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| ONR Project assessment report  Sizewell B PSR3 – Assessment of the Third Periodic Safety Review (PSR3) |



ONR Project assessment report

**Project name**: Sizewell B PSR3

**Report title**: Assessment of the Third Periodic Safety Review (PSR3)

**Dutyholder/Applicant**: EDF Nuclear Generation Ltd

**Authored by**:

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# Executive summary

**Assessment of the Third Periodic Safety Review for Sizewell B**

**Permission Requested**

EDF Nuclear Generation Ltd (EDF NGL, the ‘licensee’) has submitted its third periodic safety review (PSR3) for Sizewell B power station to ONR. The scope of PSR3 covers all nuclear safety related plant and equipment at Sizewell B power station, except the dry fuel store. PSR3 also considers aspects such as the licensee’s organisation, management systems and human factors.

A decision letter will provide our view on the adequacy of the PSR3 and its justification for continued safe operations at Sizewell B power station for the period 2025 – 2035.

**Background**

The Sizewell B power station is the only operational pressurised water reactor in the United Kingdom. It commenced generation in February 1995 and the station is currently due to cease operations at the end of the next PSR period. However, the licensee has aspirations for long term operation of Sizewell B which would extend the operational life of the station by at least 20 years, to 2055.

The requirement to carry out a PSR is based on the need for compliance with LC 15 - Periodic Review. International standards state that it is reasonable to perform a PSR about every 10 years and this is the third PSR to be carried out for Sizewell B power station.

The approach taken by the licensee for PSR3 was closely aligned to the International Atomic Energy Agency (IAEA) guidance on PSRs. The IAEA approach allows the PSR to become more focused on reviewing the effectiveness of the licensee’s business processes, which address fundamental issues related to the maintenance of, and justifiable improvements in, nuclear safety.

The licensee’s PSR3 submission concludes that the plant is safe to operate until at least the end of the next PSR period (in 2035).

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

A total of 15 regulatory assessments were carried out of the Sizewell B PSR3. These assessments included familiarisation visits to Sizewell B, inspection of plant, requests for additional information and meetings with EDF NGL staff.

**Matters arising from ONR's work**

The key findings from our regulatory assessments are:

* 12 of 15 regulatory assessments considered the Sizewell B PSR3 to be adequate. This included all the engineering and human and organisational capability assessments.
* We identified shortfalls in the systematic review of the safety case. The PSR3 review of the deterministic safety case (including the associated analysis) and hazards safety cases was not to the extent expected when benchmarking against relevant good practice There was also a failure to review aspects of the deterministic safety case. The fault analysis, external hazards and internal hazards inspectors therefore judged the Sizewell B PSR3 to be inadequate.
* There are PSR2 shortfalls that remain fully or partially unresolved. This does not meet relevant good practice for timely shortfall resolution. The most significant outstanding items will be tracked via ONR regulatory issues.
* LC 15(1) states ‘The licensee shall make and implement adequate arrangements for the periodic and systematic review and reassessment of safety cases’. The shortfalls identified lead to a conclusion that the licensee’s arrangements for LC 15 are not adequate.
* In total we have identified 16 regulatory findings, where the licensee is required to carry out further work. The licensee will develop proposals for the resolution and close out of these findings within agreed timescales in Q2 2025.
* Recognising the shortfalls identified the licensee has considered if Sizewell B remains safe to operate. The licensee has concluded there are no immediate challenges to operational safety and our inspectors have not identified any immediate safety concerns that would require Sizewell B to cease operations. We have confidence in the licensee’s decision-making process should any safety case anomalies be revealed during the work to address the shortfalls identified.

**Conclusions**

Although our work has judged parts of the Sizewell B PSR3 submission to be adequate it has also identified shortfalls in aspects of the systematic review of the safety case and, in timely shortfall resolution. The licensee has acknowledged these shortfalls and we have agreed the scope of the work required to resolve them.

Our decision letter will therefore communicate our requirement that the licensee must re-submit those aspects of the PSR which are inadequate. Until we confirm these aspects of the PSR are adequate we cannot make a judgement of the facility’s suitability for continued safe operation for the next review period (2025-2035). The resolution of the above issues and our other regulatory findings will be tracked through regulatory issues.

With regard to timely shortfall resolution this report recommends that a LC 15 compliance inspection, targeted on shortfall resolution, should be undertaken at an appropriate point in the future but no later than January 2028.

We have not identified any immediate safety concerns that would require shutdown of Sizewell B. If any anomalies are identified by the licensee during the work required to address the shortfalls in the PSR3 we have confidence in the licensee’s safety case anomalies process.

**Recommendation**

* We should issue a decision letter requiring the licensee to re-submit those aspects of the PSR which are inadequate. Specifically the reviews of the deterministic safety analysis and hazards analysis.
* We should carry out a future LC 15 inspection targeted on shortfall resolution to provide regulatory confidence that the licensee is addressing PSR shortfalls in a timely manner. This should be at an appropriate point in the future but no later than January 2028.
* We should seek improvement in the licensee’s LC 15 compliance arrangements.

Table 1: List of abbreviations.

|  |  |
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| Term/Acronym | Description |
| AGRs | Advanced Gas-Cooled Reactors |
| ALARP | As low as reasonably practicable |
| C&I | Control and Instrumentation |
| EDF NGL | EDF Nuclear Generation Ltd (the licensee for SZB) |
| IAEA | The International Atomic Energy Agency |
| LC | Licence Condition |
| LMfS | Leadership and Management for Safety |
| NNBR | New Normal Business Recommendations |
| ONR | Office for Nuclear Regulation |
| OPEX | Operating Experience |
| PSA | Probabilistic safety analysis |
| PSR | Periodic Safety Review |
| PSR2 | Second Periodic Safety Review |
| PSR3 | Third Periodic Safety Review |
| PWR | Pressurised Water Reactor |
| RGP | Relevant good practice |
| SCHR | Safety Case Health Review |
| SCR | Safety Case Review |
| SF | Safety Factors |
| SSC | Structure, system and component |
| SZB | Sizewell B |
| UK | United Kingdom |

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Appendix 1 – SZB PSR3 structure

Appendix 2 – ONR assessment summaries

# Permission requested

1. In January 2024, EDF Nuclear Generation Ltd (EDF NGL, the ‘licensee’) submitted its third periodic safety review (PSR3) for Sizewell B to ONR. The scope of the Sizewell B PSR3 covers all nuclear safety related plant, safety cases and aspects such as the licensee’s organisation, management systems and human factors.
2. The dry fuel store is not within the scope of the PSR3 submission and a PSR for the dry fuel store will be submitted to ONR by 2027, which is 10 years from the date of the first cask being loaded into that facility.
3. In line with our guidance (Ref. [1]) we will issue a decision letter to the licensee providing our view on the adequacy of the PSR and its justification for continued safe operations at Sizewell B for the period 2025 to 2035.

