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| ONR Project assessment report  Heysham 1 Reactor 2 2025 Periodic Shutdown Deferral  Agreement to Deferral of Heysham 1 Reactor 2 2025 Statutory Outage to 06 October 2025 |



ONR Project assessment report

**Project name**:

Heysham 1 Reactor 2 2025 Periodic Shutdown Deferral

**Report title**:

Agreement to Deferral of Heysham 1 Reactor 2 2025 Statutory Outage to 06 October 2025

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

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# Executive summary

**Title**

Agreement to Deferral of Heysham 1 Reactor 2 2025 Statutory Outage to 06 October 2025.

**Permission Requested**

EDF Energy Nuclear Generation Limited (EDF), in accordance with Nuclear Site Licence 60 for Heysham 1 (HYA), Licence Condition (LC) 30(2), applied for agreement from the Office for Nuclear Regulation (ONR) to an extension of the operating period of Reactor (R) 2 by a period of 143 days, to no later than 06 October 2025.

**Background**

The Nuclear Site Licence 60 for HYA requires the licensee, EDF, to periodically shutdown any plant or process under LC 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 LC 28(4).

ONR granted consent to start up HYA R2 after its last periodic shutdown on 16 May 2022 (Licence Instrument 637) and therefore it is required to shut down on or before 16 May 2025. In order to avoid a conflict with the Hartlepool Reactor 1 periodic shutdown, manage resource availability and align HYA operation with the fleet outage plan, EDF has produced a safety case, Engineering Change (EC) 375940, to justify the extension of the operating period of HYA R2 until no later than 06 October 2025.

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

ONR’s review of the proposed deferral has focused on whether EDF has provided an adequate safety case justifying that the risks from the proposed deferral remain tolerable and have been reduced to as low as reasonably practicable (ALARP). Review and assessment work has been carried out by ONR’s specialist inspectors from the following specialisms:

* Graphite structural integrity;
* Steel structural integrity;
* Electrical engineering;
* Control and instrumentation (C&I);
* Mechanical engineering;
* Civil engineering; and
* Probabilistic safety analysis (PSA).

In support of their reviews and assessments, ONR’s specialist inspectors have engaged in technical discussions with EDF to ensure that key nuclear safety issues have been adequately addressed.

**Matters arising from ONR’s work**

There are no outstanding matters arising from the review and assessment work carried out by ONR. All specialist inspectors who reviewed the proposed case consider that the granting of ONR’s agreement to the extension of the operating period of HYA R2 up to 06 October 2025 is acceptable.

**Conclusions**

I conclude that EDF has provided an adequate justification underpinning the deferral of the 2025 periodic shutdown of HYA R2 to no later than 06 October 2025 and that a licence instrument should be issued to EDF.

**Recommendation**

ONR should issue Licence Instrument 645, under LC 30(2) for Nuclear Site Licence 60, granting agreement to extend the operating period of HYA R2 to no later than 06 October 2025.

Table 1: List of abbreviations.

|  |  |
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| Term/Acronym | Description |
| ALARP | As low as reasonably practicable |
| C&I | Control and Instrumentation |
| DC | Direct Current |
| EC | Engineering Change |
| EDF | EDF Energy Nuclear Generation Limited |
| EIMT | Examination, Inspection, Maintenance and Testing |
| EA | Environment Agency |
| HRA | Hartlepool |
| HYA | Heysham 1 |
| HYB | Heysham 2 |
| INSA | Independent Nuclear Safety Assessment |
| LC | Licence Condition |
| ONR | Office for Nuclear Regulation |
| PAR | Project Assessment Report |
| PCPV | Prestressed Concrete Pressure Vessel |
| PSA | Probabilistic Safety Analysis |
| PSSR | Pressure Systems Safety Regulations |
| R | Reactor |
| RITE | Risk-Informed and Targeted Engagements |
| SQEP | Suitably Qualified and Experienced Personnel |
| SZB | Sizewell B |

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# Permission requested

1. EDF Energy Nuclear Generation Limited (EDF), the licensee, in accordance with Nuclear Site Licence 60 for Heysham 1 (HYA), Licence Condition (LC) 30(2), applied for agreement from the Office for Nuclear Regulation (ONR) to an extension of the operating period of Reactor (R) 2 by a period of 143 days, to no later than 06 October 2025 (ref. [1]).
2. The extension has been justified in a Category 2 Engineering Change (EC) 375940 Revision 000, ‘Proposal for the deferral of the Heysham 1 Reactor 2 2025 Statutory Outage (R2/028) to the 6th October 2025’ (ref. [1]).
3. In line with ONR’s procedures, this project assessment report (PAR) documents ONR’s view on the adequacy of the safety justification, EC 375940, supporting the proposed periodic shutdown deferral of HYA R2 by up to 143 days. ONR will also produce a Licence Instrument to communicate its decision on the proposed deferral to the station.

