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| ONR Project assessment report  Consent to start up Hartlepool Reactor 1 following its 2025 Periodic Shutdown |



ONR Project assessment report

**Project name**:

Hartlepool Reactor 1 Periodic Shutdown 2025

**Report title**:

Consent to start up Hartlepool Reactor 1 following its 2025 Periodic Shutdown

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

**Report issue no**.: 0

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# Executive summary

**Permission requested**

EDF Energy Nuclear Generation Limited (EDF), the operator and licensee of Hartlepool Nuclear Power Station (HRA), has written to the Office for Nuclear Regulation (ONR) requesting consent to start up Reactor 1 following its 2025 periodic shutdown. The request is in accordance with the licensee’s arrangements made under licence condition (LC) 30(3).

**Background**

The HRA nuclear site licence requires the licensee, under LC 30, to periodically shut down any plant or process to enable examination, inspection, maintenance and testing (EIMT) to take place. ONR has specified under LC 30(3) that the licensee is required to seek its consent before the start up of a reactor after its periodic shutdown in compliance with LC 30(1).

At HRA, reactor periodic shutdowns are every three years, as specified in the maintenance schedule preface, which is an approved document under LC 28(4). ONR’s consent to start up HRA Reactor 1 after its last periodic shutdown was given on 30 December 2021. This would have required Reactor 1 to shut down on or before 30 December 2024 unless ONR had agreed to an extension of the operating period.

In 2024, EDF applied for agreement from ONR to an extension of the operating period of HRA R1 by a period of 131 days, to no later than 10 May 2025. Following assessment of the justification supporting this request, ONR granted agreement to the extension request through Licence Instrument 578.

The HRA Reactor 1 2025 periodic shutdown commenced on 28 April 2025.

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

The main requirements ONR seeks to confirm during a periodic shutdown are:

* The EIMT requirements specified in the station’s maintenance schedule in support of LC 30 have been complied with;
* EIMT have been carried out by suitably qualified and experienced persons, with an appropriate level of supervision and quality assurance in place commensurate with the safety function of a system, structure or component; and
* All safety issues identified during the outage and any EIMT deferrals have been adequately addressed. Where necessary, a suitable and sufficient safety justification has been provided which allows a regulatory judgement to be made in support of restarting the reactor.

ONR’s inspection and assessment activities during this periodic shutdown have been carried out by specialist inspectors from the following specialisms:

* Metallic Structural Integrity;
* Graphite Structural Integrity;
* Electrical Engineering;
* Control and Instrumentation;
* Mechanical Engineering;
* Civil Engineering;
* Radiological Protection;
* Nuclear Site Health and Safety; and
* Operational Inspection.

**Matters arising from ONR's work**

There are no outstanding issues preventing the issue of a consent to start up Hartlepool Reactor 1 following its 2025 periodic shutdown.

**Conclusions**

ONR’s inspection and assessment findings from the Hartlepool Reactor 1 2025 periodic shutdown confirm that the licensee has carried out EIMT in accordance with the requirements of its maintenance schedule and provided an appropriate justification for any deferral. The work has been conducted to the required quality standards by competent personnel. No outstanding issues have been identified that prevent the start-up of Hartlepool Reactor 1 following its 2025 periodic shutdown.

**Recommendation**

ONR should issue licence instrument 579 granting consent to start up Hartlepool Reactor 1 following its 2025 periodic shutdown.

Table 1: List of abbreviations.

|  |  |
| --- | --- |
| Term/Acronym | Description |
| ALARP | As low as reasonably practicable |
| AFI | Area for improvement |
| EC | Engineering change |
| EDF | EDF Energy Nuclear Generation Limited |
| EIMT | Examination, inspection, maintenance and testing |
| EOSR | Early outage safety review |
| HRA | Hartlepool Nuclear Power Station |
| INA | Independent nuclear assurance |
| INSA | Independent nuclear safety assessment |
| IRR17 | Ionising Radiation Regulations 2017 |
| LC | Licence condition |
| LOLER | Lifting Operations and Lifting Equipment Regulations |
| ONR | Office for Nuclear Regulation |
| OFI | Opportunity for improvement |
| PCPV | Pre-stressed concrete pressure vessel |
| PSSR | Pressure Systems Safety Regulations 2000 |
| PVCW | Pressure vessel cooling water |
| R1 / R2 | Reactor 1 / Reactor 2 |
| SSC | Structure, system and component |
| SQEP | Suitably qualified and experienced person(s) |

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# Permission requested

1. EDF Energy Nuclear Generation Limited (EDF), the operator and licensee of Hartlepool Nuclear Power Station (HRA), has written to the Office for Nuclear Regulation (ONR) (ref. [1]) requesting consent to start up Reactor 1 (R1) after its 2025 periodic shutdown. The request is in accordance with the licensee’s arrangements made under Licence Condition (LC) 30(3).
2. This report presents how ONR has regulated the periodic shutdown, the matters considered, decisions made and the basis for granting the consent to start up HRA R1.