# Background

1. The Sizewell B power station is the only operational pressurised water reactor (PWR) in the United Kingdom (UK). It commenced generation in February 1995 and is currently planned to stop generating in 2035. However, the licensee is pursuing long term operation of Sizewell B which would extend the operational life of the station by at least 20 years, to 2055. The work required to support this aspiration is within the next PSR period.
2. The requirement to carry out a PSR is based on the need for compliance with LC 15 - Periodic Review. International standards (Ref. [2]) state that it is reasonable to perform a PSR about every 10 years and the licensee submitted the Sizewell B PSR3 to us in January 2024 (Ref [3]), 10 years from the PSR2 submission date.
3. The purpose of a PSR is to consider all factors that may affect the safety of the plant over its life time and can be summarised under the following bullet points (Ref. [1]):

* The extent to which the plant conforms to current national and/or international safety standards and operating practices.
* The extent to which the safety documentation, including the licensing basis, remains valid and reflects the current plant to ensure that the claims, arguments and evidence are still appropriate, and the risks are managed to ALARP.
* The adequacy and efficacy of the arrangements and structures, systems and components (SSC) in place to maintain safety until the next PSR or the end of life.
* Safety improvements to be implemented to resolve safety issues.

1. In line with our guidance (Ref. [1]), I have produced this project assessment report to report on the extent of our assessment, summarise our assessment findings and provide a regulatory judgement on the adequacy of the Sizewell B PSR3.

### The Periodic Safety Review

1. The licensee commenced the Sizewell B PSR3 in 2021, consistent with the approach set out the scoping document (Ref. [4]). This document defined the scope of work to be undertaken and established the methodology. The structure of the review was aligned to the International Atomic Energy Agency (IAEA) PSR guidance (Ref. [2]) and based on the use of safety factors (SF). This approach to PSR is consistent with the approach adopted by the licensee for PSR3 for the Advanced Gas-cooled Reactors (AGRs).
2. The safety factors are supported by a suite of individual safety case reviews (SCRs) that are intended to provide a comprehensive and detailed review of a plant or discipline area. This aspect is different from the AGR PSR3 approach, which used evidence from their safety case health review (SCHR) process. The SCHR process provides interim reviews of the safety case over the 10-year period and thus provides evidence of a regular review of the safety case. Sizewell B have not followed this approach and instead use the SCR documents to conduct an in-depth review of the safety case at the 10 yearly interval rather than undertaking interim reviews. The structure of the PSR3 submission is detailed in Appendix 1. The Sizewell B PSR3 excluded the IAEA safety factor related to decommissioning due to the licensee’s aspirations for long term operation of Sizewell B.
3. Supporting work carried out by the licensee that fed into the safety factor reports and the SCR’s included:

* Plant walk downs that included consideration of plant material condition, hazards and human factors issues.
* Early stand back reviews which identified areas of particular strength or best practice, issues within the plant, and issues which may constitute major deficiencies in the safety case and/or safety case management process.
* A review of the Operating Experience (OPEX) since the last PSR to assess the effectiveness of the licensee’s process to acquire, review and respond to OPEX at a high-level, and to identify specific safety case shortfalls.
* Codes and standards reviews to review conformance of nuclear safety related plant and safety cases with any changes to codes, standards and methodologies as well as all relevant good practice (RGP).
* Maintenance strategy and system performance reviews.

1. The licensee has identified PSR recommendations which they have categorised by nuclear safety significance:

* Category A: PSR3 identified nuclear safety significant issue which must be resolved by the ONR decision date.
* Category B: PSR3 identified nuclear safety significant issue, which will be resolved by a timescale commensurate with its safety significance. The timescale will be shared with ONR.
* New Normal Business Recommendations (NNBR): PSR3 identified issue of a low nuclear safety significance. Timescales are determined by existing EDF NGL normal business processes for prioritisation of work.

1. The licensee identified no category A recommendations and 42 category B recommendations. A further 295 issues were identified of low nuclear safety significance and were categorised as new normal business recommendations. The licensee will produce an integrated delivery plan for resolution of the Category B recommendations and ONR findings prior to the 31 July 2025 and share this with us.
2. The licensee has followed its own internal assurance process for the production, review and assessment of the Sizewell B PSR3 and sentencing of recommendations. The final submission document, the safety factor reports and safety case reviews have been subject to an independent periodic review assessment by the licensee’s independent nuclear assurance (Ref. [5]). The PSR3 final submission has also been considered by the licensee’s nuclear safety committee which was supportive of the work done (Ref. [6]).
3. The licensee has concluded from its review that the station’s safety case remains appropriate, the nuclear safety risk from the design and operation of Sizewell B is managed in accordance with ALARP principles, and the plant is safe to operate for at least the period until completion of the next PSR (2035) noting the potential for emergent degradation issues which could challenge future operability. No issues were identified by the licensee which pose a serious threat to securing long term operation of Sizewell B, beyond its’ 40 year design life. PSR3 also acknowledges that although the plant and safety case have not changed dramatically over the PSR3 period, there have been substantial changes to the licensee’s organisation, and that changes continue to be made. These changes are considered positive in nature by the PSR3.

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

1. A total of 15 regulatory assessments were carried out of the Sizewell B PSR3. Interventions for these assessments included familiarisation visits to Sizewell B, inspection of plant, requests for additional information and meetings with the licensee’s staff. The assessments covered the following topics:

* Electrical Engineering (Ref. [7])
* Control and Instrumentation (C&I) (Ref. [8])
* Structural Integrity (Ref. [9])
* Mechanical Engineering (Ref. [10])
* Civil Engineering (Ref. [11])
* Chemistry (Ref. [12])
* Fuel and Core (Ref. [13])
* Fault Studies (Ref. [14])
* Probabilistic Safety Analysis (PSA) (Ref. [15])
* Internal Hazards (Ref. [16])
* External Hazards (Ref. [17])
* Leadership and Management for Safety (LfMS) (Ref. [18])
* Radiological Protection (Ref. [19])
* Human Factors (Ref. [20])
* Nuclear Liabilities (Ref. [21])

1. Additionally our PSR3 assessments considered the outcome from other relevant interventions such as:

* Chief Nuclear Inspector ageing management themed inspections (Ref. [22])
* European Union’s nuclear safety directive topical peer review on fire safety (Ref. [23])

1. Our assessments considered the adequacy and implementation of the licensee’s review processes for the Sizewell B safety cases and safety management arrangements. Sampling of the outputs and outcomes of their arrangements was used to provide evidence of the effective implementation of the arrangements described and claims made in the PSR3 submission. The judgements of the inspectors are recorded in assessment reports and a summary of each assessment is provided in Appendix 2.