# Background

1. The Nuclear Site Licence 60 for HYA requires EDF to periodically shut down any plant or process under LC 30 for the purpose of examination, inspection, maintenance and testing (EIMT). 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 ONR to start up after the previous periodic shutdown.
2. Consent to start up HYA R2 after its last periodic shutdown was issued on 16 May 2022 (Licence Instrument 637). Therefore, the next periodic shutdown (R2/028) is due on or before 16 May 2025.
3. Owing to the volume and nature of work carried out during a periodic shutdown, EDF requires a significant amount of support from its contract partners. Constraints in the supply chain mean that concurrent periodic shutdowns cannot be supported appropriately. This is managed by EDF through the fleet outage plans, which manage resource availability and plan to avoid overlaps between the periodic shutdowns of the operating reactors.
4. The proposed deferral for HYA R2 is the third consecutive deferral request over a short period following similar requests for deferrals for Heysham 2 (HYB) R7 and Hartlepool (HRA) R1:

* To avoid conflict with the Sizewell B (SZB) periodic shutdown (RO19), the HYB R7 periodic shutdown was deferred to January 2025.
* To avoid conflict with the rescheduled HYB R7 periodic shutdown, the HRA R1 periodic shutdown was deferred to April 2025.
* To avoid conflict with the rescheduled HRA R1 periodic shutdown and the summer holiday period where resource availability is reduced, the HYA R2 periodic shutdown, i.e., the subject of this PAR, is proposed to be deferred from 16 May 2025 to 15 September 2025 with a backstop date of 06 October 2025 (i.e., a deferral by up to 143 days).

1. EDF has therefore produced a safety case, EC 375940 (ref. [1]), which provides the nuclear safety justification for the proposed deferral of the HYA R2 periodic shutdown to no later than 06 October 2025.
2. EDF claims that EC 375940 (ref. [1]) 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.
3. To reach a decision on the proposed deferral, ONR has carried out a risk-informed targeted review of EC 375940 (ref. [1]). The findings of ONR’s review are summarised in the following section of this PAR.

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

1. As stated above, this request for extending the operating period of HYA R2 follows similar requests made for HYB R7 and HRA R1, which were assessed and permissioned by ONR without any significant findings or issues, see permissioning records PR-01764 and PR-01907, respectively. This gives confidence in EDF’s process and quality control for justifying these short deferrals.
2. ONR’s policy on risk-informed and targeted engagements (RITE) places an expectation on ONR’s inspectors to be led by available intelligence and to target their activities at high-risk areas. Therefore, ONR’s permissioning strategy for the proposed deferral, as recorded in permissioning record PR-02007, was developed in line with the RITE principles.
3. In accordance with the regulatory permissioning plan produced for assessing the deferral submission recorded in PR-02007, ONR has carried out the following specialist reviews:

* Graphite structural integrity (ref. [2])
* Steel structural integrity (ref. [3])
* Electrical engineering (ref. [4])
* Control and instrumentation (C&I) (ref. [5])
* Mechanical engineering (ref. [6])
* Civil engineering review (ref. [7])
* Probabilistic safety analysis (PSA) (ref. [8])

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

## Graphite structural integrity

1. Ref. [2] reports the findings of the graphite structural integrity review of EDF’s justification to extend the operating period of HYA R2 to 06 October 2025.
2. The specialist inspector states that the accumulated operating period since the last statutory outage at the proposed deferred periodic shutdown date of October 2025, in terms of core burn up, is less than it would have been after three calendar years at full power. This is due to the refuelling and core inspection outages that took place over this period.
3. The specialist inspector also notes that the graphite core of HYA R2 will be inspected in April/May 2025 ahead of the proposed deferred date for the periodic shutdown. This will provide updated information on the core condition in terms of cracking of fuel bricks. It is worth noting that the level of keyway root cracking that have been observed in the graphite cores of the HYA reactors is very low.
4. Overall, the specialist inspector is content with the proposed deferral of HYA R2 periodic shutdown to 06 October 2025. Therefore, the specialist inspector has no objection, from a graphite structural integrity perspective, to agreeing to EDF’s proposal for deferring the HYA R2 periodic shutdown to 06 October 2025.