# Background

1. HRA’s nuclear site licence requires the licensee to periodically shut down any plant or process under LC 30 to enable examination, inspection, maintenance and testing (EIMT) to take place. The HRA maintenance schedule preface, an approved document under LC28(4), specifies that reactor periodic shutdowns take place every three years. ONR has specified under LC 30(3) (ref. [2]) that the licensee requires consent from ONR to start up a reactor after its shutdown for the purposes of LC 30(1).
2. ONR consent to start up HRA R1 after its last periodic shutdown was given on the 30 December 2021 (Licence Instrument 574, ref. [3]). This would have required R1 to shut down on or before 30 December 2024 unless ONR had agreed to an extension of the operating period.
3. In 2024, EDF applied for agreement from ONR to an extension of the operating period of HRA R1 by a period of 131 days, to no later than 10 May 2025. Following assessment of the justification supporting this request, ONR granted agreement to the extension request through Licence Instrument 578 (ref. [4]).
4. The HRA R1 periodic shutdown started on the 28 April 2025. The scope of work was set out in the licensee’s outage intentions document (ref. [5]). With all required EIMT now complete (except for those on the exception list as noted in sub-section ‎3.9.5.5), the licensee has applied to ONR for consent to start up R1, as required by LC 30(3).

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

1. The purposes of ONR inspection and assessment activities during a periodic shutdown are to establish that:

* The EIMT requirements specified in the station’s maintenance schedule in support of LC 30 have been complied with.
* EIMT have been carried out by suitably qualified and experienced persons (SQEP), with an appropriate level of supervision and quality assurance in place commensurate with the safety function of a system, structure or component (SSC).
* All safety issues identified during the outage and any EIMT deferrals have been adequately addressed. Where necessary, a suitable and sufficient safety justification has been provided which allows a regulatory judgement to be made in support of re-start of the reactor.

1. Based on the scope of work identified in the outage intentions document (ref. [5]) and in accordance with the regulatory permissioning strategy (PR‑02006) which utilised available regulatory intelligence, ONR has carried out the following inspections and assessments:

* Metallic Structural Integrity – assessment (ref. [6]) and LC 28 site inspection (ref. [7]).
* Graphite Structural Integrity – assessment (ref. [8]) and LC 28 site inspection (ref. [9]).
* Electrical Engineering – LC 28 site inspection (ref. [10]).
* Control and Instrumentation (C&I) – LC 28 site inspection (ref. [11]).
* Mechanical Engineering – LC 28 site inspection (ref. [12]).
* Civil Engineering – assessment (ref. [13]).
* Radiological Protection – Ionising Radiations Regulations 2017 site inspection (ref. [14]).
* Nuclear Site Health and Safety – workplace transport site inspection (ref. [15]).
* Operational Inspection – LC 26 site inspection for control and supervision of contractors (ref. [16]) and supporting the Early Outage Safety Review (ref. [17]).

1. ONR’s project inspector has maintained oversight of the outage activities prior to and throughout the outage by regular meetings with the HRA senior outage managers and through site visits.
2. Furthermore, the project inspector and the HRA nominated site inspector attended:

* The outage intentions meeting (ref. [18]) prior to the outage for the purpose of reviewing the station preparations for the outage; and
* The start up meeting (ref. [19]) towards the end of the outage for the purpose of reviewing the completed work and readiness for return to service.

1. The following sub-sections provide summaries of the ONR’s inspection and assessment findings for each of the technical discipline areas evaluated during the HRA R1 2025 periodic shutdown.