# Matters arising from ONR’s work

1. The key matters arising from our assessments can be summarised as follows:

* 12 of 15 assessments considered the Sizewell B PSR3 to be adequate. This included all the engineering assessments and the human and organisation capability assessments which generally considered RGP to have been met. However, there were a number of regulatory findings and other items to be followed up through routine regulatory business. Regulatory issues will be raised to track these.
* We considered there to be some significant shortfalls in the periodic and systematic review of the safety case. The key shortfalls identified include:
  + The systematic review of the deterministic safety case (including the associated analysis) and hazards safety cases was not to the depth expected by RGP and the licensee could not provide evidence that the PSR3 review had been undertaken to an appropriate standard. A similar observation regarding the depth of review was also raised on the review of the hazards PSA.
  + The PSR failed to review all aspects of the deterministic safety case (and associated analysis).
  + The fault studies, internal hazards and external hazards assessments consider that the Sizewell B PSR3 is inadequate.
* The licensee’s review identified a number of PSR3 recommendations and we have identified a number of further areas where the licensee needs to do additional work and these have been raised as regulatory findings (see Table 2). However, we have also identified that there are PSR2 safety significant recommendations (Category B) that remain fully or partially unresolved (paragraph 20 considers this further). This does not meet regulatory expectations for timely shortfall resolution. The decision date for PSR2 was January 2015 and our guidance (Ref. [1]) states:

*The intent should be to implement all improvements before the PSR 'Decision Date', unless alternative arrangements have been agreed with the ONR. In cases where this is not reasonably practicable, the improvements should be completed in a timely manner within a two year period after the Decision Date, unless the licensee can make a strong case for going beyond this period such as long lead times for the design and procurement of plant and equipment.*

* 7 (of 15) of our assessments were rated amber, ‘seek improvement’, in accordance with our assessment ratings guidance (Ref. [24]).

1. We have engaged with the licensee on the significant shortfalls related to the periodic and systematic review of aspects of the safety case. The licensee has accepted these findings (Ref. [25]) and will:

* revise the hazards analysis report (SF7) to provide evidence of a systematic review of the hazards safety case. We have agreed with the licensee the approach and timescales to deliver this update and we have raised a regulatory issue (RI-12223) to hold the licensee to account on delivery of this work.
* revise the deterministic safety analysis report (SF5). The licensee has acknowledged there are gaps in the completeness of the review of the deterministic safety case (including the associated analysis). Actions have been agreed to ensure a complete review of the deterministic safety case whilst also addressing our concerns regarding the depth of the review and benchmarking against RGP. This work is potentially a significant undertaking and therefore the licensee will scope the work to allow an underpinned programme to be provided. A regulatory issue (RI-12387) has been raised to hold the licensee to account on delivery of this work.

1. With regard to the weaknesses in shortfall resolution the licensee has acknowledged that the pace of resolution for the outstanding PSR2 shortfalls has not been satisfactory. The licensee has re-assessed the risk from the failure to deliver timely resolution of PSR2 shortfalls (Ref. [25]) and they consider that the residual risk from these shortfalls does not require any immediate response, that the current assessed risk for all outstanding items is improved from the assessed risk at PSR2 and the outstanding items constitute ALARP improvements. The licensee has committed to additional oversight for PSR shortfall resolution and has identified improvements in planning and delivery of work that they consider will improve the timeliness of PSR shortfall resolution (Ref. [26]). Whilst this is welcome we consider additional regulatory oversight is required on this topic. For the most significant PSR2 shortfalls that remain outstanding we have regulatory issues raised that will provide regulatory oversight. A recommendation from this project assessment report is that a LC 15 compliance inspection targeted on PSR3 shortfall resolution should be undertaken in the future.
2. Recognising the shortfalls identified in the PSR3 the licensee has considered if Sizewell B remains safe to operate (Ref [25]). The licensee has concluded that the shortfalls identified do not constitute an immediate challenge to Sizewell B’s operational safety noting the most significant shortfalls identified are in the periodic review of the safety case. Our inspectors have not identified any immediate safety concerns which would require shutdown of Sizewell B and if any anomalies are identified during the work required to address the shortfalls in the PSR we have confidence in the licensee’s safety case anomalies process.
3. LC 15(1) states ‘The licensee shall make and implement adequate arrangements for the periodic and systematic review and reassessment of safety cases’. The shortfalls identified lead to a conclusion that the licensee’s arrangements for LC 15 are not adequate. We have therefore raised a regulatory issue requiring improvement in the licensee’s LC 15 arrangements at Sizewell B, such that they are adequate. The licensee is undertaking an investigation into the shortfalls identified and failures in organisational learning, as some of these shortfalls have been identified by us in previous AGR PSR3 submissions. This investigation will be tracked through regulatory issue 12382.
4. We have also applied ONR’s enforcement management model to determine any enforcement action required as a result of the shortfalls identified. This has resulted in an enforcement letter being sent to the licensee and that letter also acts as the PSR3 decision letter required by our arrangements.
5. The licensee has concluded that Sizewell B remains safe to operate for the next period (2025 to 2035). However, we are not currently able to make a judgement on that claim given the significant shortfalls identified in aspects of the systematic review of the safety case. The re-submission of the reports identified above will allow us to make a judgement on adequacy of the PSR and the licensee’s claim of operational safety for the next period. The decision date for Sizewell B PSR4 will remain as January 2035 regardless of the ongoing work.

# Conclusions

1. Our work has judged aspects of the Sizewell B PSR3 submission to be adequate. However, it has also identified significant failures in aspects of the systematic review of the safety case and in timely shortfall resolution. The licensee has acknowledged these shortfalls and we have agreed the work required to resolve these issues
2. Our decision letter will communicate our requirement that the licensee must re-submit the SF5 (deterministic safety analysis) and SF7 (hazards analysis) reports to allow us to confirm an adequate PSR has been undertaken. We will also seek improvement in the LC 15 arrangements. The decision letter will also act as an enforcement letter.
3. With regard to the weaknesses identified in shortfall resolution a recommendation of this project assessment report is that we should carry out a targeted LC 15 inspection on shortfall resolution in the future.
4. The licensee has provided a justification as to why the station remains safe to operate. We are content that there are no immediate safety concerns that would require shutdown of Sizewell B.
5. Notwithstanding the conclusion that SZB should re-submit aspects of PSR3, the submission of the subsequent PSR would be expected no later than ten years after the stated submission date for the current PSR, namely January 2034 for a decision date of January 2035.

# Recommendations

* We should issue a decision letter requiring the licensee to re-submit those aspects of the PSR which are inadequate . Specifically the reviews of the deterministic safety analysis, hazards analysis
* We should seek improvement in the licensee’s LC 15 compliance arrangements.
* We should carry out a future LC 15 inspection targeted on shortfall resolution to provide regulatory confidence that the licensee is addressing PSR shortfalls in a timely manner. This should be at an appropriate point in the future but no later than January 2028

