|  |
| --- |
|  |
| ONR Project Assessment Report  Heysham 2 – Periodic Shutdown S12R8 |



ONR Project Assessment Report

Project Name: Heysham 2

Report Title: Periodic Shutdown S12R8

Dutyholder/Applicant: EDF Energy Nuclear Generation Limited

ONR Report Ref. No.: ONRW-2019369590-3351

Report Issue No.: 0

Publication Date: July 2023

© Office for Nuclear Regulation, [2023]

For published documents, the electronic copy on the ONR website remains the most current publicly available version and copying or printing renders this document uncontrolled. If you wish to reuse this information visit [www.onr.org.uk/copyright](http://www.onr.org.uk/copyright) for details.

# Executive Summary

**Title**

Heysham 2 - Periodic Shutdown S12R8 2023 - Consent to Start-up Reactor 8

**Permission Requested**

EDF Energy Nuclear Generation Limited, the operator and licensee of Heysham 2 nuclear power station, has written to the Office for Nuclear Regulation (ONR) asking for consent to start-up Reactor 8 after completing its 2023 periodic shutdown. The shutdown began on Friday 5 May 2023, with a planned duration of 74 days.

**Background**

The nuclear site license for Heysham 2 requires the licensee to periodically shutdown any plant or process to enable examination, inspection, maintenance and testing (EIMT) to take place. ONR has specified that the licensee must obtain our Consent before the start-up of a reactor after it is shutdown, which takes place every three years for an Advanced Gas-Cooled Reactor (AGR), as specified in the Maintenance Schedule preface.

ONR gave consent to start-up Reactor 8 after its last periodic shutdown on 3 April 2020 (Licence Instrument 628). Therefore, Reactor 8 was required to shutdown on or before 3 April 2023. However, in accordance with the flexibility allowed by the maintenance schedule preface, Heysham 2 justified an extension of the operating to 5 May 2023.

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

The documentation produced by the licensee for the periodic shutdown and the EIMT of Structures, Systems and Components important to nuclear safety has been assessed by ONR specialist inspectors in: Graphite, Structural Integrity, Electrical Engineering, Control & Instrumentation, Mechanical Engineering and Civil Engineering.

ONR’s inspection and assessment during the shutdown has focused on confirming that:

* The EIMT requirements specified in the station’s maintenance schedule in support of LC30 have been complied with.
* EIMT has been carried out by Suitably Qualified and Experienced Persons, with an appropriate level of supervision and quality assurance in place commensurate with equipment’s safety function.
* Safety issues identified by the licensee during the shutdown have been adequately addressed with suitable and sufficient safety justification provided to allow a regulatory judgement to be made in support of restart of the reactor and its safe operation until the next periodic shutdown.

The Environment Agency has been consulted and does not object to ONR issuing a Licence Instrument giving Consent for Reactor 8 to start-up following its periodic shutdown. ONR Civil Nuclear Security has also been consulted and have no security concerns regarding the start-up of Reactor 8.

**Matters arising from ONR's work**

There are no outstanding issues preventing the return to service of Heysham 2 Reactor 8. ONR intervention findings during the periodic shutdown have been recorded in the respective inspection records and reported to the licensee. All matters have now been addressed to allow consent to start-up Reactor 8 with some minor residual issues that will be followed-up through routine business.

**Conclusions**

ONR’s inspection and assessment of the Heysham 2 Reactor 8 2023 periodic shutdown confirms that the licensee has carried out EIMT in accordance with the requirements of its maintenance schedule. The work has been conducted to the required quality standards by competent personnel. No outstanding issues of significance have been identified by the licensee or ONR that prevent the start-up of Reactor 8 following its periodic shutdown.

**Recommendation**

ONR recommends that Licence Instrument 640 is issued, giving consent to start-up Heysham 2 Reactor 8 following its 2023 periodic shutdown.

