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| ONR Project assessment report  Heysham 2 periodic shutdown S13R7 – Agreement to extend operating period |



ONR Project assessment report

**Project name**: Heysham 2 periodic shutdown S13R7

**Report title**: Agreement to extend operating period

**Dutyholder/Applicant**: EDF Energy Nuclear Generation Limited

**Authored by**:

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# Executive summary

**Title**

Heysham 2 periodic shutdown S13R7 - agreement to extend operating period

**Permission Requested**

EDF Energy Nuclear Generation Limited (the licensee) has asked for our agreement to extend the operating period of Heysham 2 reactor 7 until 9 February 2025.

**Background**

The nuclear site licence for Heysham 2 requires the licensee to periodically shutdown any plant or process under Licence Condition 30 to enable examination, inspection, maintenance and testing to take place. The reactor periodic shutdowns (also known as statutory outages) take place every three years, as specified in the maintenance schedule preface, an approved document under Licence Condition 28 (4).

We gave consent to start-up reactor 7 after its last periodic shutdown on 9 September 2021 (Licence Instrument 635) and therefore it is required to shutdown on or before 9 September 2024. To avoid a conflict with the Sizewell B statutory outage, the licensee has produced a safety justification to extend the operating period of reactor 7 until no later than 9 February 2025.

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

Our specialist inspectors from graphite integrity, structural integrity, electrical engineering, control and instrumentation, mechanical engineering and civil engineering have assessed the licensee’s safety justification. No issues were identified that would prevent our agreement to extending the operating period of reactor 7.

The Environment Agency has been consulted and have confirmed that they have no objections to us agreeing to extend the operating period of reactor 7. Our civil nuclear security inspectors have also been consulted and have no concerns regarding the proposed extension.

**Matters arising from ONR's work**

There are no outstanding matters arising from our assessments.

**Conclusions**

We have considered the nuclear safety risk associated with the licensee’s request, and have not identified any reasons to prevent us from agreeing to extend the operating period of Heysham 2 reactor 7 to 9 February 2025, a maximum duration of 153 days.

**Recommendation**

We recommend the issuing of Licence Instrument 643 under Licence Condition 30 (2) for nuclear site licence 60, agreeing to extend the operating period of Heysham 2 Reactor 7 to 9 February 2025.

Table 1: List of abbreviations.

|  |  |
| --- | --- |
| Term/Acronym | Description |
| ALARP | As low as reasonably practicable |
| C&I | Control and Instrumentation |
| EIMT | Examination, Inspection Maintenance and Testing |
| HYB | Heysham 2 |
| INSA | Independent Nuclear Safety Assessment |
| LC | Licence Condition |
| NGL | EDF Nuclear Generation Ltd |
| ONR | Office for Nuclear Regulation |
| PCPV | Pre-stressed Concrete Pressure Vessel |
| PSSR | Pressure Systems Safety Regulations |
| R7 | Reactor 7 |
| SQEP | Suitably Qualified and Experienced Person |
| SZB | Sizewell B |

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# Permission requested

1. EDF Energy Nuclear Generation Limited (NGL) (the licensee) has asked [1] for our agreement to extend the operating period of Heysham 2 (HYB) reactor 7 (R7) until no later than 9 February 2025.

# Background

1. The nuclear site licence for HYB requires the licensee to periodically shutdown any plant or process under licence condition (LC) 30 for the purpose of examination, inspection, maintenance and testing. The maintenance schedule preface (an approved document under LC 28 (4)), specifies that reactor periodic shutdowns (referred to as statutory outages) take place after a maximum period of three calendar years following consent from us to start up after the previous periodic shutdown. The preface also allows the shutdown to be deferred by up to three calendar months, provided that the reactor has not operated at power for more than 1095 days before the deferred shutdown, subject to the licensee producing an adequate safety justification.
2. Consent to start-up HYB R7 after its last periodic shutdown was given on 9 September 2021 (Licence Instrument 635). Therefore, the next periodic shutdown (S13R7) is due on or before 9 September 2024. Based on the scope of work the licensee predicts that the shutdown would be complete by 23 November 2024. This would result in a significant period of overlap with the Sizewell B (SZB) periodic shutdown (RO19) which is scheduled to take place between 6 October and 5 December 2024.
3. Owing to the volume and nature of work carried out during an outage, the licensee requires a significant amount of support from its contract partners. Constraints in the supply chain mean that both outages cannot be supported concurrently. The licensee does not consider it practical to move the SZB outage since the operating period is constrained by fuel burn-up and increasing boron concentration in the primary circuit.
4. The licensee has considered a range of options to minimise the impact on outage plans across the fleet of operating reactors and proposes to defer the HYB R7 outage to no later than 9 February 2025. This represents an increased operating period of no greater than 153 days.
5. The proposed deferral avoids the conflict with the SZB statutory outage, the Christmas period when resource availability is reduced and minimises the period of extended operation.
6. The licensee’s safety justification [2] has considered all of the potentially affected plant and safety cases to ensure that the proposed extension to the operating period will not result in a significant increase in nuclear safety risk.