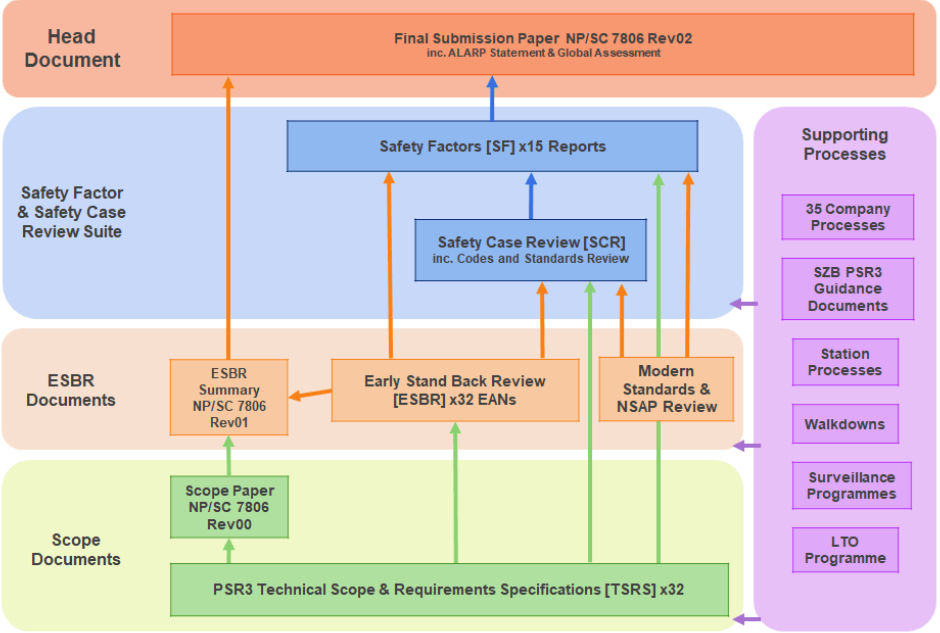
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| [10] | *ONR, Mechanical Engineering Assessment of the Sizewell B PSR 3 Submission, AR-01440, ONRW-2126615823-5387.* |
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| [14] | *ONR, Sizewell B Periodic Safety Review 3 - Fault Studies Assessment, AR-01497, ONRW-2126615823-5373.* |
| [15] | *ONR, Sizewell B Periodic Safety Review 3 – Probabilistic Safety Analysis Specialist Assessment, AR-01405, ONRW-2126615823-5100.* |
| [16] | *ONR, Sizewell B Periodic Safety Review 3 (PSR3) – Assessment of the Internal Hazard aspects of the Sizewell B PSR3, AR-01611, ONRW-2126615823-5510.* |
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**APPENDIX 1 – PSR3 Submission Structure**

1. The documentation provided by the licensee follows the guidance laid out in IAEA document number SSG-25 (Periodic Review for Nuclear Power Plants) (Ref. [2]). The documentation included a final submission document, safety factor reports and safety case reviews with supporting documentation (eg walkdown reports, early stand back reviews). The document structure and relationships are shown in Figures 1 and 2 below.

**Figure 1: Sizewell B PSR3 Document Structure**



**Figure 2: Principal PSR3 Documents**

List of principal PSR3 Documents

**APPENDIX 2 – ONR assessment summaries**

1. This appendix provides an overview of the outcomes from our assessments of the Sizewell B PSR3 submission. The conclusions and regulatory findings from each assessment are provided. Where similar findings are raised across several topic areas a consolidated ONR finding is listed in Table 2 following discussion and agreement within the assessment team.
2. We will ensure resolution of the identified findings through regulatory oversight by regulatory issues (see Table 2).

**Electrical**

1. The scope of this assessment (Ref. [7]) includes the licensee’s electrical systems review and its consideration of actual condition of plant, ageing, obsolescence and lifetime management of plant and equipment.
2. The inspector considers that the review reports submitted by the licensee provide evidence that RGP has been adopted regarding a systematic review and assessment of the electrical structures, systems and components that play an important role in supporting the Sizewell B safety case. In addition, the PSR3 recommendations have been graded with relevance to their nuclear safety significance and used to determine the means for their rectification.
3. The inspector concludes that the licensee has performed an effective review of the electrical engineering aspects of its safety case for Sizewell B and is managing plant condition, ageing and obsolescence issues in an acceptable manner. The inspector also considers that the licensee is applying RGP when assessed against ONR or other published guidance.
4. The inspector judges that the Sizewell B PSR3 has met the requirements of LC 15 and they have no objection to ONR issuing a positive decision letter to the licensee. The inspector also recommends that regulatory oversight should be maintained on timely shortfall resolution. One minor residual issue will be followed up through normal regulatory business (Regulatory issue 12395 refers).

**Control and Instrumentation**

1. The assessment (Ref. [8]) focused on ageing and obsolescence management, equipment operating environment specification and control, spares management and knowledge management.
2. The key findings were:

* Sizewell B has adequate ageing and obsolescence arrangements and that they are, being appropriately implemented.
* Sizewell B has adequate equipment operating environment control and specification arrangements and they are being appropriately implemented.
* Sizewell B has adequate C&I equipment spares management arrangements and they are being appropriately implemented. Two areas of RGP were identified relating to the use of data loggers to establish the actual environmental conditions and in the storage of C&I equipment spares within a controlled environment.
* Sizewell B has adequate C&I equipment knowledge management arrangements and that they are, being appropriately implemented.

1. Overall, the inspector judges that adequate arrangements are in place to sustain the health of Sizewell B C&I equipment and systems over the next PSR period, and that RGP has been met. A number of minor issues, where the arrangements could be improved will be followed up through normal regulatory business (Regulatory issues 12244, 12246 and 12247 refer).
2. The inspector concludes that an adequate PSR has been completed and a positive decision letter can be issued.

**Structural Integrity**

1. This assessment (Ref. [9]) targeted areas judged to be of higher risk for the next ten years of operation. The inspector sampled a number of strategy documents, which, although not safety cases themselves, can influence the safety case content going forward. The strategy documents sampled included:

* the Steam Generator strategy where the inspector judges that an adequate examination, maintenance, inspection and testing plan is in place.
* the fatigue management strategy which states a position on environmentally assisted fatigue that we do not consider to be adequate. The inspector considers further work is required on this topic and has raised a regulatory finding:
  + **Finding:** EDF NGL to address the shortfalls identified in their approach to management of environmentally assisted fatigue

1. The inspector also targeted reactor coolant pump C which has a known repair from start of life, and has challenges with inspection and the demonstration of defect tolerance. The inspector considers that the associated safety case should be reviewed due to low fracture margins and a limited inspection regime over the next PSR period. The inspector has therefore raised the following regulatory finding:

* **Finding**: EDF NGL to review and update the safety case for the RCP C pump bowl, including justification of an inspection strategy for the next PSR period and the incredibility of failure demonstration

1. Overall, the inspector considers the structural integrity aspects of PSR3 to be comprehensive, and cover the areas expected. However, the inspector also identified weaknesses in the licensee’s timely delivery of PSR shortfall resolution.
2. The inspector concludes that an adequate PSR has been completed and a positive decision letter can be issued. A number of other issues will be followed up through routine regulatory business (Regulatory issues 12102 and 12166 refer).

**Mechanical Engineering**

1. The assessment (Ref. [10]) considered:

* PSR duty holder recommendations for both the PSR2 and PSR3
* Review of codes and standards
* Lifting equipment review
* Heating, ventilation and air conditioning
* Ageing management

1. Overall, the inspector considers that the licensee has made and implemented adequate arrangements for the PSR of SSC’s important to safety, and demonstrated that the risks to continued operation over the forthcoming 10-year period are ALARP, subject to timely resolution of the licensee’s PSR recommendations. The inspector supports continued operation of Sizewell B for the period identified in the submission, subject to ongoing compliance to the station safety case.

**Civil Engineering**

1. The inspector’s conclusions are (Ref. [11]):

* The submission and supporting documentation is of a good quality.
* The approach and format of the submission is generally in line with ONR and IAEA guidance.
* They have not identified any additional recommendations beyond those identified by the licensee and consider the recommended actions and closure criteria appropriate.
* They are satisfied with the claims, arguments and evidence laid down within the licensee’s safety case

1. The inspector concludes that the PSR3 is adequate and that the licensee’s arrangements and strategic programmes are appropriate for the continued safe operation of the Sizewell B power station for the next PSR period. A couple of minor residual matters will be followed up through normal regulatory business.