# List of Abbreviations

AGTE Advanced Graphite Trepanning Equipment

APEX Appointed Examiner

ALARP As Low As Reasonably Practicable

BCU Boiler Closure Unit

DHB Decay Heat Boiler

DHFV Decay Heat Flash Vessel

C&I Control and Instrumentation

COG Circulator Outlet Temperature

CGO Channel Gas Oitlet Temperature

CNSS Civil Nuclear Security and Safeguards

DGL Diverse Guardline

EC Engineering Change

ECIT Eddy Current Inspection Tool

EE Electrical Engineering

EIMT Examination, Inspection, Maintenance and Testing

EOSR Early Outage Safety Review

GAP Graphite Assessment Panel

GC Gas Circulator

HYB Heysham 2

INA Independent Nuclear Assurance

INSA Independent Nuclear Safety Assessment

JCO Justification for Continued Operation

LC Licence Condition

LI Licence Instrument

MBFP Main Boiler Feed Pump

MGL Main Guardline

MS Maintenance Schedule

NICIE2 New In-core Inspection Equipment

NGL EDF Energy Nuclear Generation Limited

OAP Outage Assessment Panel

ODM Operational Decision Making

OID Outage Intentions Document

OpEx Operating Experience

ONR Office for Nuclear Regulation

PCPV Pre-stressed Concrete Pressure Vessel

PSSR Pressure Systems Safety Regulations

R8 Reactor 8

RI Regulatory Issue

RTS Return to Service

SCC Stress Corrosion Cracking

SSC Structures Systems and Components

SQEP Suitably Qualified and Experienced Persons

VFC Variable Frequency Converter

Contents

[Executive Summary 3](#_Toc140214820)

[List of Abbreviations 5](#_Toc140214821)

[1. Permission Requested 8](#_Toc140214822)

[2. Background 8](#_Toc140214823)

[3. Assessment and Inspection Work Carried out by ONR in Consideration of this Request 8](#_Toc140214824)

[3.1. Graphite Integrity 9](#_Toc140214825)

[3.2. Structural integrity 10](#_Toc140214826)

[3.3. Electrical engineering 11](#_Toc140214827)

[3.4. Control and instrumentation 12](#_Toc140214828)

[3.5. Mechanical engineering 13](#_Toc140214829)

[3.6. Civil engineering 14](#_Toc140214830)

[3.7. Events and Emergent Issues 15](#_Toc140214831)

[3.7.1. Events 15](#_Toc140214832)

[3.7.2. Emergent Issues 15](#_Toc140214833)

[3.8. Project Inspector 15](#_Toc140214834)

[3.8.1. Early Outage Safety Review 15](#_Toc140214835)

[3.8.2. Start-up Meeting 16](#_Toc140214836)

[3.8.3. Start-up Letter 16](#_Toc140214837)

[3.8.4. Maintenance Schedule Exceptions List and Safety Justification 16](#_Toc140214838)

[3.8.5. Return to Service EC 17](#_Toc140214839)

[3.8.6. Graphite Core Inspections EC 17](#_Toc140214840)

[3.8.7. APEX Statement on Concrete Pre-Stressed Pressure Vessel 17](#_Toc140214841)

[3.8.8. Appointed Examiner Statement on Reactor Penetrations Examination 17](#_Toc140214842)

[3.8.9. Appointed Examiner Statement PSSR 17](#_Toc140214843)

[3.8.10. HYB INA Concurrence 18](#_Toc140214844)

[3.8.11. Civil Nuclear Security and Safeguards 18](#_Toc140214845)

[3.8.12. Engagement with other Governmental Agencies 18](#_Toc140214846)

[4. Matters Arising from ONR’s Work 18](#_Toc140214847)

[5. Conclusions 18](#_Toc140214848)

[6. Recommendations 19](#_Toc140214849)

[References 19](#_Toc140214850)

# Permission Requested

1. EDF Energy Nuclear Generation Limited (NGL) has requested the Office for Nuclear Regulation’s (ONR) [1] consent to start-up Heysham 2 (HYB) Reactor 8 (R8) in accordance with its arrangements made under Licence Condition (LC) 30: Periodic shutdown.