## Metallic structural integrity

1. Refs. [6] and [7] report the findings of the metallic structural integrity assessment and LC 28 inspection activities, respectively, during the HRA R1 2025 periodic shutdown.
2. The structural integrity specialist inspector focused their LC 28 inspection on the following sample:

* Pressure systems and related inspections under the Pressure Systems Safety Regulations 2000 (PSSR);
* Reactor/boiler internal inspections;
* Corrosion including flow accelerated corrosion;
* Hangers and snubbers;
* Materials and weld inspections;
* High temperature fasteners;
* Feed and condensate pipework leaks; and
* Cooling water systems.

1. Based on the activities sampled during the site inspection, the specialist inspector is content that HRA is in compliance with their LC 28 arrangements.
2. During the inspection the specialist inspector identified a shortfall related to the observation of a pipe clash between the reactor’s main steam interconnection pipework and the decay heat loop pipework. At the time of the site inspection, evidence was not available on the proposed resolution strategy and therefore there was not sufficient confidence that the risks were being reduced to ALARP. Hence, the specialist inspector considered this as a shortfall requiring resolution before return to service.
3. The specialist inspector states that the station had initially decided to lower the reactor interconnections pipeline by adjusting its hangers to remove the clash with the decay heat pipeline noted in paragraph ‎15 above and create as much gap as possible. However, following further questioning by ONR, the station decided to re-route the decay heat pipeline to resolve this issue before return to service.
4. The specialist inspector is content that the proposed re-routing work will resolve the issue. The justification for re-routing the decay heat return pipework is provided in engineering change (EC) 377796 (ref. [20]), which the specialist inspector has confirmed to be adequate (ref. [21]). The station has confirmed that this work is scheduled to be completed before return to service of R1 when the reactor’s cooling is switched off the decay heat loop (ref. [1]).
5. The specialist inspector also assessed in ref. [6] a sample of:

* The scope and results of the EIMT of the metallic SSCs important to nuclear safety carried out during the 2025 HRA R1 periodic shutdown; and
* PSSR examinations.

1. The specialist inspector is satisfied that HRA is adequately controlling and monitoring the R1 inspection programme. These inspections are being undertaken in line with the HRA R1 2025 outage intentions document and that HRA is following relevant procedures in the selection of component inspections and assessment and sentencing of inspection results.
2. The specialist inspector judged that HRA has appropriately fulfilled the requirements of LC 28 during the R1 periodic shutdown and had no objection to consent being granted for the start-up of HRA R1, subject to ONR receiving a number of additional documents and assurances.
3. EDF has submitted the documentation required within the start-up request (see sub-sections ‎3.9.5.3, ‎3.9.5.7, ‎3.9.5.8) and the structural integrity specialist inspector has further confirmed they are content for ONR to grant consent to start up HRA R1 (ref. [22]).

## Graphite structural integrity

1. Refs. [8] and [9] report the findings of the graphite assessment and LC 28 inspection activities, respectively, during the HRA R1 2025 periodic shutdown.
2. The scope of the EDF’s graphite inspections for this periodic shutdown include:

* A target of 36 fuel channel wall samples to be trepanned for examination (30 samples are required as a minimum) to monitor graphite weight loss.
* An additional 72 control rod channel wall samples to be trepanned for examination. This is an additional activity and is not required by the maintenance schedule.
* Visual inspections and bore measurements of 16 fuel channels.
* Eddy current inspection of six fuel channels. This is not a required activity by the maintenance schedule.
* Visual inspections of one control rod channel.

1. ONR’s LC 28 graphite inspection was carried out prior to the start of the periodic shutdown. This is because it focused on the pre-outage activities, carried out by EDF, for the calibration and testing of the graphite core inspection and trepanning equipment to ensure quality data would be collected and the maintenance schedule requirements would be met.
2. The specialist inspector states that the process of calibration and testing is rigorous and there is clear evidence of learning from previous graphite equipment issues. Therefore, the specialist inspector judged that the station’s arrangements with regards to the calibration and testing of the graphite inspection and trepanning equipment to be suitable and adequate.
3. The specialist inspector observed a minor shortfall in the management of the lifting defects noted in the Lifting Operations and Lifting Equipment Regulations (LOLER) certificate for the inspection equipment. Although the equipment is deemed safe to use, EDF should have adequate arrangements in place to record, sentence and manage defects and observations highlighted by the LOLER competent inspection certificate. Regulatory issue RI-12564 has been raised to track and resolve this shortfall.
4. The specialist inspector has made a few observations that would require further consideration and potential improvement work by HRA. These observations and the shortfall noted in paragraph ‎26 above do not present a challenge to return to service and will be followed up through routine regulatory business.
5. The specialist inspector has assessed the graphite core inspection findings in ref. [8] against the limits of the extant graphite safety case and whether return to service is justified.
6. The specialist inspector stated that at the time of writing their assessment report, HRA had completed inspections of 6 out of 16 fuel channels, trepanned 36 samples from fuel channels and carried out Eddy Current inspections on 6 fuel channels.
7. The specialist inspector therefore based their assessment on the results of the completed inspections (as noted in paragraph ‎29) and raised the following recommendation to cover the outstanding inspection activities:

“Recommendation 1: I recommend the Project Inspector obtains confirmation from the appropriate graphite specialist Inspector that all required inspection activities on the graphite core have been complete, and that no return to service issues were identified by the remaining inspections.”

1. The specialist inspector stated that the six channels that were inspected are high burn-up channels where keyway root cracking would be most likely to occur. No keyway root cracks were observed in these channels. Only a number early-life bore-initiated cracks were observed which do not challenge the safety case.
2. The remaining inspections and trepanning activities have subsequently been completed. Inspection observations have been reported and assessed by EDF in the graphite return to service safety case EC 377472 (ref. [23]). The specialist inspector has maintained oversight of the inspection observations and has confirmed that all required inspection activities on the graphite core have been completed and that no return to service issues were identified by the remaining inspections (ref. [24]). This satisfies their recommendation noted in paragraph ‎30 above.
3. It is worth noting that the remaining inspections of ten fuel channels did not show any keyway root cracking. This means no keyway root cracking has been observed at HRA reactors to date.
4. The specialist inspector did not identify any significant issues that would prevent granting a consent for the start-up of HRA R1 following its periodic shutdown.

## Electrical engineering

1. Ref. [10] reports the findings of the electrical engineering LC 28 inspection during the HRA R1 2025 periodic shutdown.
2. The electrical engineering specialist inspector sampled EIMT activities related to the station’s electrical SSCs important to nuclear safety, these included the essential supplies transformers, switchboards and switchgear.
3. The specialist inspector has noted that HRA had taken the decision to defer maintenance work on a limited number of circuit breakers carried out by National Grid. National Grid’s resource was no longer available to support this work due to the delay to the start of the periodic shutdown. EDF and National Grid consider that this equipment is maintained more frequently by comparison to other similar breakers across the UK. The specialist inspector considers this to be acceptable as alternative supply arrangements are available and there is no risk to nuclear safety if failure occurs.
4. During a plant walkdown, the specialist inspector observed that electric cables over a fire exit were supported by non-metallic cable ties. The specialist inspector advised the station that current relevant good practice effectively rules out the use of non-metallic cable clips, cable ties and conduit or cable trunking as the sole means of support for the cables in escape routes. HRA reacted positively and initiated corrective actions. To monitor progress, ONR has raised regulatory issue RI-12583 for the station to carry out an extent of condition and take corrective actions where needed.
5. Based on the sampled evidence and plant walkdowns, the specialist inspector is content that EDF has met the electrical engineering LC 28 expectations during the HRA R1 periodic outage.
6. The specialist inspector has no objections to ONR granting consent to the start-up of HRA R1 following its periodic shutdown.

## Control and instrumentation

1. Ref. [11] reports the findings of the C&I LC 28 inspection during the HRA R1 2025 periodic shutdown.
2. The C&I specialist inspector sampled EIMT related activities on C&I equipment and systems important to nuclear safety, these included:

* Reactor safety circuits:
  + Guardline systems.
  + Neutron flux detectors.
* Core and safety equipment thermocouples.
* Control rod control system.
* Reactor post trip logic system.
* Secondary shutdown system.
* Data processing and control system.
* Gas circulator control system.
* Chloride ingress protection system.
* Pressure vessel cooling water system.
* C&I equipment relating to the gas turbines and condensate polishing plant.

