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| ONR Project Assessment Report  Hunterston B Power Station Post Defuelling Safety Case |



ONR Project assessment report

**Project name**: Hunterston B Power Station Post Defuelling Safety Case. EC 371015 000 Proposal Version No. 05

**Report title**: Hunterston B Power Station Post Defuelling Safety Case

**Dutyholder/Applicant**: EDF Nuclear Generation Limited – Hunterston B

**Authored by**: Project Inspector, Operating Reactors Sub-Directorate, ONR

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# Executive summary

**Permission Requested**

The Hunterston B (HNB) Post Defuelling Safety Case (PDSC) will be the first safety case of its kind to be implemented in EDF Energy Nuclear Generation Limited’s (NGL) fleet of advanced gas-cooled reactors (AGR). To deliver a safety case commensurate with the hazards on a defuelled station it was produced in accordance with a new Radiological Safety Assessment Standard for Decommissioning AGR Sites which is based on a Nuclear Restoration Services (NRS) standard. The case is safety category 2 reflecting the lower radiological hazards on a fuel free site. ONR decided it was proportionate to assess and permission the first safety case of this type and notified HNB that it should not commence, nor thereafter proceed with the implementation of the HNB PDSC without the agreement of the ONR. HNB has therefore requested ONR’s agreement to implement the safety case.

**Background**

In April 2025, HNB informed ONR that the station was free of all fuel and ONR accepted this statement. There are no fault sequences involving nuclear fuel and the essential defuelling safety cases are no longer relevant to this phase of the station’s lifecycle. EDF has developed the PDSC to justify safety during decommissioning. It covers safety during normal operation of existing facilities and processing of the wastes which are required to maintain the site in the state defined by the safety case. It is not a time limited case but will need to be updated in the future to justify the safety of any further decommissioning activities.

**Assessment work carried by ONR out in consideration of this request**

The purpose of ONR’s assessment was to make a judgement on the adequacy of the PDSC to inform our permissioning decision. A secondary objective was to determine the adequacy of the new Radiological Safety Assessment Standard to inform ONR’s future approach to the permissioning strategy for future submissions written using this standard.

NGL will submit a periodic review of safety for HNB to coincide with the change in lifecycle phase. To inform a future decision on adequacy of the periodic safety review this assessment also considered what elements of a periodic review are fulfilled by the PDSC.

**Matters arising from ONR’s work**

The views of several specialist disciplines were sought and detailed assessment carried out where they considered the risks were highest.

ONR’s assessment confirmed many faults are of low consequence or low frequency. It also found that risks have been reduced as far as is reasonably practicable. The specialists, therefore, had no objections to ONR allowing HNB to implement the PDSC.

For the current plant state, the assessment team concluded the new radiological safety assessment standard has produced an adequate safety case. However, the internal hazards specialist identified weaknesses in the new assessment standard regarding analysis of fire faults and combined hazards and has raised a regulatory issue focussed on the arrangements. The fault studies specialist also observed that due to the low consequence or low frequency of the faults in the PDSC they could not assess the efficacy of the standard in dealing with higher risk faults and made two observations to inform ONR’s intervention strategies for any future cases involving more significant risks.

The PDSC forms part of the HNB periodic safety review (PSR) and meets the requirement for a review of the safety case. It does not, however, meet many of the requirements for PSR and observations are made in this report for consideration when developing ONR’s strategy for deciding on the adequacy of the HNB PSR.

**Conclusion**

Based on the work carried out by ONR, I am satisfied that the HNB Post Defuelling Safety Case (PDSC) is adequate and that risks have been reduced so far as reasonably practicable.

**Recommendation**

I recommend that ONR should issue derived powers licence instrument (LI) 577 agreeing to the implementation of engineering change proposal No: 371015 000, Proposal Version No.: 05, Title: Hunterston B Power Station Post Defuelling Safety Case.