# Background

1. The HYB nuclear site licence requires any plant or process to be shut down in accordance with the requirements of the plant maintenance schedule (referred to in licence condition 28) for the purpose of Examination, Inspection, Maintenance or Testing (EIMT) to take place.
2. The HYB maintenance schedule preface, (an approved document under LC 28 (4)) specifies that reactor periodic shutdowns take place every three years. ONR has specified under LC 30 (3) that the licensee requires ONR’s consent to start-up a reactor after its shutdown in compliance with LC 30 (1).
3. ONR gave consent to start-up Reactor 8 after its last periodic shutdown on 3 April 2020 (LI 628) and it was therefore required to shutdown on or before 3 April 2023. However, in accordance with the flexibility allowed within the maintenance schedule preface, HYB has justified an extension of the operating period lasting less than three calendar months until 5 May 2023, but no later than 12 May 2023 (maximum 39-day deferral)
4. The HYB Reactor 8 2023 periodic shutdown, identified as S12R8, started on Friday 5 May 2023, with a planned duration of 74 days.
5. The licensee’s Outage Intentions Document (OID) [2] sets out the scope of plant inspections, EIMT requirements, plant and pressure circuit inspection strategy and other work to be carried out in support of safety. It also identifies the licensee’s arrangements for managing safety and quality during the shutdown.

# Assessment and Inspection Work Carried out by ONR in Consideration of this Request

1. In accordance with the regulatory permissioning plan [3] ONR’s regulation of the outage involved detailed inspections and assessments by several specialist inspectors along with more general inspections undertaken by the project inspector. ONR’s inspections and assessments have focused on confirming that:

* The EIMT requirements specified in the stations maintenance schedule in support of LC 30 have been complied with.
* EIMT has been carried out by Suitably Qualified and Experienced Persons (SQEP), with an appropriate level of supervision and quality assurance in place, commensurate with the equipment’s safety function.
* Safety issues identified by the licensee during the shutdown have been adequately addressed with suitable and sufficient safety justification provided to allow a regulatory judgement to be made in support of restart of the reactor and its safe operation until the next periodic shutdown.

1. Based on the scope of work identified in the outage intentions document, ONR judged it proportionate to obtain advice from the following disciplines to support its recommendation to give consent:

* Graphite Integrity
* Structural integrity
* Electrical engineering
* Control and instrumentation
* Mechanical engineering
* Civil engineering

1. The inspections and assessments have been undertaken in accordance with ONR Technical Inspection and Assessment Guidance. The project inspector maintained an overview of the work undertaken by the ONR specialist inspectors, monitored the periodic shutdown activities and provided regulatory advice where necessary.
2. The following sections provide summaries of the inspection and assessment findings for each technical discipline which have informed ONR’s recommendation to give consent to start-up HYB R8.

## Graphite integrity

1. Reference [4] reports the findings of ONR’s graphite integrity inspection and assessment of the HYB S12R8 periodic shutdown.
2. The inspector targeted the licensee’s examination and inspection activities associated with the graphite core and peripheral bricks.
3. The licensee’s inspection activities consisted of:

* Inspection of a minimum of 20 fuel channels both visually and dimensionally using a New In-Core Inspection Equipment (NICIE2);
* Trepanning of a minimum of 30 graphite specimens to a depth of 80mm using the Advanced Graphite Trepanning Equipment (AGTE), with a target of 35 samples;
* Visual inspection of one control rod channel;
* Inspection of 3 faces of the peripheral shield wall; and
* Inspection of 7 channels with the Eddy Current Inspection Tool (ECIT).