1. The specialist inspector has found the majority of activities sampled were either satisfactorily completed or on schedule to be completed.
2. However, the specialist inspector has found a few shortfalls. The most significant was an instance where out-of-tolerance timer relays for the reactor post trip logic system had not been identified and had been declared fit for return to service. The specialist inspector considered this a significant shortfall in the implementation of compliance arrangements.
3. HRA has subsequently re-tested the timer relays and found them to be within tolerance. HRA has identified that incorrect operation of the timing equipment by the maintenance technician had resulted in the timer relay times being incorrectly recorded as out-of-tolerance.
4. The specialist inspector is content this is acceptable for return to service. However, a regulatory issue RI-12640 has been raised for the station to review the root cause and implement appropriate measures to prevent a similar occurrence of this situation.
5. The specialist inspector provided advice to the station for the other minor shortfalls, two of which will be tracked through regulatory issues RI-12638 and RI-12639, to ensure timely and adequate resolution by the station. The former is related to leaks on the condensate polishing plant causing degradation to surrounding pipework and equipment and the latter associated with the apparent use of an unapproved method to inhibit protection relay operation during testing.
6. The specialist inspector is content that the observed shortfalls do not pose an immediate or significant risk to nuclear safety or need to be addressed before return to service.
7. Therefore, the specialist inspector has recommended granting a consent for the start-up of HRA R1 following its periodic shutdown.

## Mechanical engineering

1. Ref. [12] reports the findings of the mechanical engineering LC 28 inspection during the HRA R1 2025 periodic shutdown.
2. The mechanical engineering specialist inspector has sampled the mechanical engineering aspects of SSCs important to nuclear safety being maintained during the HRA R1 periodic shutdown, these included:

* Secondary and tertiary shutdown systems;
* Auxiliary cooling circuit; and
* Main steam system.

1. Based on the sampled evidence and plant walkdowns, the specialist inspector does not have any concerns over EDF’s processes and personnel's ability to adequately meet the mechanical engineering LC 28 expectations during the HRA R1 periodic outage. The specialist inspector identified potential improvements to the work instructions and fed this back to the licensee, but these do not present a challenge to return to service.
2. The specialist inspector has no objections to ONR granting consent to the start up of HRA R1 following its periodic shutdown.

## Civil engineering

1. Ref. [13] reports the findings of the civil engineering assessment of the statutory examination of the pre-stressed concrete pressure vessel (PCPV) of HRA R1.
2. It documents the findings of the surveillances, inspections, and tests of certain key safety related components of the PCPV including:

* Concrete surface condition (including PCPV support walls);
* Tendon and wire winding anchorages;
* Vertical tendon and circumferential wire winding residual load;
* Assessment of the pre-stressing strands;
* Settlement and tilt survey;
* Review of embedded strain gauges readings;
* Review of vessel concrete temperatures;
* Review of reactor coolant leakage;
* Review of pressure vessel cooling water leaks;
* Top cap deflection survey; and
* Review of boiler closure units instrumentation data and remote access inspections.

1. The specialist inspector did not find any significant shortfalls in the surveillances and inspections reported by the appointed examiner and has not identified any concerns regarding the integrity of the R1 PCPV.
2. At the time of writing their assessment report, there were a number of outstanding activities that had not been completed. These are now complete and the specialist inspector has confirmed (ref. [25]) they are content for ONR to grant consent for the start-up of HRA R1 following its periodic shutdown

## Workplace transport

1. Ref. [15] reports the findings of the workplace transport inspection during the HRA R1 2025 periodic shutdown. During a periodic shutdown, personnel and vehicle movements on site increase significantly. Hence, the nuclear site conventional health and safety specialist inspector has focused on how HRA was managing workplace transport during this periodic shutdown.
2. The specialist inspector has sampled the workplace transport arrangements and the control measures identified and utilised for high risk areas.
3. The specialist inspector states that EDF has undertaken significant work on the workplace transport risk assessment and implemented control and mitigation measures for the high risk areas on site in preparation for the periodic shutdown.
4. One of the most effective demonstrations of this was the closure of the road between contractors welfare cabins; something that had not happened during previous periodic shutdowns. EDF had identified this road as a high risk area and has mitigated that risk by closing it and re-routing vehicular traffic for the duration of the outage.
5. The specialist inspector did not identify any significant issues that would prevent granting a consent for the start-up of HRA R1 following its periodic shutdown.

## Radiation Protection

1. Ref. [14] reports the findings of the radiation protection inspection during the HRA R1 2025 periodic shutdown. The radiation protection specialist inspector has assessed the station compliance with the Ionising Radiation Regulations 2017 (IRR17) focusing on:

* Arrangements to demonstrate compliance with IRR17 regulations 8 (radiation risk assessment) and 9 (restriction of exposure); and
* Working practices within the radiologically controlled area against company standards and relevant good practice.