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

1. In accordance with the regulatory permissioning strategy, our agreement to extend the operating period of HYB R7 had been informed by advice from the following disciplines:

* graphite integrity
* structural integrity
* electrical engineering
* control and instrumentation
* mechanical engineering
* civil engineering

1. The following sections provide summaries of the assessment findings for each discipline.

## Graphite Integrity

1. Reference [3] reports the findings from the graphite integrity assessment of the licensee’s justification to extend the operating period of HYB R7.
2. Our inspectors assessment focused on the reactor core state for the deferral period, noting the cracking observed in May 2024 was at the higher end of expectations and the implications of reducing the methane concentration in the coolant gas on the graphite core weight loss during the deferral period.
3. Our inspector was content that the licensee has adequately justified that the nuclear safety risk posed by the deferral to the graphite core is low and identified suitable mitigation activities to monitor the core state. Our inspector did not object to us agreeing to an extension of the operating period.

## Structural integrity

1. Reference [4] reports the findings of the structural integrity assessment of the licensee’s justification to extend the operating period of HYB R7.
2. Our inspector considered time at power, weld inspections, component life assessment, corrosion management and compliance with the Pressure Systems Safety Regulations (PSSR).
3. Our inspector was content that the evidence presented by the licensee adequately addressed the delay in EIMT for structures, systems and components important to nuclear safety, from a structural integrity perspective.
4. In our inspector’s opinion, the licensee had undertaken a thorough review of EIMT activities against the maintenance schedule requirements. Our inspector was satisfied that component inspection history, operating conditions, emergent issues and safety case revisions since the return to service from the last periodic shutdown had been adequately considered.
5. Our inspector was satisfied that the licensee had an adequate process to manage PSSR inspections affected by the deferral, by the completion of inspections during inspection and refuelling outages, or through the timely issuance of postponement certificates in accordance with the relevant Competent Person.
6. Our inspector was satisfied with the claims, arguments and evidence in the licensee’s safety justification and supported us agreeing to an extension of the operating period.

## Electrical engineering

1. Reference [5] reports the findings of the electrical engineering assessment of the licensee’s justification to extend the operating period of HYB R7.
2. Our inspector considered the impact of extending the operating period on nuclear safety significant plant systems and equipment performance, reliability, availability and material condition from an electrical engineering perspective.
3. Our inspector was satisfied that:

* nuclear safety systems will not incur any significant decrease in their reliability or functionality, and therefore there will be no significant increase in the risk of an initiating event during the extended period of operation; and
* there are no safety case commitments or related issues which would prevent the safe deferral of the outage.

1. Our inspector was content that the increased risks associated with deferring the outage are acceptably small, that overall the proposal is consistent with the As low as reasonably practicable (ALARP) principle and supports us agreeing to an extension of the operating period.

## Control and instrumentation

1. Reference [6] reports the findings of the control and instrumentation (C&I) assessment of the licensee’s justification to extend the operating period of HYB R7.
2. Our inspector’s assessment focused on determining:

* whether C&I related statutory outage examination, inspection, maintenance, and testing activities covered by the HYB R7 maintenance schedule have been reviewed by suitably qualified and experienced personnel (SQEP);
* if the potential for the performance of C&I systems/equipment important to safety to drift/degrade such that it becomes unable to perform its nuclear safety function during the statutory outage deferral period has been adequately assessed by SQEP and confirmed to remain acceptably low;
* if the potential for C&I systems/equipment important to safety to reach a reliability cliff edge during the statutory outage deferral period has been considered by SQEP and been adequately assessed to remain acceptably low; and
* if potential C&I related statutory outage risk reduction measures have been identified and assessed to consider if they would be reasonably practicable to implement.

1. Our inspector was content that the C&I related HYB R7 statutory outage activities in the maintenance schedule have been reviewed by appropriate SQEP. Our inspector considers that the likelihood of the C&I equipment parameters drifting/degrading past the point that they will be unable to fulfil their nuclear safety function(s), or reaching a reliability cliff edge, will remain low during the extended operating period. In addition, our inspector considered that potential C&I related periodic shutdown risk reduction measures have been identified and considered.
2. Our inspector considers that the C&I system/equipment risks associated with deferring the periodic shutdown to be negligible and supports us agreeing to an extension of the operating period.

## Mechanical engineering

1. Reference [7] reports the findings of the mechanical engineering assessment of the licensee’s justification to extend the operating period of HYB R7.
2. Our inspector focused on whether the proposed deferral of EIMT activities would lead to the degradation of equipment claimed in the safety case. Our inspector sampled control rod drop tests, the gas circulator exchange programme, boiler safety relief valves, and the circulator auxiliary cooling system.
3. Our inspector was satisfied with the claims, arguments and evidence in the licensee’s safety justification. Our inspector was content that the licensee adequately justified that the nuclear safety risk posed by the deferral of plant maintenance is low and identified suitable mitigation activities to monitor the relevant items. Our inspector did not object to us agreeing to an extension of the operating period.

