuclear safety case and its PSR submission identified perceived shortfalls in the completeness of the documentation. However, through discussion with ML and further explanation and evidence provided, the Specialist Inspector applied a proportionate view and is broadly content that ML has provided sufficient evidence to satisfy the initial assessment observations.

36. It was not instinctively clear how nuclear safety in respect of mechanical SSCs was being managed holistically at Oldbury from the way in which ML presented its PSR submission. This required the Specialist Inspector to seek further evidence and assurance. ML provided separately and the Oldbury site safety case manager acknowledged this shortfall and has shared this learning with other ML sites currently undertaking LC15 PSR's.

37. Based on the evidence sampled the Mechanical Engineering Specialist Inspector considers the licensee's proposal to continue operations at Oldbury site for a further ten years to be adequate.

Civil Engineering and External Hazards (Ref. 14)

38. The Civil Engineering and External Hazards assessment has considered the PSR documentation as it applies to civil engineering and external hazards to form a judgement on the robustness of the PSR conclusions and the adequacy of the PSR process.

39. The Specialist Inspector's review of the safety case found that the RPDSC uses consequence based analysis to demonstrate that Oldbury A is a low hazard site. Consequently, the majority of civil structures are not claimed for nuclear safety

purposes and are not included in the PSR. A large number of the civil structures are excluded from the review and as a result, the Specialist Inspector is not satisfied that the Licensee's PSR process in isolation is sufficient to form a view as to whether the holistic site risks are being maintained risk ALARP. The Specialist Inspector will raise the matter at the ONR Civil Engineering Specialism Meeting, and makes the following Observation for consideration by ONR:

- **Observation 1:** The PSR approach for Decommissioning, Fuel and Waste (DFW) sites is focussed solely on Nuclear Safety. Whilst this complies with the requirements under LC15, the constrained nature of the review is not sufficient for inspectors to judge whether the overall site risks to workers (comprising both nuclear safety and conventional safety) are being maintained ALARP. The need for an additional ONR review process should be considered.

40. It is the view of the Specialist Inspector, that from observations during the site walk down and subsequent correspondence with ML, that the ML LC 28 arrangements for examination, inspection, maintenance and testing of the nuclear safety civil structures are effective and meet the intent of the ONR SAPs. It is the opinion of the Specialist Inspector that the nuclear safety related civil structures are, in general, robust and the site is likely to be in a good position to demonstrate that the intent of the relevant SAPs can be met for the future C&M period.

41. The Specialist Inspector is satisfied that for civil engineering as respects nuclear safety related civil structures, the PSR is adequate and that the site has recognised the broader ALARP requirements in line with the fundamental principles in the SAPs, and TAG-026 section 9.

42. The Specialist Inspector's assessment of external hazards noted that design bases are not defined, but is content with this approach given the low radiological nature of the site and guidance provided by ONR SAPs. However, the way in which external hazards are considered within the PSR process could be more robust and as a result, the following observation is made for consideration by ONR:

- **Observation 2:** A systematic approach to examining external hazards and the faults that arise with increasing hazard severity would better inform the C&M strategy that all ML sites will need to develop. The current approach taken by the Licensee based on unmitigated radiological consequences only is certainly the most expeditious route to producing a safety case but is less rigorous and does not allow an understanding of the hazard / risk profile.

43. The assessment identified that ML's arrangements used to develop the RPDSC did not require doses to workers resulting from external hazards initiated faults to be determined. Similarly, some civil structures claimed as Passive Safety Features have not been substantiated against external hazards because the off-site doses are low, and the consequences for workers are not considered. The licensee has noted this matter and their internal guidance, the Decommissioning Safety Case Handbook (S-259), has been re-issued to account for this. However, as the PSR documentation has yet to be updated to reflect the latest guidance, the Specialist Inspector makes the following recommendation of the license:

- **Recommendation 1:** ML should clarify the scope and timeframe with respect to PSR observation TR1-3 to ensure that the radiological risk to workers arising from external hazards is ALARP.