1. The specialist inspector states that HRA has demonstrated:

* Clear understanding of the dose and radioactive contamination challenges presented during the outage;
* Significant focus on contamination control and learning from previous events to reduce the number of personal contamination events during this outage; and
* Robust dose tracking tools to monitor doses across the outage and that any deviation from the estimated doses are acted upon quickly.

1. The specialist inspector states that dose exposures are well controlled by HRA and the risks have been reduced to ALARP.
2. Therefore, the specialist inspector judges, based on the evidence sampled during the inspection, that HRA has demonstrated compliance with the relevant aspects of IRR17. No significant issues have been identified that would prevent granting a consent for the start-up of HRA R1 following its periodic shutdown.

## Project inspection and start up request

### Outage intentions meeting

1. EDF formally engaged with ONR in January 2025 through the outage intentions meeting (ref. [18]). At this meeting, EDF presented (ref. [5]) its intended scope of maintenance work and the approach to managing safety and quality during the R1 periodic shutdown.
2. The HRA R1 outage intentions document (ref. [5]) sets out the required maintenance work as well as other work to be carried out in support of safety during the periodic shutdown.

### Early outage safety review

1. ONR’s project inspector joined the EDF’s internal nuclear assurance (INA) team on their early outage safety review (EOSR) (ref. [17]), which forms part of their outage activities during the 2025 periodic shutdown of HRA R1.
2. The HRA R1 EOSR was a week-long event led by INA, which took place from 5 to 9 May 2025 at the station. The purpose of the EOSR was to:

* Identify safety performance shortfalls in the early stages of an outage;
* Assist station management in reducing or eliminating undesirable behaviours and conditions which could have an adverse impact on outage success. This includes station response and reinforcement following significant findings; and
* Assist fleet to identify potential issues at various levels of outage oversight and implement long term, sustainable solutions with the relevant process owners.

1. The EOSR focused on nuclear safety (e.g. protected plant, defence in depth) and conventional health and safety (e.g. lifting operations, working at height). Feedback was given to the station lead team at the end of each day with more significant observations followed up immediately.
2. At the end of the EOSR, feedback was given to the station’s lead team on positive observations and areas for improvement ref. [26]. The INA team identified four areas for improvement (AFI) and two opportunities for improvement (OFI), these were:

* AFI1: Protection of the running unit during outage;
* AFI2: Operational risk management reverence during outage;
* AFI3: Control of temporary barriers;
* AFI4: Inconsistent visibility of site passes;
* OFI1: Waste management and oil storage shortfalls; and
* OFI2: Inconsistency in dropped object prevention.

1. The issues identified were accepted by the station lead team and commitment was given that actions would be taken to address them. There was positive engagement between the INA team and the station lead team.

### LC 26 compliance inspection

1. ONR’s project inspector carried out an LC 26 compliance inspection (ref. [16]) focusing on the station’s arrangements and their implementation for control and supervision of maintenance work carried out by contractors during the periodic shutdown.
2. LC 26 requires that safety related operations / activities are carried out under the control and supervision of suitably qualified and experienced personnel (SQEP) appointed for this purpose by the dutyholder.
3. The inspection included:

* The station’s arrangements for control and supervision of contractors.
* Discussions with the station’s contract manager, personnel from a sampled contractor which included site manager, field supervisors and workers for a specific task.
* A sample of documentation that included company specifications, monitoring and tracking activities by the station, safety documents, training records and nomination forms to confirm appropriate implementations of the station’s arrangements.

1. The project inspector concluded based on the evidence sampled that:

* The station has made adequate arrangements for control and supervision of operations and activities carried out by contractors under the supervision of SQEP who are appointed for this purpose; and
* These arrangements have been adequately implemented.

1. Overall, the inspection was positive with no significant issues identified that would prevent granting a consent for the start-up of HRA R1 following its periodic shutdown.