**Chemistry**

1. The assessment (Ref. [12]) judges that the historic review aspects of the dutyholder’s submission met expectations in many of the areas considered. However, the inspector also considers that the review does not perform any significant analysis against modern safety standards and expectations in order to identify those areas where improvements can be made, or provide any forward look in respect of timescales by when any such improvements can be implemented.
2. The inspector considers that the chemistry elements sampled during review of the Sizewell B PSR3 include significant shortfalls against RGP and established standards and expectations. The assessment has identified a total of 8 topics requiring follow-up. One regulatory finding regarding the timely implementation of zinc injection would have been raised by this assessment, however, this is already the subject of a level 3 regulatory issue (RI-8472 refers). Other issues requiring follow-up include the condition of the water treatment and condensate polishing plant. These will be followed up through routine regulatory business (RI-12279 refers).
3. In conclusion the inspector considers the chemistry aspects of the Sizewell B PSR3 to be adequate and a positive decision letter can be issued. However this is subject to the timely and adequate resolution of the shortfalls identified.

**Fuel and core**

1. The inspector’s conclusions are (Ref. [13]):

* Sizewell B responded to the only significant event during the PSR3 period, the detachment of the reactor pressure vessel thermal sleeves, in a way that is in line with relevant safety assessment principles. The PSR3 description of the event, of its consequences, and of the station’s follow-up activities satisfies the inspector’s expectations.
* ONR’s inspections related to Sizewell B fuel and core have found no significant regulatory gaps, all issues identified by the inspections have been closed and the inspection topics have been covered in PSR3 to a sufficient level of detail.
* The safety aspects of the fuel storage and handling are presented with a sufficient level of detail to demonstrate that the related risk is currently ALARP and potential issues for the next PSR period are clearly identified, so that resolutions could be found to support longer term operation.
* The responses to regulatory queries indicate significant progress achieved since the end of the PSR3 period and continuing work for further improvement of the relevant safety arrangements.

1. The inspector judges that PSR3 demonstrates that the overall risk related to Sizewell B fuel and core was ALARP at the cut-off date of 1 April 2021. The inspector is content with the progress observed after the cut-off date, which provides grounds for expectation that the risk will be maintained ALARP for the next PSR period.
2. The assessment recognises that there are two regulatory issues relating to PSR2 open and identifies a concern regarding timely shortfall resolution.
3. The inspector concludes that an adequate PSR has been completed and a positive decision letter can be issued.

**Fault Studies**

1. This assessment (Ref. [14]) focussed on the fault studies aspects of safety factor 1 (safety case review against modern standards), safety factor 5 (transient/deterministic analysis) and safety factor 6 (severe accident analysis).
2. The inspector considers the following to be strengths of PSR3:

* The review of transient analysis modelling capability and recognition that there is a need for a concerted effort to address known challenges in this area.
* The evidence that the existing transient analysis is being updated for plant changes.
* The recognition of the need for an overdue update to severe accident methodology and the extant analysis, which was conceived to support the original design.

1. The assessment identified significant shortfalls in the scope and depth of the licensee’s review of the Sizewell B deterministic analyses and associated safety case against modern standards. In response to the questions raised during the assessment, the licensee considers that the extant safety case, developed to support start of operation some thirty years ago, essentially remains fit for purpose. The licensee argues that reviews for earlier PSRs considered the standards that were in place at the time and that this provides evidence to support PSR3. However, in the inspector’s opinion insufficient evidence has been provided to demonstrate that modern standards have been considered in PSR3.
2. The report raises the following regulatory findings:

* **Finding**: The licensee should provide evidence that, for accidents not involving core melt, it has systematically and comprehensively reviewed the Sizewell B deterministic analysis against modern standards set out in relevant national and international standards and good practice. This should be to a level commensurate with IAEA and ONR expectations for periodic review. If necessary it should produce a programme of work to address any identified shortfalls in the analysis and any associated safety case documentation.
* **Finding**: The licensee should provide evidence that it has reviewed the content and purpose of the Sizewell B fault schedule (or other relevant parts of the ‘safety case’) against modern standards expectations and through this provide evidence that its deterministic analysis is providing clear requirements for structures, systems & components, limits and conditions, and operator actions. If necessary it should produce a programme of work to address any shortfalls in the safety case documentation.

1. An expectation for periodic review is also to determine whether there are reasonably practicable safety improvements that could be implemented to prevent or mitigate large or early releases. This reflects the modern standards expectation that such release should be practically eliminated. The licensee presents arguments that the extant safety case addresses the intent of this expectation and provides examples of why it considers this to be the case, although there is no pre-existing demonstration as such. However, there is no review of whether the approach being presented meets the modern standard. The inspector therefore raises the following regulatory finding:

* **Finding**: The licensee should review the position taken in PSR3 regarding the demonstration that large or early releases have been ‘practically eliminated’. This should address the international guidance on this topic, both existing and also the recent detailed guidance produced by the IAEA in SSG-88. For existing plants the expectation is that a suitable demonstration of practical elimination should be part of a periodic review and that this should be used to identify whether there are any reasonably practicable safety improvements. The licensee should ensure that its proposed update to the severe accident analysis (PSA Category B finding) provides any necessary evidence required to support the demonstration.

1. Overall, the inspector considers the Sizewell B PSR3 submission to be inadequate and notes their concerns relate to the delivery of an adequate periodic review. The inspector has not assessed the safety case and as such has not identified any plant safety concerns requiring prompt attention.
2. The findings have been discussed with the licensee and the inspector is satisfied that the licensee has correctly identified the key shortfalls as being:

* Lack of review of the deterministic safety analysis from the fault schedule to the derivation of the fault sequences for analysis.
* No evidence of review of the use of the analysis output in the safety case operational documentation.
* Weaknesses in benchmarking of the Sizewell B deterministic fault analysis against relevant good practice (e.g. IAEA’s standard on deterministic safety analysis, SSG-2).

**Probabilistic Safety Assessment**

1. This assessment (Ref. [15]) focussed on the PSA review and PSA results. A detailed review of the PSA modelling for internal fire and pressure part failure PSA modelling was also undertaken as these are significant risk contributors.
2. The inspector is satisfied that the review of Sizewell B’s living PSA results meets the expectations of relevant ONR safety assessment principles and the inspector considers the licensee’s response to findings made during the previous PSR to be largely satisfactory.
3. With the exception of the hazards PSA, the inspector is satisfied with the licensee’s review of its living PSA and the work completed in support of PSR3. The inspector is content that the licensee’s scope of the PSR3 PSA review meets RGP.
4. With regards to the licensee’s review of the hazards PSA, the inspector found the submission to be lacking in depth of review. Hazards screened-out of the PSA and those hazards not updated since the PSR2 have not had a sufficiently detailed review to ensure that the hazards PSA reflects the current design and operating features, takes account of all relevant operating experience and up to date generic data. The inspector therefore raised the following finding:

* **Finding:** EDFNGL should review hazards (including combined hazards) that have been screened-out of the PSA to ensure that the basis for screening out the hazards continue to be valid. EDF NGL also should develop a mechanism to periodically review hazards screened-out of the PSA based on frequency.