**Table 1: List of abbreviations.**

|  |  |
| --- | --- |
| Term/Acronym | Description |
| ALARP | As low as reasonably practicable |
| AGR | Advanced Gas-cooled Reactor |
| C&I | Control and Instrumentation |
| DFW | Decommissioning, Fuel and Waste (a sub-directorate within ONR) |
| EC | Engineering Change |
| EIMT | Examination, Inspection, Maintenance and Testing |
| HNB | Hunterston B Power Station |
| INSA | Independent Nuclear Safety Assurance |
| LC | Licence Condition |
| LI | Licence Instrument |
| MITS | Maintenance, Inspection and Test Schedule |
| NGL | EDF Energy Nuclear Generation Limited |
| NRS | Nuclear Restoration Services |
| ONR | Office for Nuclear Regulation |
| PCPV | Prestressed concrete pressure vessel |
| PDSC | Post Defuelling Safety Case |
| PSR | Periodic Safety Review |
| SEPA | Scottish Environmental Protection Agency |
| SQEP | Suitable Qualified and Experienced Persons |
| SSC | Structure, system and component |

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# Permission requested

1. In accordance with the licensee's arrangements made under LC22(1) ONR notified [1] HNB that it shall not commence nor thereafter proceed with the implementation of the HNB PDSC without the agreement of the ONR.
2. In April 2025 HNB requested [2] ONR’s agreement to implement the PDSC EC 371015. The station submitted engineering change (EC) proposal 371015 000, Proposal Version No.: 05, Title: Hunterston B Power Station Post Defuelling Safety Case [2] and its independent nuclear safety assurance (INSA) approval statement [2].

# Background

1. The PDSC will be the first post defuelling safety case of its kind to be implemented in NGL’s AGR fleet. It is safety category 2 reflecting the lower radiological hazards on a fuel free site. ONR decided it was proportionate to assess the first safety case of this type and permission the activities covered by it. HNB was notified that it should not implement the PDSC without the agreement of ONR.
2. HNB power station ceased generation in 2022 and commenced defuelling. The safety of defuelling operations were justified by the Defuelling Essential Shutdown Reactor Safety Case and Defuelling Fuel Handling Essential Safety Case. ONR’s agreement to implement these cases was given in LI’s 571 and 572 respectively. See project assessment report ONR-OFD-PAR-21-009 for further details [3].
3. In April 2025 the station wrote [4] to ONR confirming that the HNB Operational Safety Review Committee had confirmed that all the planned quality and associated governance arrangements were complete to confirm that the station was free of all fuel. ONR replied [5] accepting this statement.
4. A fuel free power station does not have any fault sequences involving nuclear fuel and this represents a significant reduction in radiological hazards. The essential defuelling safety cases were therefore no longer relevant to this phase of the station's lifecycle. HNB developed the PDSC [2] to justify safety during the decommissioning lifecycle phase and this identifies, where appropriate, the appropriate limits and conditions for operations, safety mechanisms and maintenance schedule requirements needed for the decommissioning plant state described in the PDSC. The PDSC:

* Identifies the significant radioactive material on site.
* Assesses these plant areas appropriately during normal operations and fault and hazard conditions.
* Proposes appropriate controls and engineered protections to mitigate any dose to workers and public.
* Demonstrates the radiological risk is as low as reasonably practical (ALARP).

1. The PDSC covers the normal operation of existing facilities and processing of the wastes at HNB which are required to maintain the site in the state defined by the safety case. It recognises these activities are not complex compared to an operational or defuelling power station and that the potential radiological hazards are significantly reduced. The PDSC concludes that there are no credible faults that result in public doses greater than 1mSv or worker doses greater than 20mSv. The PDSC is not a time limited case but will need to be updated in accordance with the station’s LC22 arrangements in the future to justify the safety of any decommissioning activities which may affect the plant state described in the PDSC.
2. The PDSC has been written to a new Radiological Safety Assessment Standard for Decommissioning AGR Sites BEG/SPEC/DAO/045 [6] (referred to as DAO/045) which is based on the Nuclear Restoration Services (NRS) standard S-259. At an early stage, ONR engaged with NGL [7-10] to confirm the suitability of this standard. It is the standard currently used by NRS on its decommissioning sites and NGL added a few minor improvements. ONR concluded its use was appropriate for the risks presented by a decommissioning power station which was free from fuel. This has the benefit that the case will be similar to the existing safety cases for NRS’s decommissioning sites and will be familiar when the site is transferred to them. For HNB, this is planned to occur on 1st April 2026.
3. The PDSC was verified in accordance with the licensee's arrangements and has been subject to Independent Nuclear Safety Assessment (INSA). The safety case was presented to NGL’s nuclear safety committee on the 19 March 2025. The committee commented on the case but did not give any formal advice. The INSA approval statement [2] confirms that the INSA and nuclear safety committee’s comments have been addressed.