### Emergent issues and events

#### Double reactor outage and resultant deferral of EIMT

1. On 3 June 2025 the operating unit R2 suffered an unplanned automatic shutdown. This was due to an automatic shutdown of generator transformer 2 during routine transformer adjustments to support National Grid.
2. The loss of generator transformer 2 led to a loss of grid supplies, as generator transformer 1 was offline for maintenance work as part of the R1 periodic shutdown.
3. The station declared a site incident and priorities changed, leading to outage related maintenance work on R1 to stop until the site incident response was stood down on 8 June 2025 and grid supplies restored.
4. During the incident, and in the interest of safety, the station took the decision to curtail maintenance work on generator transformer 1 and return it back to service to restore grid supplies and exit the site incident.
5. Following generator transformer 2 return to service, generator transformer 1 was re-isolated to complete its outage maintenance work. However, some maintenance work on a limited number of circuit breakers has been deferred due to resource availability. The electrical engineering inspector is content with this deferral as alternative feeding arrangements are available and there is no nuclear safety risk if failure occurs (see sub-section ‎3.3, paragraph ‎37). Therefore, this does not present a challenge to return to service.

#### EC 377675 ‘Return to Service Case – HRA Demineralised Water Usage’

1. Following the unplanned trip of R2, post trip cooling was required to remove decay heat. The post trip cooling is usually a closed loop system. However, a loss of vacuum on the main condenser caused the post trip cooling system to operate in a once through (open loop) configuration for a short period until closed loop operations could be restored. During this period demineralised water was supplied from the reserve feed tanks with the usage observed to be in excess of that identified by the safety case.
2. Therefore, EDF entered their safety case anomalies process with the outcome being the embargo of operations at Hartlepool until the cause of excess demineralised water use was understood and a safety case made for returning to operation.
3. EC377675 (ref. [27]) is the return to service safety case for demineralised water usage which is a category 2 case and is therefore not subject to ONR permissioning as a matter of routine or process requirement. However, due to a previous event where there was a higher than expected use of demineralised water, ONR requested the safety case for information.
4. The safety case (ref. [27]) identifies the causes of the excess demineralised water usage and identifies plant modifications to prevent re-occurrence. A fault studies specialist inspector has reviewed this safety case (ref. [28]) and concluded that the case for return to service is apparent as EDF has understood the causes with a high degree of confidence and returned the plant to within its extant safety case.
5. It is noted there remain ongoing improvements to the plant and work towards a long-term consolidated safety case which we are tracking through regulatory issue RI-12228.

### Start up request

1. This section summarises the start-up request which:

* Confirms that HRA R1 is in a satisfactory state for start-up following its 2025 periodic shutdown; and
* Provides confirmation of completion of statutory examinations and justifies any exceptions.

#### Start up meeting

1. ONR inspectors attended the start-up meeting (ref. [19]) which was held on 17 July 2025 at the station. A briefing pack was submitted in advance of the meeting with verbal updates provided during the meeting on outage progress and findings. Prior to the meeting, a plant walkdown was completed which included areas where there was work being carried to support ongoing significant periodic shutdown work packages. No issues that would prevent the start-up of R1 were identified, subject to completion of outstanding EIMT and adequate safety justifications being provided for start-up of HRA R1. This included justifications for any deferred EIMT and for the usage rates and stocks of demineralised water.

#### Start up letter

1. The Station Director has asked ONR for consent to start up HRA R1 under LC 30(3) (ref. [1]). The Station Director has confirmed that the reactor and associated plant is in a satisfactory state for a further period of operation subject to completion of a small number of activities that are required before, or as part of, the return to service activities.

#### Return to service EC 377246

1. The licensee’s justification to return HRA R1 to service following the inspections and associated assessments during the 2025 periodic shutdown is set out in EC 377246 (ref. [29]).
2. It confirms that the inspection programme has been successfully completed and the reactor is fit for return to service for the next operating period.
3. This is supported by an INSA approval statement (ref. [30]).

#### Graphite core inspections EC 377472

1. EDF’s justification to return HRA R1 to service following the graphite core inspections is set out in EC 377472 (ref. [23]) which is supported by an INSA approval statement (ref. [31]).
2. It confirms that the inspection of the graphite core has been completed in accordance with the maintenance schedule requirements and the graphite assessment panel has confirmed that the results are within the accepted limits of the relevant graphite safety cases.

#### Maintenance schedule exceptions list and safety justifications

1. The licensee’s request for ONR’s consent to start up HRA R1 following its 2025 periodic shutdown states that the EIMT specified in the outage intentions document is now complete, with the exceptions detailed in ref. [1] and that these will be completed before, or as part of, return to service.
2. The licensee notes that a number of maintenance schedule activities have been deferred and justified; these are:

* Selected high voltage electrical testing.
* 1A2 gas circulator penetration liner weld inspection and end closure plate overhaul.