44. Despite this matter and the non-systematic approach for reviewing external hazards adopted by the PSR, the Specialist Inspector is broadly content with the approach taken. Given the low-hazard nature of the site and the historical substantiations for the

nuclear related civil structures, the Specialist Inspector believes that the risks from external hazards are ALARP.

45. Overall, the Specialist Inspector is broadly satisfied with the claims, arguments and evidence presented within the PSR submission (i.e. the RPDSC) and does not have any objections to ONR issuing a decision letter accepting this PSR submission.

Structural Integrity (Ref. 15)

46. There has been no specific submission addressing the primary circuit related SSCs in the PSR submission from ML. However, throughout the assessment of relevant PSR documents and liaison with ML, the Specialist Inspector is generally content with the PSR submission, excepting the lack of focus on monitoring of general corrosion rate.

46.1 Regarding Pre-stressed Concrete Pressure Vessel (PCPV) internal components, e.g., diagrid supporting the core, ML stated that degradation and subsequent collapse of the PCPV internal components would not pose a significant radiological risk, due to the PCPV being vented to external atmosphere, and any failure of the penetrations (internal boiler header connections), would lead to DB0 category “air borne” contamination related dose. ML has not addressed the integrity of the diagrid structure directly, but argued on the “consequences” basis only. The Specialist Inspector believes that although any risk of catastrophic collapse of the diagrid under the weight of the graphite core over the forthcoming PSR period is extremely unlikely, ML would need to monitor the temperature and moisture inside the PCPV to ensure that risk from general corrosion of the core support structure, the diagrid, is demonstrably reduced to SFAIRP.

46.2 In regards to boiler penetrations and pipework, from the evidence provided, the Specialist Inspector is content that since the reactor is now de-fuelled and in quiescent state, and that the primary circuit is vented to external atmosphere, any further deleterious effect due to “operations” related activities is very unlikely over the PSR period. Although the boiler penetrations, which are still lagged and the main steam pipework appear to the Specialist Inspector to be in a reasonably good state, the Specialist Inspector believes ML need to address the effect of general corrosion over the PSR period, on the pipework.

46.3 Regarding the condition of the pipework supporting hangers, based on the evidence provided and the plant walk-down, the Specialist Inspector did not find evidence of any visible signs of degradation with the primary circuit (e.g. main steam line) hangers. However, the Specialist Inspector notes that significant corrosion over the PSR period may degrade the hangers significantly so as to affect integrity of the relevant pipework.

46.4 Regarding temperature / moisture monitoring and corrosion assessments, although there are monitoring regimes in place within the reactor building this does not confirm the absence of corrosion inside the primary circuit. It is the opinion of the Specialist Inspector that the risk of any “wetting” related corrosion is minimal. Considering that the primary circuit metallic components are reasonably thick, the Specialist Inspector believes that corrosion due to moisture in the air would not be a significant issue over the PSR period. However, ML need to address quantitatively with appropriate evidence, the following expectations in the SAP, EMT.1 to EMT.3 and EAD.2.

47. From the structural integrity considerations, whilst the primary components could be judged to be in a reasonably good state, the Specialist Inspector recommends that ML justify the effect of corrosion due to atmospheric moisture over the PSR period, both inside and outside the primary circuit and therefore makes the following recommendation of the licensee:

- **Recommendation 2:** Magnox should continue to monitor the temperature and humidity inside and outside the metallic components containing / retaining the nuclear materials (e.g. de-fuelled graphite core), and take appropriate measures, if judged necessary, such that the risks to those components remain demonstrably So Far As Is Reasonably Practicable (SFAIRP) over the PSR period.

Electrical Engineering, Control and Instrumentation (Ref. 16)

48. The EC&I assessment has targeted the following specific areas:

- Ventilation Systems
- Emergency Equipment
- Provision of back-up electrical power
- Maintenance of electrical systems
- Management of ageing and obsolescence

49. The EC&I Specialist Inspector identified that ML has used a consequence-based fault analysis to determine that the site presents a low nuclear safety risk. Based on the low dose potential of credible faults, the RPDSC only makes nuclear safety claims on civil containment structures that have been substantiated as passive safety features. The RPDSC does not therefore place any nuclear safety claims on EC&I structures, systems and components (SSC).