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

1. The permissioning plan in permissioning record PR-01389 recognises that ONR issued an LI agreeing to the implementation of essential reactor and fuel handling safety cases at HNB [3]. Before agreeing to the implementation of these cases, ONR carried out proportionate assessment which provided rigorous oversight, and this gave ONR confidence in the defuelling safety case process. Defuelling has now been concluded successfully. The PDSC has been categorised by NGL as safety category 2 reflecting the reduced risks on a defuelled site. This level of risk would not normally be subject to a high level of scrutiny or permissioning by ONR. However, HNB is the first of the AGR Fleet to implement a PDSC and it is written to a new assessment standard. ONR therefore decided it was proportionate to require the licensee to seek ONR's agreement to implement the first PDSC.
2. The purpose of ONR’s assessment is to make a judgement on the adequacy of the PDSC to inform our permissioning decision. A secondary objective is to determine the adequacy of standard DAO/45 to inform ONR’s future approach to the permissioning strategy for future submissions written using DAO/45.
3. A Fault Analysis specialist carried out an initial assessment of the PDSC to provide guidance on the highest risks where the specialist inspectors should focus their attention (See section 4.6). The specialists consulted were:

* Fault Analysis
* Nuclear Liabilities Specialist
* Radiological Protection
* Civils
* Internal Hazards
* External Hazards
* Control & Instrumentation
* Mechanical Engineering
* Electrical Engineering
* Structural Integrity
* Human Factors

1. Many of the radiological hazards associated with a defuelling power station are no longer present on a fuel free decommissioning station where the safety related plant consists largely of passive safety features. To ensure that the new standard had produced an adequate safety case for a decommissioning site the specialist inspectors were asked to initially review the PDSC from their perspective to form a view on whether their discipline had been covered appropriately in the safety case and if the new standard had produced the desired result. They were then asked, in consultation with the fault analysis specialist, to consider the magnitude of radiological hazard involved and decide if further assessment was proportionate. They were asked to either produce an ‘other’ report confirming no further assessment was required or carry out a proportionate assessment and record this in a ‘routine’ assessment report.
2. NGLs arrangements under Licence Condition 15: Periodic Review, require a periodic and systematic review and reassessment of safety cases. NGL has aligned the next PSR for HNB with entry into decommissioning recognising that this new re-baselined safety case, the PDSC, will form a significant part of the PSR. However, this assessment of the PDSC will consider to what extent it fulfils the requirements of a periodic review.

# Matters arising from ONR’s work

## Structural Integrity [11]

1. The structural integrity specialist reviewed the HNB PDSC from a steel structural integrity perspective. They also considered, where appropriate, the plant and structures report.
2. The specialist concluded that most SSC’s will have been permanently depressurised, drained of relevant fluids and isolated at the point of implementation of the PDSC. The reactor will be ‘boxed’ (i.e. isolated but not fully sealed) with no engineered vent route to atmosphere. The reactor vessel will be vented to atmosphere rather than isolated. This significantly reduces the nuclear safety risk as most failure mechanisms are no longer relevant or negligible. Similarly, inspection and maintenance activities have also significantly reduced. In general, the radwaste facilities will remain in service. Normal operations will then consist of routine maintenance, inspection and monitoring to ensure functionality and acceptable physical condition. A new nuclear Maintenance, Inspection and Test Schedule (MITS) will be implemented. All existing NGL requirements for non-nuclear safety will remain in place.
3. The main area for consideration from a structural integrity perspective is degradation due to corrosion of SSCs within the reactor vessel due to the unconditioned air environment. The justification for this is presented within the plant and structures report. This provides a justification for 20 years, until the reactor enters care and maintenance. This justification is based upon predicted corrosion levels and is supported by operating experience for similar reactor environments. Metal loss is conservatively predicted to be 0.24mm for each exposed surface. The justification concedes that there may be failures in thin components, but these would not be structurally significant. The case concluded that degradation mechanisms do not challenge the structural integrity of the reactor vessel. The risk from a collapsed core structure is also judged to be radiologically insignificant in the plant and structures report.
4. Based upon the above information the structural integrity specialist had no objections to ONR accepting the PDSC from a structural integrity perspective. Further structural integrity assessment of the case was not considered to be proportionate.