## Civil engineering

1. Reference [8] reports the findings of the civil engineering assessment of the licensee’s justification to extend the operating period of HYB R7.
2. Our inspector focused on the effect of extending the operating period on the Pre-stressed Concrete Pressure Vessel (PCPV) and its associated maintenance schedule routines including surveillances, inspections and tests.
3. Our inspector was satisfied with the claims, arguments and evidence in the licensee’s safety justification and judged that the licensee had:

* adequately demonstrated that the proposed deferral meets requirements of PSSR 2000 Regulation 9 (7);
* adequately demonstrated that the pre-stressed concrete pressure vessel is sufficiently free from significant defects such that its safety function is not impaired; and
* demonstrated that the civil engineering components of the PCPV have adequate margins to allow for any ageing and degradation processes in the stated statutory outage deferral period.

1. Our inspector concluded that the licensee has demonstrated that the overall condition of the PCPV and support structure is satisfactory and will remain so for the extended operating period. Our inspector was satisfied that the licensee has demonstrated that the risk to the PCPV and associated support structure from extending the operating period is ALARP and supported us agreeing to an extension of the operating period.

## Independent Nuclear Safety Assessment

1. The licensee categorised its justification to extend the operating period of HYB R7, as a Category 2 modification. In accordance with the licensee’s arrangements the engineering change has completed due process for a Category 2 submission [9] and been subject to independent nuclear safety assessment (INSA) [10], no commitments requiring review were made.

## Civil Nuclear Security and Safeguards

1. Our civil nuclear security site inspector for HYB has confirmed [11] that they do not have any objections to us agreeing to extend the operating period of HYB R7.

## Engagement with other governmental agencies

1. Before issuing a Licence Instrument, it is established practice to notify other competent regulatory authorities of our intention to ensure there are no specific objections that may compromise other regulatory requirements. The HYB Environment Agency site inspector has confirmed [12] that they have no objections to extending the operating period for HYB R7.

# Matters arising from ONR’s work

1. There are no outstanding matters arising from our assessments.

# Conclusions

1. We have considered the nuclear safety risk associated with the licensee’s request to extend the operating period of HYB R7, from 9 September 2024 to 9 February 2025, a maximum duration of 153 days.
2. Our judgement has been informed by advice from our graphite integrity, structural integrity, electrical engineering, control and instrumentation, mechanical engineering and civil engineering specialist inspectors. Based on their assessments we are satisfied that:

* the licensee has provided a valid reason to request to extend the operating period of HYB R7; and
* nuclear safety systems will not incur any significant decrease in their reliability or functionality, and there will be no significant increase in the risk of an initiating event.

1. In conclusion, we have not identified any reasons that would prevent us agreeing to extend the operating period of HYB R7 to 9 February 2025.

# Recommendations

1. We recommend the issuing of Licence Instrument 643 under LC 30 (2) for nuclear site licence 60, Agreeing to extend the operating period of Heysham 2 Reactor 7 to 9 February 2025.

# References

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| [1] | *Letter, Heysham 2, 51173R, Request to extend the operating period of reactor 7.* |
| [2] | *Heysham 2 reactor 7, Proposal for the deferral of the reactor 7 2024 satutory outage S13R7, EC 373896.* |
| [3] | *Heysham 2 reactor 7, statutory outage deferral EC 373896 – Assessment of the activities relating to graphite nuclear safety, ONRW-2126615823-4132.* |
| [4] | *Heysham 2 reactor 7, Structural Integrity (Steels) assessment of the HYB R7 2024 statutory outage deferral, ONRW-2126615823-4050.* |
| [5] | *Heysham 2 reactor 7, Electrical engineering assessment of the proposal for the deferral of the reactor 7 statutory outage (S13R7), ONRW-2126615823-4138.* |
| [6] | *Heysham 2 reactor 7, Control and Instrumentation Assessment of the Deferral of the Heysham 2 Reactor 7 2024 Statutory Outage (S13R7) (Licence Condition 30), ONRW-2126615823-4269.* |
| [7] | *Heysham 2 reactor 7, Mechanical Engineering Assessment of Heysham 2 Request for Permission to Defer R7 Statutory Outage, ONRW-2126615823-4278.* |
| [8] | *Heysham 2 reactor 7, Civil Engineering Assessment of Agreement to Extend the Operating Period of Heysham 2 Reactor 7, ONRW-2126615823-4165.* |
| [9] | *Heysham 2 reactor 7, AMS approval, ONRW-2019369590-10381.* |
| [10] | *Heysham 2 reactor 7, INSA Approval Statement, ONRW-2019369590-10380.* |
| [11] | *Security inspectors advice on Heysham 2 reactor 7 - extension of operating Period ONR email dated 5 August 2024, ONRW-2019369590-10380.* |
| [12] | *Environment Agency advice on Heysham 2 reactor 7 - extension of operating period EA email dated 13 August 2024, ONRW-2019369590-12264.* |