1. The fuel channel inspections found a full height axial crack, which the licensee provisionally sentenced as a keyway root crack. This observation is within the licensee’s pre-outage forecasts and the inspector was content that the findings of the graphite inspections do not challenge the existing graphite safety case and should not prevent the return to service of HYB R8.
2. The inspector notes that the return to service Engineering Change documents had not completed due process and were not available at the time of the assessment. Consequently, the inspector recommended that the project inspector confirms the Independent Nuclear Safety Assessment (INSA) statements for EC373326 and EC 372946 have been made available by the licensee and agrees with these views in the Engineering Change documents.
3. ONR has subsequently received and is content with this information (refer to sections 3.8.6)
4. Overall, the inspector judged that the graphite core inspection results were within the bounds and arguments of the safety case and had no objection to recommending that consent is given to return HYB R8 back to service.

## Structural integrity

1. Reference [5] reports the findings of ONR’s structural integrity inspection and assessment of the HYB S12R8 periodic shutdown.
2. The assessment considered the adequacy of the inspections, assessments and analysis of welds, metallic reactor internal structures and components, main cooling water system, pipe hangers, thermal movement survey and compliance with Pressure Systems Safety Regulations 2000 (PSSR).
3. The inspector was satisfied with the proposed inspection programme; that inspections have been undertaken in line with the outage intentions document and that assessment and sentencing of inspection results has followed corporate procedures. The inspector is satisfied that changes to the inspection scope have been sentenced appropriately and in accordance with the licensee’s arrangements.
4. The inspector raised two Level 4 Regulatory Issues concerning the lack of Suitably Qualified and Experienced Persons to oversee the corrosion management programme in line with the licensee’s guidance, and to understand how stations nearing end of operating life manage inspection strategies at a detailed level and a wider level. The inspector judged that resolution of these Regulatory Issues is not necessary for the return to service of the reactor.
5. From a structural integrity perspective, the inspector recommended that ONR should give consent for start-up of HYB R8, following the 2023 periodic shutdown, subject to receiving the following:

* A demonstration that the periodic shutdown inspection programme and sentencing of actions through the OAP has been completed satisfactorily. The licensee should submit the INSA certificate for the return to service Engineering Change report as part of the licensee’s application for consent to return to service.
* A demonstration that the PSSR inspections have been completed satisfactorily and no concerns have been raised. The licensee should submit a return to service statement from the third-party Competent Person as part of the licensee’s application for consent to return to service.
* A demonstration that the inspections not covered by the Appointed Examiner and third-party PSSR Competent Person have been completed satisfactorily. The return to service Engineering Change report must include a statement from the licensee’s second party PSSR ressure Systems Safety Regulations Competent Person supporting the fitness for return to service.
* Confrimation from the structural integrity inspector that no emergent issues, relating to structural integrity, have been identified since completion of this assessment report that would prevent HYB Reactor 8 from returning to service.

1. ONR has subsequently received and is content with this information (refer to sections 3.8.5, 3.8.7, 3.8.8, 3.8.8 and reference [6]).

## Electrical engineering

1. Reference [7] reports the findings of ONR’s electrical engineering inspection of the HYB S12R8 periodic shutdown.
2. This electrical engineering inspection considered the structures, systems and components (SSCs) that are being maintained during the Reactor 8 2023 statutory outage. Key themes were:

* Inspection and observation of the actual condition of the station’s electrical engineering SSCs including; 11 kV short break system boards and switchgear; 3.3 kV short break system boards and switchgear; 415V short break system boards and switchgear; generators and unit transformers.
* Maintenance schedule activities specifically related to: Gas Circulators; Essential Supplies Systems; Reactor Shutdown Sequencing Equipment/Post Trip Sequencing Equipment.
* A review of the station's:
  + Electrical engineering SSCs examination, inspection, maintenance and test schedule;
  + Progress against the station’s Reactor 8 2023 statutory outage plan;
  + Significant emergent electrical engineering issues, where applicable, and any resultant resolution;
  + Completed Reactor 8 2023 statutory outage electrical engineering work activity documentation;
  + Electrical engineering activity deferrals, where applicable; and
  + Reactor 8 statutory outage scheduled electrical engineering changes, where applicable.