## Human Factors [12]

1. A human factors specialist reviewed the HNB PDSC and concluded that a detailed human factors assessment is not required because the PDSC justifies maintenance and waste processing activities on a largely quiescent site and these activities are neither complex nor novel. The human actions described in the PDSC were not considered challenging from a human factors perspective and the specialist noted the significantly reduced nuclear safety risks on the defuelled site. The specialist did not consider it proportionate to subject this submission to further regulatory scrutiny from a human factors perspective.
2. Due to the simple nature of the human factors content in the PDSC the specialist was unable to comment on the efficacy of the new standard regarding more complex human factors safety justifications.

## Control and Instrumentation (C&I) [13]

1. The C&I specialist reviewed the PDSC considering Licence Condition (LC) 28 Examination, Inspection, Maintenance and Testing (EIMT) arrangements for control and instrumentation (C&I) equipment. The review confirmed any changes to EIMT of C&I equipment monitoring radioactive waste will be justified in accordance with the licensee's arrangements made under LC 22. The specialist judged that:

* HNB has adequately identified and justified C&I related EIMT activities for SSC’s important to safety to ensure that they remain capable of delivering their required safety function.
* HNB has adequately ensured that equipment required for the reliable operation of alarms and indications remain capable of performing their required safety function and that no CCR alarms and indications are necessary to mitigate any risks.
* there is no risk posed by the loss of electrical supplies to the C&I equipment sampled in this assessment.

1. The specialist considered the safety case conclusions to be appropriate and did not identify any significant issues or shortfalls that would prevent them from endorsing the acceptance of the PDSC from a C&I perspective. Based on their assessment, they recommend that ONR grant permission for the implementation of the HNB PDSC.

## Electrical Engineering [14]

1. The electrical engineering specialist consulted with the fault analysis and C&I specialists and confirmed there are no nuclear significant risks arising from the loss of electrical power. There are no faults that require the restoration of an electrical supply within a defined timescale. Therefore, no electrical systems have been included within the nuclear significant MITS. The conclusion of the review was that there is no need for any further electrical assessment because there will be nothing from a nuclear safety significance perspective to assess.
2. There are no reasons from an electrical engineering perspective to prevent NGL implementing the PDSC.

## Mechanical Engineering [15]

1. The mechanical engineering specialist reviewed the HNB PDSC and noted the significantly reduced radiological risks post defuelling. There is no requirement for core cooling as the reactor is in "Unconditioned Air," and Gas Circulators are isolated. Lifting Equipment will be parked safely when not in use and subjected to statutory inspections.
2. Existing site safety management systems will remain unchanged, and MITS are deemed adequate. The radiological risks from lifting operations are low, with the worst fault potentially resulting in an 11mSv dose to a worker.
3. The specialist concluded that based on the identified radiological hazards and risks it is disproportionate to complete a further mechanical engineering assessment.

## Fault Analysis [16]

1. The fault analysis specialist assisted other specialists in targeting their assessment work and sampled relevant areas of the PDSC to gain confidence that the most significant risks were being effectively managed and the new methodology was delivering an adequate safety case. Based on the sampling undertaken, the specialist was satisfied that NGL has undertaken an adequate fault analysis to identify measures to reduce risks ALARP and thus considered the PDSC to be adequate. This judgement recognises the significantly reduced radiological risk posed by the operations proposed in the PDSC, with many areas being managed in a largely quiescent state, and active processing facilities primarily treating low activity radioactive waste/effluent.
2. The fault analysis concludes that most faults are of low consequence or low frequency. The specialist was only able to gain confidence in NGL’s new radiological assessment methodology in this lower risk region, and not for higher consequence faults. They made two observations (below) on this to inform future ONR regulatory engagement strategies. Any specific shortfalls with the methodology have already been highlighted to NGL in previous engagements and no specific recommendation on the dutyholder relating to the methodology at this point was made.

* Observation (1): Assessment of the application of the DAO/045 standard in the PDSC identified no faults falling within SAPs Numerical Target 4 thresholds for Design Basis Analysis. As such it was not possible to establish regulatory confidence on how effective application of the new standard would be for such faults. ONR may wish to consider this further when developing future AGR decommissioning intervention strategies, if required.
* Observation (2): DAO/045 has a frequency cut-off for high consequence faults set at 1E-4 per year, which is set an order of magnitude higher than the expectation in SAPs Target 4. EDF NGL has retained this, from NRS standard S-259, on the basis that a change does not impact the PDSC. ONR may wish to consider the impact of this difference on future AGR decommissioning intervention strategies.