1. Based on the detailed review of EDF NGL’s internal fire and pressure part failure PSAs, the inspector judges that these parts of the Sizewell B living PSA do not fully satisfy our expectations or international standards. The inspector has therefore raised the following findings:

* **Finding:** EDF NGL should develop its Sizewell B Internal Fire PSA to be adequately representative of the plant and operations at Sizewell B and taking account of modern standards and RGP.
* **Finding:** EDF NGL should develop its Sizewell B Pressure Part Failure PSA to be adequately representative of the plant and operations at Sizewell B and taking account of modern standards and RGP.

1. The inspector considers the licensees PSR recommendations raised during the PSA review to be appropriate and judges (with the exception of the recommendation for Level 2 PSA and Level 3 PSA discussed below) they have been suitably categorised based on their nuclear safety significance.
2. The licensee raised a Category B recommendation to update the Level 2 PSA. However, a detailed approach to the implementation of this recommendation has not been provided. Due to this absence of detail and the lack of progress in the development of the Level 2 PSA since PSR2 the inspector has raised the following finding:

* **Finding**: EDF NGL should update the Level 2 PSA to represent the plant and potential severe accident progression, taking account of modern standards, methods and RGP.

1. The licensee’s review has raised several NNBRs to update the Level 3 PSA. However, the inspector does not consider the work to be sufficiently prioritised and has raised the following finding:

* **Finding**: EDF NGL should update its radiological consequences analysis and Level 3 PSA. This should include determining individual risk from effective dose for the most vulnerable group, considering fault frequency, wind rose and specific dose to risk conversion factors (DRFs.). For societal risk, changing weather conditions at distance from site, updated population, meteorological, habit and food production data should be taken into account.

1. The inspector assessed the extent of the licensee’s review of the PSA to risk inform operations and decision making and find this to be satisfactory. They consider the approach in which the living PSA is used to support risk informed operations and decision making to be good practice.
2. Overall, from a PSA perspective, the inspector concludes that the Sizewell B PSR is adequate, subject to timely shortfall resolution and a positive decision letter can be issued.

**Internal Hazards**

1. This assessment (Ref. [16]) identified that internal hazards have not been adequately reviewed as part of PSR3. The assessment also identified that some PSR2 high priority observations (these are equivalent to a PSR3 category B recommendation) have not been resolved. The assessment identifies four overarching findings:

* **Finding**: EDF NGL should review its PSR process to ensure that it achieves an adequate, fit for purpose, internal hazards PSR in the future.
  + EDF NGL should consider including the requirement for more frequent (interim or continual) internal hazards reviews, which feed into the PSR.
* **Finding**: EDF NGL should undertake a comprehensive and systematic review of the internal hazards safety case. This should include a review of the adequacy of the safety case (e.g. a review of safety case hazard analysis, methodology, codes and standards) and include the relevant observations raised in this report and the findings from the first internal hazards finding. The review should be clearly documented and any shortfalls identified should be sentenced and a credible resolution plan be developed to ensure PSR improvements are implemented in a timely manner.
* **Finding**: EDF NGL should develop a credible resolution plan to implement the high priority observation from PSR2 relating to the essential service water system. This should include:
  + Review the risk of flooding from essential service water system including consideration of safety improvements and any organisational weaknesses that has led to delay in implementation.
  + A resolution plan should be developed to implement the PSR improvements in a timely manner.
* **Finding**: EDF NGL should develop a credible resolution plan to implement the high priority observation from PSR2 and Cat B Recommendation from PSR3 relating to the essential service water tunnel pipework condition. This should include:
  + Review the risk of flooding from essential service water tunnel pipework condition including consideration of safety improvements, and any organisational weaknesses that has led to delay in implementation of the PSR2 recommendation.
  + A resolution plan should be developed to implement the PSR improvements in a timely manner.

1. The inspector judges that the Sizewell B PSR3 is not adequate. The inspector does not consider that there is an immediate safety concern as no significant safety shortfalls were identified in their sampling, and the licensee has processes in place to address safety anomalies that may arise.

**External Hazards**

1. The assessment (Ref. [17]) considers whether the safety case for external hazards remains adequate now and for the period up to the next PSR. The assessment sampled several external hazards to understand:

* The effectiveness of the Sizewell B PSR process in relation to external hazards, given that this is the third PSR.
* EDF NGL’s approach to reviewing and updating SZB external hazards site data and ensuring its applicability to the present day and Sizewell B’s continued operation for the next 10 years.
* EDF NGL’s approach to climate change for Sizewell B, particularly given its intent to operate until 2055.
* Progress made in relation to external hazards PSR2 recommendations and findings.
* Interface with Sizewell C.

1. The assessment identifies that external hazards have generally not been adequately reviewed as part of PSR3. This means that potential nuclear safety implications for the station are unclear as design basis events are not adequately characterised. Further, consideration of the effects of climate change currently and over the next PSR period were limited. Whilst EDF NGL identify several areas where future external hazards work is required, our assessment does not consider the prioritisation and breadth of this EDF NGL work to be sufficient to address the shortfalls identified. The assessment has identified three overarching findings to address the shortfalls. The findings are:

* **Finding:** EDF NGL should review its PSR process to ensure that it achieves an adequate, fit for purpose, external hazards PSR in the future. As part of this, EDF NGL should:
  + Define a process that uses the best available data sources to determine the present-day values (10-4/yr events) for external hazards, and define revised design basis events that account for the reasonably foreseeable effects of climate change over the lifetime of the facility. The process should allow the potential nuclear safety implications to be understood and informed judgements to be made.
  + Consider including the requirement for more frequent (interim or continual) external hazards reviews, which feed into the PSR.
  + Consider conducting a lessons learnt as to why the PSR process did not identify external hazards safety case anomalies that were subsequently recognised
* **Finding:** EDF NGL should review the Sizewell B non-stationary hazards to ensure that the design bases events for Sizewell B are characterised using best available relevant data and take account of the reasonably foreseeable effects of climate change over the lifetime of the facility. EDF NGL should demonstrate the adequacy of the revised hazard values and demonstrate plant can withstand the revised design basis events. The reviews should include adequate analysis of beyond design basis events and cliff-edge effects. Where appropriate, EDF NGL should implement measures to ensure nuclear safety risks are reduced as low as reasonably practicable.

Following the reviews, EDF NGL should ensure that its Sizewell B safety case is updated to provide a consistent narrative of its revised design basis events and the design substantiation. This should also demonstrate that climate change has been accounted for in the safety case. These reviews should cover:

* + Sizewell B coastal flood hazard, including waves and tsunami.
  + Sizewell B pluvial flood hazard.
  + Sizewell B high air temperature and enthalpy.
* **Finding:** EDF NGL should develop and present its approach for ensuring climate change is appropriately considered and included in future safety cases and PSRs, to ensure the effects are understood over the lifetime of the facility. This should incorporate lessons from the first external hazards finding and should consider more frequent hazard and climate change reviews.

1. The inspector judges that the Sizewell B PSR3 is not adequate but does not identify any immediate safety concerns with Sizewell B’s continued operation whilst the identified gaps are addressed (Ref [27]).