1. The inspector was satisfied with the condition of the electrical equipment observed, the management of emergent issues and completion of maintenance records. The inspector did not identify any significant shortfalls with the implementation of the established arrangements for LC 28 in relation to the planned electrical work undertaken as part of the periodic shutdown.
2. The inspector did not identify any issues that would prevent ONR granting consent for HYB R8 to return to service.

## Control and instrumentation

1. Reference [8] reports the findings of ONR’s Control and Instrumentation (C&I) inspection of the HYB S12R8 periodic shutdown.
2. The aim of the inspection was to verify that relevant work activities have been carried out on C&I equipment and systems important to safety to confirm that they remain fit for their intended purpose. The inspector targeted the following aspects of the reactor safety circuits:

* Neutron flux detectors insulation resistance and performance pulse and counter plateaux tests;
* Laddic waveform checks;
* Functional test of main guard line (MGL) and diverse guard line (DGL) systems testing, including final break contactor, as defined in MS2.7.1;
* Thermocouples – Loop and IR checks of Channel Gas Outlet (CGO), Circulator Outlet Gas (COG) and pile cap;
* Control rod interlock testing; and
* Quadrant Protection equipment.

1. The inspector also examined the licensee’s response to a failure of one of the gas circulator variable frequency converters (VFC) during the shutdown and similar recent faults during normal operation. The inspector was satisfied that the licensee had identified the issues and taken steps to replace, not only the affected components, but also the associated components in all of the gas circulator variable frequency converters.
2. Overall, the inspector was content that the commitments made in the Outage Intentions Document for C&I equipment and systems important to nuclear safety had been satisfied for those elements of work complete at the time of the inspection. The inspector found that the workmanship was adequate and consistent with the standards expected from C&I suitably qualified and experienced persons.
3. The inspector did not identify any C&I issues that may impact nuclear safety and supported ONR giving Consent for HYB R8 to return to service.

## Mechanical engineering

1. Reference [9] reports the findings of ONR’s mechanical engineering inspection of the HYB S12R8 periodic shutdown.
2. The inspector targeted the EIMT of the following mechanical engineering equipment, based on their nuclear safety significance:

* Gas circulators;
* Boiler safety relief valves; and
* Secondary shutdown system.

1. The inspector was satisfied that the licensee had:

* adequately demonstrated its mechanical engineering examination, inspection, maintenance and testing arrangements and their implementation.
* carried out EIMT on plant which may affect safety in accordance with written schemes.
* adequately demonstrated compliance with relevant good practice in relation to mechanical engineering EIMT.

1. The inspector identified some minor issues and judged that they were being adequately addressed by the licensee, and no further action was required.
2. The inspector did not identify any issues that would prevent the start-up and supported ONR giving consent for start-up of HYB R8.

## Civil engineering

1. Reference [10] reports the findings of ONR’s Civil Engineering inspection and assessment of the HYB S12R8 periodic shutdown.
2. The assessment considered the surveillances, inspections and tests undertaken on components of the Reactor 2 Pre-stressed Concrete Pressure Vessel (PCPV) that were reported in the Appointed Examiner’s (APEX) report for the PCPV management. On the basis that the pre-stressed tendons and the cooling of the PCPV are the areas of highest risk for the operating station, the inspector focused on the following activities:

* Concrete surface visual inspections ;
* Tendon loading and inspections;
* Vessel temperature measurements; and
* Pressure vessel cooling system.

1. The inspector did not find any significant shortfalls with the surveillances and inspections reported by the appointed examiner. However, the inspector notes that a cooling water leak occurred in the safety shutdown room during the outage. The inspector reports that HYB had committed to locating and isolating the leak prior to return to service. In the inspector’s opinion the location and isolation activity should be completed prior to return to service, to establish the extent of condition before restart of the reactor. To ensure that the outstanding work is satisfactorily completed prior to return to service the inspector has made the following recommendations:

* Station should undertake an inspection of the Secondary Shutdown Room when access is available to confirm the extent of the PCPV external concrete surface which has been affected by the active PVCS leak.
* Station shoild locate, isolate and seal leak HYB/R8/WA/043 prior to the return to service, or locate and isolate the leak and propose a method of returning to service and seal the leak outside the outage, once the reactor is ‘on-load’.