1. As project inspector, I will bring the observations to the attention of relevant ONR inspectors.
2. The fault studies inspector recommended that, from a fault studies perspective, they support permission being given to NGL to implement the PDSC for HNB.

## Radiological Protection [17]

1. The focus of the radiological protection assessment was on how NGL had identified facilities and structures where a radiological hazard remained, and that occupation dose exposures were reduced to as low as reasonably practicable. The specialist only considered routine activities and excluded any decommissioning activities which will be covered by future specific safety case submissions. The key aspects considered were:

* Assessment of projected occupational doses associated with the implementation of the PDSC – i.e. steady plant state pending decommissioning activities.
* Suitable arrangements of radiological monitoring / inspection of the plant to capture any degradation of key structures and supporting equipment to ensure occupational doses remain ALARP.
* Maintenance activities associated with key plant containing radioactive material or supporting radiological protection measures (e.g. engineering controls and design features).
* Arrangements and capability, including governance, documentation, supervision, and suitably qualified and experienced radiological protection staff for compliance with the ionising radiations regulations 2017.
* Personal dose monitoring arrangements and associated equipment (radiological protection instrumentation) remain available and are maintained.

1. The specialist was satisfied that NGL has adequately considered the impact on radiological conditions and operational exposure and that operator doses will remain ALARP. They support, from a radiological protection perspective, the granting of a LC22 derived power LI to implement the PDSC at HNB.
2. The specialist recommended that the assessment of the PSR for HNB should consider the following areas:

* That there are suitable radiological safety rules / arrangement in place at the point of transition from NGL to NRS.
* Radiological protection capability - ensuring there are suitably qualified and experienced persons (SQEP) available to support operations post PDSC implementation and transfer to NRS.
* Radiological protection instrumentation obsolescence should be considered to maintain site capability and support future decommissioning operations.

1. These have been taken forward as observations and will be considered when developing the assessment strategy for the HNB PSR.

## Nuclear Liabilities [18]

1. The Nuclear Liabilities Regulation assessment of the PDSC focussed on the quiescent plant state described in the case and considered the changes that the PDSC will implement relative to the extant defuelling safety case. It recognised that the decommissioning activities that will implement the site-specific decommissioning plan are out of scope of the PDSC.
2. The PDSC does not implement significant changes to the operation of the radwaste facilities but it does claim that less radioactive waste is generated in the plant state described by the PDSC and so the specialist judged the capacity of radwaste facilities to be sufficient to process the expected volume of waste generated. They also consider there to be suitable SSC’s and administrative controls in place to reduce generation of radioactive waste so far as is reasonably practicable.
3. The specialist sampled the waste acceptance criteria and inventory of the Intermediate Level Waste Store and judged NGL to have adequate arrangements in place for safe storage of waste in the store. They are satisfied that the desiccant and catalyst waste stream is being given due consideration so that there will be sufficient storage capacity for this in the repurposed New Fuel Store when it is retrieved from the vaults. The specialist was satisfied that the PDSC adequately addresses radioactive waste safety.
4. The PDSC does not define a sequence of decommissioning activities, nor does it justify the availability of SSCs which may be required over the care and maintenance preparations phase of decommissioning. To ensure HNB has adequately considered these aspects the specialist recommended “ONR should consider whether HNB PSR is integrated with the site decommissioning strategy and the site-specific decommissioning plan. This includes considering whether the PSR presents an adequate forward-looking safety justification which considers the availability of SSCs required to support decommissioning. This should be followed up via the PSR assessment process.”
5. The safety risks of radioactively contaminated land to workers at HNB are relatively low and there are no faults associated with contaminated land in the fault schedule. NGL has corporate arrangements for managing contaminated land which HNB is implementing through its groundwater monitoring programme and by developing a conceptual site model for potentially contaminated land. The specialist judged NGL to be adequately implementing arrangements for identifying and characterising radioactively contaminated land and groundwater at HNB.
6. From an NLR perspective the specialist considered the PDSC to present an adequate safety case and to have demonstrated that risks have been reduced ALARP. The inspector supports ONR permissioning the safety case.