## Steel structural integrity

1. Ref. [3] reports the findings of the steel structural integrity review of EDF’s justification to extend the operating period of HYA R2 to 06 October 2025.
2. The specialist inspector states that HYA R2 will not have operated continuously at power for more than three years since its last statutory outage by the time the deferred outage commences. Therefore, all degradation mechanisms relating to at-power operation will remain within the safety case assumption of three-year operation between statutory outages.
3. The specialist inspector accepts EDF’s conclusion that the deferral will have insignificant impact on damage accumulation and does not invalidate any existing safety claims on essential plant reliability or functionality.
4. The specialist inspector judges that the Pressure Systems Safety Regulations (PSSR) considerations have been thoroughly considered by EDF and that PSSR compliance will be sustained despite the deferral.
5. Overall, the specialist inspector is content with the proposed deferral of HYA R2 periodic shutdown to 06 October 2025. Therefore, the specialist inspector has no objection, from a steel structural integrity perspective, to agreeing to EDF’s proposal for deferring the HYA R2 periodic shutdown to 06 October 2025.

## Electrical engineering

1. Ref. [4] reports the findings of the electrical engineering review of EDF’s justification to extend the operating period of HYA R2 to 06 October 2025.
2. The specialist inspector has considered the impact of the proposed periodic shutdown deferral on nuclear safety-significant electrical systems by determining that:

* The nuclear safety electrical 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 during the extended period of operation;
* There are no safety case commitments, or related issues which would prevent the safe deferral of the outage; and
* Any increased risks associated with deferring the outage by up to 143 days are acceptably low and the overall proposal is consistent with the ALARP principles.

1. Based on their review and assessment of EC 375940 and discussions with HYA relevant personnel, the specialist inspector states they are satisfied with the claims, arguments and evidence provided within EC 375940 and that they have not identified any safety-significant shortfalls in relation to electrical engineering aspects.
2. Overall, the specialist inspector is content with the proposed deferral of HYA R2 periodic shutdown to 06 October 2025. Therefore, the specialist inspector has no objection, from an electrical engineering perspective, to agreeing to EDF’s proposal for deferring the HYA R2 periodic shutdown to 06 October 2025.

## Control and Instrumentation (C&I)

1. Ref. [5] reports the findings of the C&I review of EDF’s justification to extend the operating period of HYA R2 to 06 October 2025.
2. The specialist inspector has focused their review of the proposed deferral on:

* Whether C&I related statutory outage examination, inspection, maintenance, and testing activities covered by the HYA maintenance schedule have been adequately reviewed by suitably qualified and experienced personnel (SQEP).
* The potential for the accuracy of C&I systems and equipment important to safety to drift past the point that it is unable to perform its nuclear safety function during the statutory outage deferral period has been considered by SQEP and the risk has been adequately assessed to remain acceptably low.
* The potential for C&I systems and equipment important to safety to reach a reliability cliff edge during the statutory outage deferral period has been considered by SQEP and the risk has been adequately assessed to remain acceptably low.
* The risk of delaying the systematic modification or replacement of Pulse to Direct Current (DC) Converters showing evidence of localised heat damage has been considered by SQEP and the risk has been adequately assessed to remain acceptably low.
* Whether further potential C&I-related risk reduction measures have been identified and assessed to demonstrate that the risk has been reduced to ALARP.

1. The specialist inspector states that they are content that EDF has adequately considered the above points. The specialist inspector did not identify any significant issues or shortfalls that would prevent agreeing to the HYA R2 deferral EC 375940 from a C&I perspective.
2. Overall, the specialist inspector is content with the proposed deferral of HYA R2 periodic shutdown to 06 October 2025. Therefore, the specialist inspector has no objection, from a C&I perspective, to agreeing to EDF’s proposal for deferring the HYA R2 periodic shutdown to 06 October 2025.