1. ONR has subsequently received and is content with this information (refer to sections 3.8.7 and 3.8.8).
2. The inspector is content to support the return to service of the Reactor 8 PCPV for the next operating period of three years.

## Events and emergent issues

### Events

1. The licensee has reported several events associated with the periodic shutdown which met the criteria under LC 7. In addition, the licensee informed ONR of events which resulted in a reduction in nuclear safety margins owing to:

* VFC and electrical failures;
* Availability of Bulk Moisture indications;
* Propane cylinder fire;
* Gas circulator lubrication oil sampling issue; and
* Bypass gas plant desiccant event recovery.

1. I judged that they were not significant with respect to giving consent to start-up and will be managed by the site inspector as routine regulatory matters.
2. The licensee also reported industrial safety events including, minor injuries, dropped objects, poor behavioural standards and safety rule breaches. None of these were significant and the licensee responded positively with appropriate levels of investigation and targeted briefs.

### Emergent issues

1. Owing to issues removing the Main Boiler Feed Pump (MBFP) Suction Stage Cartridge during planned overhaul, the entire suction stage pump (cartridge and casing) needed to be removed from site and returned to the manufacturer for the exchange of the cartridge. Due to this unplanned delay, the MBFP will not be available or installed prior to start-up. There are no safety claims on this pump, and the pump will be installed at (or before) the next refuelling outage.

## Project Inspector

1. Throughout the S12R8 periodic shutdown ONR engaged with the licensee to maintain awareness of the progress of the shutdown activities and emergent issues. ONR observed the licensee’s daily outage meetings and held a weekly oversight meeting with the licensee’s outage lead team.

### Early Outage Safety Review

1. ONR observed the licensee’s early outage safety review [11] which was conducted by the licensee’s internal nuclear assurance (INA) team, with the intent of:

* Assisting station management in reducing or eliminating undesirable behaviours and conditions which could have an adverse impact on outage success.
* Identification of performance shortfalls in the early stages of an outage.
* Identifying any Fleet issues for resolution in the longer term.

1. The team observed the conduct of outage related activities, interviewed licensee and contract staff, and daily outage meetings.
2. The review focused on Nuclear Safety (e.g. protected plant, defence in depth) and conventional health and safety (e.g. lifting operations, working at height). A hot debrief was given to the station lead team at the end of each day and significant issues were followed up immediately. The review identified areas for improvement in the following areas:

* Line supervision peer to peer improvements;
* Scaffolding and insulation removal;
* Lifting standards;
* Foreign materials exclusion standards;
* Traffic management; and
* Defence in depth.

1. The station lead team responded positively to the findings and committed to implement appropriate corrective actions.

### Start-up meeting

1. The start-up meeting [12] was held on 30 June 2023 and was chaired by the TSSM. The licensee presented a summary of the outage safety and technical performance. No issues that would prevent the start-up of R8 were identified.

### Start-up letter

1. The Station Director has asked ONR for consent to restart HYB R8 under LC 30 (3) [1]. The Station Director has confirmed that subject to completion the activities which can only be performed on-load or during start-up that the reactor and associated plant is safe to start-up.

### Maintenance schedule exceptions list and safety justification

1. The licensee has confirmed [13] that all the maintenance schedule revalidations and compliance testing is complete, with the exception of work requiring the reactor to be at full power plus 5 days, which are controlled under the licensee’s arrangements.

### Return to service EC

1. The licensee’s justification to restart HYB R8 following the in-service inspections and associated assessments is set out in EC372946 [14]. It confirms that, the inspection programme has been successfully completed and the reactor is fit for return to service, this is supported by the INSA approval statement [15].