## Civil Engineering [19]

1. The civil engineering assessment focussed on the civil structures and prestressed concrete pressure vessel (PCPV) and the associated maintenance requirements. The assessment found the PDSC does not place any increased duty or identify additional hazards post fuel free verification on civil structures or the PCPVs. Despite this, the existing LC28 inspection programme for the nuclear safety related civil structures and the PCPVs will be initially unchanged and will be transferred to the new PDSC MITS and continued into the post-defuelling period. NGL has also identified the gaps between the current LC28 buildings inspection programme and the claims/assumptions in the PDSC, and recommendations raised and actioned appropriately.
2. Future arrangements to achieve de-stressing of PCPVs will be covered outside of the PDSC.
3. Based on the sampling of the submission undertaken the specialist was satisfied with the NGL approach.
4. The specialist recommended that ONR’s assessment of the HNB PSR should give special consideration to ageing effects of civil structures and potential consequences on maintenance and inspection regime.

## External Hazards [20]

1. The external hazards specialist sampled relevant aspects of the PDSC to gain confidence that the most significant risks are being effectively managed.
2. The specialist considers the external hazards analysis and the PDSC to be adequate. Their judgement recognises the reduced radiological risk present on the HNB site which limits the risks that external hazards may pose to the site.
3. The specialist raised two observations that will be followed up through routine regulatory interactions. These are:

* The dutyholder claims that activities can be suspended during extreme ambient temperature events. It is unclear at what temperatures activities would be suspended. The dutyholder should clarify the temperatures at which activities would be paused.
* ONR should clarify how NRS will manage climate change effects on HNB over the PDSC period, and beyond. I propose ONR follow this up during relicensing of HNB to NRS

## Internal Hazards [21]

1. The internal hazards specialist recognises that the post-FFV state, as presented by the PDSC, reflects a general reduction in risks due to a reduction in radiological risk following reactor shutdown, the lower temperatures and pressures found on plant and a reduction in the chemotoxic risk. Areas of risk persist to some extent, including from flood and dropped loads. However, the maintenance of safety arrangements, as indicated in the PDSC, indicate no increase in the level of risk in these areas and this aspect was not considered further.
2. Radwaste facilities are identified as areas that will retain an element of radiological risk due to the requirement for continued operation. The specialist focussed their review on this aspect and specifically the PDSC assessment of fire faults in the low-level waste facility. The inspector observed that the analysis should be based on complete burn-out of all combustible loads within the compartment, which in the context of an un-compartmented building may form the whole building
3. The radiological significance of the combination of fire faults involving multiple waste inventories stored in the low-level waste facility has not been assessed under the PDSC. The specialist consulted with ONR’s radiation protection inspector who provided some confidence that a public dose of 1 mSv will not be reached in the event of fire involving the total radiological inventory of the low-level waste facility. The inspector therefore considered it to be disproportionate to undertake further assessment.
4. This assessment has identified a weakness in DAO/45 in the treatment of combined hazards and assessment of fire faults. This will be followed up through a regulatory issue (RI-12645) seeking improvement in the arrangements.
5. The inspector has no objections to ONR permissioning the HNB PDSC.

## Project Inspection

1. The PDSC contains six key assumptions that must be met for the fault schedule assessments in the PDSC to remain valid. These assumptions include the plant state and fuel free status of the site, the continuation of radiological and non-nuclear safety arrangements and appropriate EIMT of SSCs.
2. I have reviewed the six key assumptions and judge they are reasonable and reflect the post fuel free verification status of the plant and management arrangements.

## Periodic Safety Review

1. For the decommissioning phase, the PDSC justifies the safety of operations in the plant state defined in the case including an update of the current radiological inventory of the site. Further justifications will be needed to cover future decommissioning activities. The PDSC contains a revised maintenance schedule detailing the maintenance and testing requirements for the remaining plant which may affect safety. Removal of the plant which is not required from the maintenance schedule will be controlled by the licensee’s arrangements made under LC 22. Production of the PDSC, therefore, constitutes an adequate review of the station’s safety case and confirms it is adequate for current operations. The case considers degradation mechanisms associated with the reactor being vented to air and justifies the safety of these conditions for the decommissioning phase.
2. There are a few specific observations by specialist inspectors that have been highlighted in previous sections (see Sections 4.7, 4.8 and 4.9). These observations should be considered by ONR when developing the strategies for assessment of the HNB PSR and the relicensing of the site to NRS.
3. Requirements of a periodic review which are not fulfilled by the PDSC include:

* The PDSC does not review ageing and other effects which may render the plant unsafe before the next PSR. Table 1 (structures, systems and components important to safety) in the PDSC generally assumes the state of SSCs important to safety are structurally intact with no significant degradation. This assumption is not substantiated by inspections or walkdowns and the actual condition of the plant will need to be considered by the PSR.
* The PDSC does not review the management of safety arrangements or the resources available for their implementation. It also does not consider the station’s safety performance or any external operating experience. NGL has produced an engineering advice note describing the scope for the fourth periodic safety review and this describes how the requirements for the PSR and PDSC differ.[22]

## SEPA

1. The Scottish Environmental Protection Agency (SEPA) has confirmed [23] it has no reasons for ONR to withhold permission to implement the PDSC.

# Conclusions

1. The PDSC has been verified, independently reviewed, presented to the nuclear safety committee and approved in accordance with the licensee’s arrangements. SEPA has confirmed it has no reasons to withhold permission to implement the case [23].
2. I have reviewed the six key assumptions in the safety case and judge they are reasonable and reflect the post fuel free verification status of the plant and management arrangements.
3. Pertinent specialist inspectors have reviewed and, where proportionate, assessed the PDSC and have found no reasons to withhold permission to implement it. The fault studies and radiation protection inspectors consider the risks to be ALARP. These are key assessments recognising the low radiological risks at a fuel free site.
4. The PDSC fulfils the requirement of a PSR for an adequate review of the station safety case and confirms it is adequate for current operations. Section 4.13 lists additional requirements of a periodic review which are not addressed by the PDSC.
5. No issues were identified with the new Radiological Safety Assessment Standard for Decommissioning AGR Sites BEG/SPEC/DAO/045 [6] and it has delivered an adequate PDSC. Due to the reduced hazards on the station the assessment could only gain confidence in NGL’s new radiological assessment methodology in this lower risk region, and not for higher consequence faults. Two observations are made to inform future ONR regulatory engagement strategies.
6. Based on the assessment work, I am satisfied that the HNB PDSC is adequate and that risks have been reduced so far as reasonably practicable.

# Recommendations & Observations

1. I recommend that ONR should issue derived powers LI577 agreeing to the implementation of engineering change proposal No: 371015 000, Proposal Version No.: 05, Title: Hunterston B Power Station Post Defuelling Safety Case. I have prepared LI577 [24] for signature
2. When developing a strategy for assessment of future HNB submissions (e.g. PSR and site relicensing) the following observations should be considered:

* Whether the submissions are integrated with the site decommissioning strategy and the site-specific decommissioning plan. This includes considering whether the submissions present an adequate forward-looking safety justification which considers the availability of SSCs required to support decommissioning.
* If there are suitable radiological safety rules / arrangement in place at the point of transition from NGL to NRS.
* Is there suitable radiological protection capability and SQEP resource available to support operations post PDSC implementation and transfer to NRS.
* Is radiological protection instrumentation obsolescence considered to maintain site capability and support future decommissioning operations.
* Ageing and other effects which may render the plant unsafe before the next PSR. The civil engineering specialist recommended special consideration of the ageing effects of civil structures and potential consequences on maintenance and inspection regime.
* The management of safety arrangements and the resources available for their implementation, the station’s safety performance, and any external operating experience.
* ONR should clarify how NRS will manage climate change effects on HNB over the PDSC period, and beyond.

1. The fault analysis and internal hazards specialists made the following observations to inform ONR’s future interventions involving BEG/SPEC/DAO/045 [6]

* There were shortfalls in the assessment of combined hazards and fire faults. A regulatory issue (RI-12645) has been raised seeking improvement in the arrangements.
* Assessment of the application of the DAO/045 standard in the PDSC identified no faults falling within SAPs Numerical Target 4 thresholds for design basis analysis. As such, it was not possible to establish regulatory confidence on how effective application of the new standard would be for such faults.
* DAO/045 has a frequency cut-off for high consequence faults set at 1E-4 per year, which is set an order of magnitude higher than the expectation in SAPs Target 4. EDF NGL has retained this, from NRS standard S-259, on the basis that a change does not impact the PDSC.

# References

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