50. ML's PSR process is focussed solely on nuclear safety, which meets the requirements of ONR Licence Condition 15 (LC15). However, due to the absence of nuclear safety claims on EC&I SSCs, the Specialist inspector found that there was only limited information to support a judgment on whether the provision and maintenance of EC&I SSCs is sufficient to ensure that risks to the public and workers are as low as is reasonably practicable (ALARP). However, based on the limited information available in relation to E,C&I SSCs the Specialist Inspector identified a number of issues requiring further exploration and as such makes the following recommendations:

- **Recommendation 3:** ONR should seek further justification from ML on why the non-provision of back-up diesel generators for radioactive waste storage facilities is considered ALARP. ML's justification should also consider revised National Grid planning assumptions that are more pessimistic in terms of the duration of power outages for a given frequency of occurrence.
- **Recommendation 4:** ONR should seek further assurances that maintenance arrangements for electrical equipment at Oldbury are adequate and that associated risks are reduced ALARP.

51. However, despite the issues that have prompted the Specialist Inspector to make these recommendations and the omission of considerations relating to E,C&I considerations in the PSR/RPDSC, the Specialist Inspector is broadly satisfied with the licensee's PSR submission and has no objections to ONR issuing a decision letter accepting this PSR submission.

Radiation Protection (Ref. 17)

52. The radiological protection assessment of the Oldbury PSR is a proportionate and targeted assessment of the adequacy of radiation protection and emergency arrangements, focusing on:

- Radiological protection arrangements for planned operations
- The collective dose accrued during the review period
- Emergency arrangements

- Proposed future arrangements
- ALARP assessment

53. The Specialist Inspector found the radiological protection arrangements for Oldbury to be appropriate and in line with current guidance. The additional documentation that has been supplied with the topic report provided the required information.

54. From reviewing dose information provided the Specialist Inspector found that the annual collective dose for the site has reduced over the ten years, and the predicted collective dose in majority of cases is higher than actual collective dose. Also the maximum individual dose to any one person on site has been below or around the 1mSv (apart from 2009 which was due to boiler entry). Since 2012, personal contamination events recorded have been less than 20 a year compared to previous years (2009 was 70 contamination events) due to the setup of a Radiological Improvement Group to review and implement changes. This is visible when reviewing plant contamination events which have increased through the improvement of contamination survey practices since 2011. Overall the Specialist inspector found the information provided and justification over the assessment of accrued dose to be acceptable.

55. The Specialist Inspector found the emergency arrangements for Oldbury are appropriate and due to Oldbury entering a new phase within its life cycle for the next ten years the radiological risk to the public is reduced and in line with current guidance.

56. From information provided it is apparent that within the next ten years substantial decommissioning work will commence as Oldbury enters C&M in 2027. However even though the predicted dose for 2018 is double the 2017 estimate the maximum individual dose predicted stays relatively low and in line with previous maximum dose information. The Specialist inspector noted that experience from other ML stations undergoing decommissioning and from other sites across GB has been utilised at Oldbury to help with decommissioning of ponds and other aspects.

57. From reviewing the ALARP assessment provided the five faults assessed all have relatively low dose consequences to both worker and public, where current mitigating options installed are appropriate. However it should be noted that the style that the ALARP assessment was written in did not provide enough justification, due to its main argument being Cost Benefit Analysis (CBA). However Oldbury have provided appropriate information on their approach to ALARP that an appropriate review was undertaken though was not provided in the original document. Though what should be reviewed by ML is the monetary value they have for a statistical fatality as this is below the current limit which is stipulated in ONR ALARP TAG.

58. The Specialist Inspector is satisfied that adequate arrangements have been demonstrated regarding the Oldbury PSR. However, substantial further information was requested which was not in the original documentation provided to ONR for the PSR review.