**Leadership and Management for Safety (LfMS)**

1. The assessment (Ref. [18]) explored, on a sample basis, whether the objectives of the PSR has been achieved for the LMfS aspects. EDF NGL’s consideration of the adequacy of Sizewell B’s organisational capability (including capacity and competence) to discharge its nuclear safety responsibilities for the PSR period was sampled. This is an area we consider to be potentially challenging for several reasons including station demographics and the potential construction of Sizewell C nuclear power station.
2. The assessment found that EDF NGL had adopted a wide ranging, open minded and challenging approach. The assessment would have ordinarily resulted in regulatory findings for two matters relating to regulatory shortfalls. The first matter was already covered by three existing regulatory issues regarding the adequacy of the licensee’s LC 36 corporate arrangements and their implementation. These issues relate to the adequacy of EDF NGL’s approach to justifying the reference nuclear baseline, how EDF NGL identify and manage posts and roles, and the implementation of EDF NGL’s Intelligent Customer arrangements.
3. The second matter related to a lack of convincing evidence within the PSR3 regarding personnel resource planning and how EDF NGL would manage the self identified related challenges during the PSR period. However, a Sizewell B long term resourcing strategy produced after the PSR3 cut-off date was found to have appropriately considered both the internal and external risks, and the SZB human resource demand requirements for the PSR period. Consequently, a finding was not raised for either matter.
4. In response to the ongoing challenges to organisational capability EDF NGL raised an overarching PSR3 category B recommendation to address singleton Suitable Qualified and Experienced Persons, concerns regarding the loss of accumulated experience, and loss of tacit knowledge. EDF NGL are yet to sentence the recommendation. The inspector considers that the sentencing is a principal task associated with the PSR process and therefore a regulatory finding has been raised.

* **Finding:** EDF NGL to appropriately sentence self-identified safety significant organisational capability finding (NGL ID AR 1340225) and to demonstrate that the related improvements have been effectively implemented in a timely manner.

1. With one exception, the assessment concluded that ONR’s expectations for the objectives of a PSR have been met for the LMfS aspects. The exception being the assessment finding that EDF NGL are yet to sentence their self-identified LMfS related safety significant recommendations. With the proviso that EDF NGL appropriately undertake that sentencing the inspector concludes that EDF NGL will have undertaken an adequate SZB PSR3 and a positive decision letter can be issued.

**Radiological Protection**

1. The inspector’s conclusions (Ref. [19]) are that:

* The Sizewell B PSR3 provides clear, sufficiently detailed and evidence based coverage of the most important aspects of radiological safety over the PSR period.
* ONR’s inspections of EDF NGL’s compliance with the ionising radiation regulations have found no significant regulatory gaps, all identified issues have been closed and the inspections’ topics have been covered in PSR3 to a sufficient level of detail.
* EDF NGL’s response to events related to radiological protection has been fit for purpose and subject to appropriate regulatory oversight.
* The data for occupational exposure since the end of the PSR3 reporting period shows a worsening performance and further work to ensure occupational exposures remain ALARP over the next period may be required. The inspector considers that additional work may be required, beyond that currently planned over the next reporting period, to ensure that worker doses remain ALARP. An regulatory finding has therefore been identified:
  + **Finding:**  EDF-NGL should undertake a strategic analysis of the current and likely future Sizewell B primary circuit source term and determine what steps can be taken to mitigate current and future risk by assessing international RGP. The scope of this should include but not be limited to; source identification, coolant chemistry, coolant filtration and material specifications

1. Notwithstanding the above findings the inspector considers that the Radiological Protection related parts of PSR3 comply with RGP. The inspector concludes that an adequate PSR has been completed and a positive decision letter can be issued.

**Human Factors**

1. This assessment (Ref. [20]) considers for each PSR objective the licensee’s approach to the identification of safety important actions, and how reliable and effective human performance is supported via the provision of human machine interface management, and the appropriate use of task support measures, including procedures, training and competence.
2. The inspector is satisfied that the licensee has met our expectations for PSR reviews and welcomes the systematic and thorough nature of the PSR3 human factors review. This includes the consideration of factors that may influence human factors implementation across the site (such as pre-fault tasks, fatigue, effectiveness of training, and so on).
3. With regards to the extent to which the nuclear facility and the safety case conform to good practice that is relevant to the UK nuclear industry, the inspector found that the licensee demonstrated a considered review of many of the significant RGP updates, aligned with the human factors topics as specified by the IAEA.
4. With regards to the extent to which the safety documentation, including the licensing basis, remains valid and reflects the current plant to ensure that the claims, arguments and evidence are still appropriate and the risks are managed to ALARP, the inspector found that the licensee demonstrated that the human factor aspects sampled remain valid. However, there were instances where the human factor review was limited by the structure of the Sizewell B safety case and this has been considered in the fault studies assessment report.
5. With regards to the adequacy and efficacy of the arrangements and SSC’s in place to maintain safety until the next PSR the inspector found that the licensee demonstrated the majority of arrangements were adequate and had been positively improved over the duration of the PSR. However, there were instances where there was insufficient consideration of the adequacy of the arrangements to manage reasonably foreseeable issues (for example, competence management).
6. With regards to safety improvements to be implemented to resolve safety issues, the inspector found a number of areas where Sizewell B have indications of workload challenges, resulting in delays and backlogs.
7. The inspector judges that the licensees recommendations raised are appropriate to enact the necessary safety improvements.
8. One residual matter will be followed up through routine regulatory business (regulatory issue 12345 refers).
9. The inspector concludes that an adequate PSR has been completed and a positive decision letter can be issued.

**Nuclear Liabilities**

1. The inspector targeted their assessment (Ref. [21]) on waste storage and minimisation, including disposability of waste; failed fuel; and decommissioning. They also sampled ageing and obsolescence of plant and equipment associated with radioactive waste management to reflect the increasing significance of this area for any plant entering its third PSR period.
2. The inspector considered that the submission described adequate radioactive waste management arrangements and systems to support the continued safe operation of the plant, consistent with ONR’s Safety Assessment Principles and other RGP. It is also considered that the submission indicates that the ageing of the plant is being well managed.
3. The inspector is content that the overall approach and process for the Sizewell B PSR3 is appropriate. The inspector considers PSR3 to be sufficient to give support to continued generation at Sizewell B power station. One issue identified by the assessment will be followed up through routine regulatory business (regulatory issue 12406 refers).