### Graphite core inspections EC

1. The licensee’s justification to restart HYB R8 following the graphite core inspections is set out in EC 373326 [16] which is supported by the INSA approval statement [17]. It confirms that the inspection of the graphite core has been completed in accordance with the requirements of the OID and the GAP has confirmed that the results are within the accepted boundaries of the graphite safety case.

### APEX statement on concrete pre-stressed pressure vessel

1. The Appointed Examiner has confirmed [13] that the required maintenance schedule inspections for the PCPV have been completed and that it is satisfactory for return to service subject to normal in-service surveillance. The examiner notes that there are a number of isolated and active PVCS leaks which require sealing as soon as practicable following the return to service.

### Appointed examiner statement on reactor penetrations examination

1. The licensee has reported the outcome of the HYB R8 PCPV penetrations thorough examination [18], required by the PSSR written scheme of examination. The penetrations were assessed as being in a satisfactory condition, with no significant challenges to integrity identified and confirmed suitable for continued service.

### Appointed examiner statement PSSR

1. The licensee has submitted a statement with respect to the inspections performed in accordance with PSSR during the shutdown from their independent third party PSSR Competent Person [19] (Bureau Veritas). The statement confirms that there are no changes to plant operating conditions or reductions in inspection intervals as referenced in the written schemes of examination.
2. At the start-up meeting the licensee reported operating experience from Torness relating to the potential to over pressurise the Decay Heat Flash Vessel (DHFV) owing to the level controls not operating as per the design intent. The licensee was actioned to confirm the PSSR position before the introduction of a relevant fluid into the decay heat system. The PSSR competent person is satisfied [20] that the licensee’s analysis demonstrates that there is adequate over pressure protection for the DHFV and that the Decay Heat Boiler (DHB) system is resilient to failure. The competent person concludes that from a PSSR compliance perspective, operation of the DHB systems can continue to the end of 2024.

### HYB INA concurrence

1. The HYB Independent Nuclear Assurance (INA) have provided oversight of the outage through the Concurrence process. INA will issue a concurrence statement when satisfied that the outage activities have been adequately conducted and, as far as can be established, the associated risks to start-up and continued operation are acceptable and ALARP.
2. INA have confirmed [21] that there are no issues that present a threat to start-up or continued operation, noting that the final concurrence statement cannot be issued until work requiring the reactor to be at full power has been completed. The licensees arrangements provide suitable hold points, and staged concurrence, during the start-up process to confirm that INA concurrence has been provided.

### Civil Nuclear Security and Safeguards

1. In addition to the nuclear safety assessments identified, I sought the opinion of ONR’s Civil Nuclear Security and Safeguards (CNSS) site security inspector, to understand if there were any aspects of the periodic shutdown that may have an impact on ONR’s decision to give consent to start-up HYB R8. The CNSS inspector [22] has not identified any issues that would impact on the decision to give consent to start-up HYB R8.

### Engagement with other governmental agencies

1. Before issuing an LI it is established practice to notify other competent regulatory authorities of ONR’s intention to ensure that there are no specific objections that may compromise other regulatory requirements. The HYB Environment Agency site inspector was informed that ONR intended to issue an LI giving its consent to the restart of HYB R8 following the 2023 periodic shutdown and confirmed [23] that they had no objections.

# Matters Arising from ONR’s Work

1. There are no outstanding matters arising from the inspection and assessment work carried out by ONR.

# Conclusions

1. Based on the evidence gathered. ONR is satisfied that:

* The EIMT requirements specified in HYB’s maintenance schedule in support of LC30 have been complied with.
* The EIMT has been carried out by SQEPs, with an appropriate level of supervision and quality assurance commensurate with the equipment’s safety function.
* Safety issues identified by the licensee during the shutdown have been adequately addressed with suitable and sufficient safety justification that the relevant safety case limits and conditions are not challenged.

1. ONR is therefore content that all necessary work has been completed, subject to those activities that must be delayed until the reactor is pressurised or will be carried out during the restart. The remaining information will be reported to ONR in the 28-day report, or in specific documents that are not required prior to giving consent.
2. ONR has not identified any matters that would prevent giving consent for HYB R8 to start-up after the S12R8 periodic shutdown.