59. The Specialist Inspector has raised a single recommendation in relation to ML:

- **Recommendation 5:** ML should review the monetary value they have for a statistical fatality when reviewing CBA.

Radioactive Waste Management (Ref. 18)

60. The PSR covers the period from April 2018 to September 2027, which aligns with the site's Care and Maintenance Preparations (C&MP) phase. Decommissioning activities to reduce hazards to the public, personnel and the environment will be undertaken

during the PSR period. However, these proposals were not fully developed at the time of the Specialist Inspector's assessment, therefore have only been considered in the context of ensuring that future decommissioning work will not be compromised by the arrangements described in the RPDSC.

61. The Radioactive Waste Management assessment was focussed on determining the adequacy of:

- The site's Radioactive Waste Strategy
- Arrangements for the safe storage of the existing inventory of radioactive waste.
- Approach to Characterisation
- Waste processing capability during the PSR period (excluding decommissioning wastes)
- Arrangements for the management of Contaminated Land

62. The site's Radioactive Waste Management Case (RWMC) provides an overview of the site's strategy for radioactive waste and identifies appropriate disposal routes for the site's wastes. The RPDSC describes adequate arrangements for the safe storage of radioactive waste, consistent with the SAPs and other relevant good practice. The Specialist Inspector found there to be appropriate waste processing capability for routine waste arisings during the PSR period and that the current arrangements for the management of contaminated land to be adequate and consistent with the SAPs.

63. Based on the evidence sampled, the Specialist Inspector is satisfied that the RPDSC provides an adequate safety case for the safe storage of the existing inventory of radioactive waste and no objections to ONR issuing a decision letter accepting this PSR submission.

Table 1
ONR Findings and Recommendations

ONR Finding	Detail
N/A	N/A – No formal safety significant or lesser safety significant findings
Recommendation	**Detail**
OBA-PSR-REC-01 Civil Engineering and External Hazards	ML should clarify the scope and timeframe with respect to PSR observation TR1-3 to ensure that the radiological risk to workers arising from external hazards is ALARP.
OBA-PSR-REC-02 Structural Integrity	Magnox should continue to monitor the temperature and humidity inside and outside the metallic components containing / retaining the nuclear materials (e.g. de-fuelled graphite core), and take appropriate measures, if judged necessary, such that the risks to those components remain demonstrably So Far As Is Reasonably Practicable (SFAIRP) over the PSR period.
OBA-PSR-REC-03 Electrical Engineering	ONR should seek further justification from ML on why the non-provision of back-up diesel generators for radioactive waste storage facilities is considered ALARP. ML's justification should also consider revised National Grid planning assumptions that are more pessimistic in terms of the duration of power outages for a given frequency of occurrence.
OBA-PSR-REC-04 Electrical Engineering	ONR should seek further assurances that maintenance arrangements for electrical equipment at Oldbury are adequate and that associated risks are reduced ALARP.
OBA-PSR-REC-05 Radiation Protection	ML should review the monetary value they have for a statistical fatality when reviewing CBA.
OBA-PSR-REC-06 General	ONR seeks clarification from ML of when it intends to submit the next PSR, and discuss whether such a delay until 2027 would be of interest to them.
Observation	**Detail**
OBA-PSR-OBS-01 Civil Engineering and External Hazards	The PSR approach for Decommissioning, Fuel and Waste (DFW) sites is focussed solely on Nuclear Safety. Whilst this complies with the requirements under LC15, the constrained nature of the review is not sufficient for inspectors to judge whether civil structures across the site are being adequately maintained to ensure site wide risks are ALARP. An additional review process appears to be needed.
OBA-PSR-OBS-02 Civil Engineering and External Hazards	A systematic approach to examining external hazards and the faults that arise with increasing hazard severity would enable a better understanding of the resilience of civil structures. The current approach taken by the Licensee based on radiological consequences only is certainly the most expeditious route to producing a safety case but is less rigorous and does not allow an understanding of the hazard / risk profile.