Table 2: ONR Findings.

|  |  |
| --- | --- |
| ONR Finding | Detail |
| **SZB-PSR3-01**  **PSA**  **Regulatory Issue Number:**  **RI-12371** | A number of hazards have been considered but not modelled in the LPSA on the basis that their frequencies are low comparative to plant-based faults To address this shortfall:   * EDF NGL should review hazards (including combined hazards) that have been screened-out of the PSA to ensure that the basis for screening-out the hazards remains valid. * EDF NGL should develop a mechanism to periodically review hazards screened-out of the LPSA based on frequency. |
| **SZB-PSR3-02**  **PSA**  **Regulatory Issue Number:**  **RI-12372** | EDF NGL should develop its Sizewell B internal fire PSA to be adequately representative of the plant and operations at Sizewell B and taking account of modern standards and relevant good practice. To this end, EDF NGL should:   * Develop an internal fire PSA methodology that utilises Sizewell B specific plant information (e.g. equipment, fire areas), OPEX and modern generic industry data as appropriate. The methodology should take account of modern standards and relevant good practice. Any deviations in the methodology from modern standards/relevant good practice should be adequately justified. * Define a programme of work that will update/develop the Sizewell B internal fire PSA in accordance with the internal fire PSA methodology produced above. * Commence implementation of the internal fire PSA development in accordance with the programme of work agreed above. |
| **SZB-PSR3-03**  **PSA**  **Regulatory Issue Number:**  **RI-12373** | EDF NGL should develop its Sizewell B pressure part failure PSA to be adequately representative of the plant and operations at Sizewell B and taking account of modern standards and relevant good practice. To this end, EDF NGL should:   * Develop a pressure part failure PSA methodology that utilises Sizewell B specific information (e.g. equipment, flood areas), OPEX and generic industry data as appropriate. The methodology should take account of modern standards and relevant good practice. Any deviations in the methodology from modern standards/relevant good practice should be adequately justified. * Define a programme of work that will update/develop the Sizewell B pressure part failure PSA in accordance with the methodology produced above. * Commence implementation of the pressure part failure PSA development in accordance with the programme of work agreed above. |
| **SZB-PSR3-04**  **PSA**  **Regulatory Issue Number:**  **RI-12374** | EDF NGL should update the Level 2 PSA to represent the plant and potential severe accident progression, taking account of modern standards, methods and RGP. To this end EDF NGL should:   * Provide a detailed implementation plan for updating the Level 2 PSA in accordance with the Category B recommendation (AR 1339186) raised in PSR3. This implementation plan should include, the scope of work, timescales and resource plan for updating the Level 2 PSA. The scope of work should be suitably justified. * Where the Level 2 PSA update is linked to the filtered containment ventilation FCV project, develop a contingency plan for updating the Level 2 PSA if the FCV project is delayed. * Commence update of the Level 2 PSA in accordance with the programme of work agreed above. |
| **SZB-PSR3-05**  **PSA**  **Regulatory Issue Number:**  **RI-12375** | EDF NGL should update its radiological consequences analysis and Level 3 PSA. This should include determining individual risk from effective dose for the most vulnerable group, considering fault frequency, wind rose and specific Dose to Risk Conversion Factors (DRFs.). For Societal Risk, changing weather conditions at distance from site, updated population, meteorological, habit and food production data should be taken into account.   * Determine individual risk from effective dose for the most vulnerable group, considering fault frequency, wind rose and specific Dose to Risk Conversion Factors (DRFs.) Only long-term counter measures, such as a food ban should be included. * For Societal Risk, changing weather conditions at distance from site, updated population, meteorological, habit and food production data should be taken into account. Sensitivity to specific DRFs for vulnerable groups should be provided. |
| **SZB-PSR3-06**  **Radiological Protection**  **Regulatory Issue Number:**  **RI-12389** | EDF NGL should undertake a strategic analysis of the current and likely future Sizewell B primary circuit source term and determine what steps can be taken to mitigate current and future risk by assessing international RGP. The scope of this should include but not be limited to; source identification, coolant chemistry, coolant filtration and material specifications. |
| **SZB-PSR3-07**  **Structural Integrity**  **Regulatory Issue Number:**  **RI-12370** | EDF NGL should review and update the safety case for the RCP C pump bowl including justification of inspection strategy for the next PSR period and the incredibility of failure demonstration |
| **SZB-PSR3-08**  **Structural Integrity**  **Regulatory Issue Number:**  **RI-1597** | EDF NGL should address the shortfalls identified in their approach to management of environmentally assisted fatigue |
| **SZB-PSR3-09**  **Hazards (External and Internal)**  **Regulatory Issue Number:**  **RI-12223** | EDF NGL should undertake an adequate systematic review of the hazards safety case  (Note: this overarching finding covers the second finding identified by the internal and external hazards assessments) |
| **SZB-PSR3-10**  **External Hazards**  **Regulatory Issue Number:**  **RI-** **12224** | EDF NGL should develop and present its approach for ensuring climate change is appropriately considered and included in future safety cases and PSRs, to ensure the effects are understood over the lifetime of the facility. This should consider the need for more frequent hazard and climate change reviews. |
| **SZB-PSR3-11**  **Internal Hazards**  **Regulatory Issue Number:**  **RI-12353** | EDF NGL should develop a credible resolution plan to implement the high priority observation from PSR2 relating to the essential service water system. This should include:   * Review the risk of flooding from essential service water system including consideration of safety improvements and any organisational weaknesses that has led to delay in implementation. * A resolution plan should be developed to implement the PSR improvements in a timely manner. |
| **SZB-PSR3-12**  **Internal Hazards**  **Regulatory Issue Number:**  **RI 12354** | EDF NGL should develop a credible resolution plan to implement high priority observation from PSR2 and Cat B Recommendation from PSR3 relating to the essential service water tunnel pipework condition. This should include:   * Review the risk of flooding from essential service water tunnel pipework condition including consideration of safety improvements, and any organisational weaknesses that has led to delay in implementation of the PSR2 recommendation. * A resolution plan should be developed to implement the PSR improvements in a timely manner. |
| **SZB-PSR3-13**  **Fault Studies**  **Regulatory Issue Number:**  **RI-12387** | EDF NGL should undertake a systematic and comprehensive review of the Sizewell B deterministic analysis against modern standards and relevant good practice. This should include reviewing the fault schedule and through this provide evidence that its deterministic analysis is providing clear requirements for structures, systems & components, limits and conditions, and operator actions.  (Note: this overarching findings covers the first two fault studies recommendations) |
| **SZB-PSR3-14**  **Fault Studies**  **Regulatory Issue Number:**  **RI-12388** | EDF NGL should review the position taken in PSR3 regarding the demonstration that large or early releases have been ‘practically eliminated’. This should address the international guidance on this topic, both existing and also the recent detailed guidance produced by the IAEA in SSG-88. For existing plants the expectation is that a suitable demonstration of practical elimination should be part of a periodic review and that this should be used to identify whether there are any reasonably practicable safety improvements. The licensee should ensure that its proposed update to the severe accident analysis (PSA Category B finding) provides any necessary evidence required to support the demonstration. |
| **SZB-PSR3-15**  **Leadership and Management for Safety**  **Regulatory Issue Number:**  **RI-12399** | EDF NGL should appropriately sentence self-identified safety significant organisational capability finding (NGL ID AR 1340225) and to demonstrate that the related improvements have been effectively implemented in a timely manner. |
| **SZB-PSR3-16**  **Project Inspection**  **Regulatory Issue Number:**  **RI-12382** | EDF NGL should review the PSR arrangements at SZB to ensure they achieve an adequate, fit for purpose, PSR in the future. The review should include consideration of:   * the need for more frequent (interim or continuous reviews) * the organisational weaknesses that has led to delay in implementation of the PSR2 recommendations * uses the best available data sources to determine the present-day values (10-4/yr events) for external hazards, and define revised design basis events that account for the reasonably foreseeable effects of climate change over the lifetime of the facility. The process should allow the potential nuclear safety implications to be understood and informed judgements to be made.   (Note: this overarching finding covers the first internal and external hazards findings) |