# Recommendations

1. ONR recommends the issuing of Licence Instrument 640, giving consent to start-up Heysham 2 Reactor 8 after the S12R8 periodic shutdown.

# References

|  |  |
| --- | --- |
| [1] | *Heysham 2 Reactor 8 - Application for Consent to Star-up Reactor 8 Under Licence Condition 30 (3) - NSL/HYB/51160R. ONRW-2019369590-3415.* |
| [2] | *Heysham 2 Unit 8 S12R8 Outage Intentions Document HB-REPS-OM120 (REV000) ONRW-2019369590-111.* |
| [3] | *regulatory permissioning plan PR-01038.* |
| [4] | *Heysham 2 Reactor 8 2023 Periodic Shutdown, Structural Integrity Assessment of the Graphite Core Inspection Findings, ONRW-2126615823-861.* |
| [5] | *EDF NGL Heysham 2 Nuclear Power Station: Assessment of Structural Integrity in Support of the Restart of Reactor 8 following the 2023 Periodic Shutdown, ONRW-2126615823-920.* |
| [6] | *Structural Integrity Inspector's advice on HYB S12R8 emergent issues recommendation. ONR Email dated 26 June 2023. ONRW-2019369590-3353.* |
| [7] | *Electrical engineering inspection of Heysham 2 planned reactor 8 2023 statutory outage (S12R8) work activities, IR-52750.* |
| [8] | *C&I R8 Outage Inspection, IR-52758.* |
| [9] | *Mechanical Intervention for HYB Outage S12R8, IR-52743.* |
| [10] | *Civil Engineering Assessment of the HYB pre-stressed concrete pressure vessel in support of the Reactor 8 return to service, ONRW-2126615823-967.* |
| [11] | *ONR Contact Record, Heysham 2 - INA Early Outage Safety Review (S12R8), ONRW-2019369590-2847.* |
| [12] | *HYB - S12R8 - Start Up Meeting Minutes 30 Jun 2023. ONRW-2019369590-3348.* |
| [13] | *HYB - S12R8 Maintenance Schedule Completion Certificate. ONRW-2019369590-3350.* |
| [14] | *EC372946 Statutory Outage Approval of Inspection Results Proposal. ONRW-2019369590-3416.* |
| [15] | *INSA Approved Milestone for EC372946. ONRW-2019369590-3417.* |
| [16] | *Justification for Return to Service of Heysham 2 Reactor 8 Following the Graphite Core Inspections at the 2023 Periodic Shutdown.* |
| [17] | *INSA Approved Milestone for EC 373326. ONRW-2019369590-3337.* |
| [18] | *Heysham 2 Reactor 8 PCPV Penetrations PSSR Thorough Examination, E/TSK/HYB/16885/19.06. ONRW-2019369590-3362.* |
| [19] | *Heysham 2 Reactor 8 - S12R8 - Bureau Veritas PSSR Statement. ONRW-2019369590-3351.* |
| [20] | *HYB S12R8 - Decay Heat Flash Vessel Feed Flow Anomaly, HYB PR/19227232/001. ONRW-2019369590-3359.* |
| [21] | *Heysham 2 Unit 8 Statutory Outage 2023 INA Concurrence Memo, ONRW-2019369590-3407.* |
| [22] | *Security Inspector's advice on HYB S12R8. ONR Email dated 7 July 2023. ONRW-2019369590-3386.* |
| [23] | *Heysham 2 Reactor 8 - Periodic Shutdown 2023 - Notice of No Objection - Environment Agency, ONRW-2019369590-3001.* |
| [24] | *HYB R8 2023 PCPV MS Completion Certification. ONRW-2019369590-3349.* |
| [25] | *Security Inspector's advice on HYB S12R8. ONR Email dated 7 July 2023, ONRW-2019369590-3386.* |