## Mechanical engineering

1. Ref. [6] reports the findings of the mechanical engineering review of EDF’s justification to extend the operating period of HYA R2 to 06 October 2025.
2. The specialist inspector has focused their review on the potential effect of the deferral of maintenance or testing of specific plant items by 143 days which included gas circulators, control rods, boiler safety relief valves, steam admission valves, main boiler feed pump valves and high temperature fasteners.
3. The specialist inspector states that they have not identified an unacceptable increase in risk for the sampled mechanical systems due to the proposed outage deferral and EDF is following its standard process for managing specific items deferrals and developing required dispensations when required.
4. Overall, the specialist inspector is content with the proposed deferral of HYA R2 periodic shutdown to 06 October 2025. Therefore, the specialist inspector has no objection, from a mechanical engineering perspective, to agreeing to EDF’s proposal for deferring the HYA R2 periodic shutdown to 06 October 2025.

## Civil engineering

1. Ref. [7] reports the findings of the civil engineering review of EDF’s justification to extend the operating period of HYA R2 to 06 October 2025.
2. The specialist inspector has considered the potential effect of the periodic shutdown deferral on the civil structures, focusing on the prestressed concrete pressure vessel (PCPV) and its associated maintenance schedule routine.
3. Based on their consideration of recent surveillances, inspections, tests and checks of the PCPV and other civil structures provided by EDF, the specialist inspector is satisfied that the proposed periodic shutdown deferral does not have any adverse impact on the PCPV and other civil structures.
4. Overall, the specialist inspector is content with the proposed deferral of HYA R2 periodic shutdown to 06 October 2025. Therefore, the specialist inspector has no objection, from a civil engineering perspective, to agreeing to EDF’s proposal for deferring the HYA R2 periodic shutdown to 06 October 2025.

## Probabilistic safety analysis (PSA)

1. Ref. [8] reports the findings of the PSA review of EDF’s justification to extend the operating period of HYA R2 to 06 October 2025.
2. The specialist inspector has considered how EDF utilised the PSA model to demonstrate that the station risk is not impacted significantly by the proposed periodic shutdown deferral and is reduced to ALARP.
3. The specialist inspector is content that the risk impact due to the proposed deferral is minor and the PSA results do not point to any specific component that has a significant change in importance due to the deferral.
4. Overall, the specialist inspector is content with the proposed deferral of HYA R2 periodic shutdown to 06 October 2025. Therefore, the specialist inspector has no objection, from a PSA perspective, to agreeing to EDF’s proposal for deferring the HYA R2 periodic shutdown to 06 October 2025.

# Matters arising from ONR’s work

1. There are no outstanding matters arising from the review and assessment work carried out by ONR that would prevent granting agreement to the extension of the operating period of HYA R2 up to 06 October 2025.
2. On that basis, I have prepared Licence Instrument 645 for agreement to the proposed extension of the operating period of HYA R2 by a period of 143 days, to no later than 06 October 2025.

# Other Matters

1. I have confirmed that EDF has followed its own due process. An Independent Nuclear Safety Assessment (INSA) statement for EC 375940 has been submitted in support of the case (ref. [1]).
2. Before issuing a Licence Instrument, it is established practice to notify other competent regulatory authorities of ONR’s intention, to ensure there are no specific objections that may compromise other regulatory requirements. I have liaised with the Environment Agency (EA) and they have confirmed that they have no objection to ONR’s agreement to the proposed periodic shutdown deferral for HYA R2 to 06 October 2025 (ref. [9]).
3. I have also liaised with ONR’s nuclear security and safeguards inspectors and they have confirmed that they have no objection to ONR’s agreement to the proposed periodic shutdown deferral of HYA R2 to 06 October 2025 (refs. [10] and [11]).

# Conclusions

1. Based on the work carried out by ONR, I am satisfied that ONR should agree to the extension of the operating period of HYA R2 to no later than 06 October 2025.

# Recommendations

1. ONR should issue Licence Instrument 645, under LC 30(2) for Nuclear Site Licence 60, granting agreement to extend the operating period of HYA R2 to no later than 06 October 2025.

# References

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| --- | --- |
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