1. The justification for the deferred work related to the high voltage electrical testing was discussed under sub-sections ‎3.3 and ‎3.9.4.1.
2. For the deferred work on the 1A2 gas circulator, EDF provided a safety justification in EC 375925 (ref. [32]). The structural integrity specialist inspector has confirmed EC 375925 provides an adequate justification (ref. [33]).
3. Based on the evidence from ONR’s inspections and assessments, I am content that the licensee has complied with their plant maintenance schedule requirements or provided an appropriate justification for any deferred work.

#### Appointed examiner report for PCPV

1. The licensee has submitted the Appointed Examiner’s report (ref. [34]) summarising the outcome of the PCPV examinations as specified in the station’s maintenance schedule and the written scheme of examination.
2. The report confirms that all the inspection activities required to monitor the PCPV during the periodic shutdown are complete, except those which have to be completed as part of or after return to service.
3. Based on the results of the inspection activities undertaken, the Appointed Examiner concludes that the HRA R1 PCPV is in a satisfactory condition for continued operation, subject to normal in-service surveillance, until the next scheduled statutory outage due in 2028 and is certified for operation at pressure for a period of 42 months to 14 February 2029, noting that there are no cliff-edge effects associated with this date.

#### Competent person statement for PCPV penetrations

1. The licensee has submitted the inspection results of the thorough examination for the HRA R1 PCPV penetrations (ref. [35]).
2. All the penetrations inspected were confirmed as being in a satisfactory condition, with no significant challenges to integrity identified. The competent person has confirmed the suitability of the system of PCPV penetrations on R1 for continued service for the maximum interval permitted by the written scheme of examination (up to 20 February 2029 unless a postponement has been agreed with the competent person).

#### Competent person statement for PSSR-related systems

1. The licensee has submitted a statement with respect to the inspections performed in accordance with the PSSR during the periodic shutdown from their independent third party PSSR competent person (ref. [36]).
2. The statement confirms that the out-of-service examinations detailed in the written schemes of examination are complete and have been found to be satisfactory. In-service examinations of the HRA R1 pressure systems will be completed following return to service.

#### Station independent nuclear assurance (INA) concurrence

1. INA has provided an interim concurrence statement (attached to ref. [1]) which concludes that they do not identify any issues that present a threat to the start up or continued operation of HRA R1.

### ONR’s civil nuclear security and safeguards

1. ONR’s civil nuclear security and safeguards inspectors have confirmed (refs. [37] and [38]) that they have no objections to ONR granting consent to the start up HRA R1.

### Engagements with other governmental agencies

1. Before granting consent, other relevant competent regulatory authorities are notified of ONR’s intentions to ensure there are no specific objections that may compromise other regulatory requirements. ONR has engaged with the Environment Agency, who has confirmed (ref. [39]) that they have no objection to the start-up of HRA R1 following the 2025 periodic shutdown.

# Matters arising from ONR’s work

1. There are no outstanding matters arising from the inspection and assessment work carried out by ONR that would prevent granting consent to start up HRA R1 after its 2025 periodic shutdown.
2. Residual issues that do not prevent ONR granting consent to start up HRA R1 will be followed up through normal regulatory business.

# Conclusions

1. Based on the evidence gathered from ONR’s inspection and assessment activities for the HRA R1 2025 periodic shutdown, together with the claims, arguments and evidence presented by the licensee in its request for consent to start up HRA R1, I am satisfied that:

* The EIMT requirements specified in the station’s maintenance schedule in support of LC 30 have been complied with. Where maintenance schedule activities have been deferred, appropriate safety justifications have been provided.
* EIMT have been carried out by SQEP, with an appropriate level of supervision and quality assurance in place commensurate with the safety function of a system, structure or component (SSC).
* Safety issues identified by the licensee during the shutdown have been adequately addressed with suitable and sufficient safety justification that relevant safety case limits and conditions are not challenged.

1. There remain some outstanding activities to complete as part of the reactor start-up and completion of these activities will be reported to ONR in the 28‑day report, or in specific documents that are not required prior to granting consent to start up.
2. In conclusion, no matters of concern have been identified and ONR should grant consent for HRA R1 to start up following its 2025 periodic shutdown.

# Recommendations

1. ONR should issue Licence Instrument 579, granting consent to start up Hartlepool Reactor 1 following its 2025 periodic shutdown.

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