Office for Nuclear Regulation (ONR)
Site Report for
Heysham Power Stations

Report for period 1 July 2021 – 30 September 2021

Foreword

This report is issued as part of our commitment to make information about inspection and regulatory activities relating to the above site available to the public. Reports are distributed quarterly to members of the Local Community Liaison Committee and are also available on our website (http://www.onr.org.uk/llc/).

Our site inspectors usually attend the Heysham 1 and 2 Local Community Liaison Committee meetings and will respond to any questions raised there. Any person wishing to enquire about matters covered by this report should contact ONR.

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1 Inspections

Dates of inspection

Our nominated site inspectors made inspections on the following dates during the quarter:

Heysham 1

- 6 – 8 July (Onsite)
- 19 – 22 July (Onsite)
- 28 July (Onsite)
- 4 – 5 August (Onsite)
- 23 – 26 August (Onsite)
- 20 – 23 September (Onsite)

In addition, our specialist inspectors were involved in interventions on the following dates during the quarter:

- 6 – 7 July (Onsite)
- 22 July (Onsite)
- 28 July (Onsite)
- 4 - 5 August (Onsite)
- 18 August (Onsite)
- 23 August (Onsite)
- 22 – 23 September (Onsite)

Heysham 2

- 12-15 July (Remote)
- 22 July (Onsite) – R7 Outage - Start-up Meeting
- 7 September (Onsite)
- 23 September (Onsite)

In addition, our specialist inspectors were involved in interventions on the following dates during the quarter:

- 7 July (Onsite) – R7 Outage – Mechanical
- 12-15 July (Remote)
- 22-23 July (Onsite) – R7 Outage – C&I
- 7 September (Onsite)

2 Routine Matters

Inspections

Inspections are undertaken as part of the process for monitoring compliance with:

- the conditions attached by ONR to the nuclear site licence granted under the Nuclear Installations Act 1965 (NIA65) (as amended);
- the Energy Act 2013;
- the Health and Safety at Work Act 1974 (HSWA74); and
- Regulations made under HSWA74, for example the Ionising Radiations Regulations 2017 (IRR17) and the Management of Health and Safety at Work Regulations 1999 (MHSWR99).

The inspections entail monitoring the licensee's actions on the site in relation to incidents, operations, maintenance, projects, modifications, safety case changes and any other matters that may affect safety. The licensee is required to make and implement adequate arrangements under the conditions attached to the licence in order to ensure legal compliance. Inspections seek to judge both the adequacy of these arrangements and their implementation.

Due to the Covid-19 pandemic, access to site has been more restricted than pre-pandemic, but more routine regulatory activity was carried out than during the previous quarter. More details can be found in the News from ONR section at the back of this report and on our website. We have however maintained regulatory oversight of both stations by:-

- Initiating increased dialogue with site management, the licensee's independent nuclear safety assurance function, and trade union safety representatives to develop a consistent picture of the measures put in place to manage the safety of both the workforce and the plant.

- Observing regular station meetings and special working groups the licensee established to assess the coronavirus pandemic and manage the response. This includes the pandemic lead team meeting (which co-ordinated the site's response) and maintenance requirements review group (which managed the impact of potential or actual staff and supply chain shortfalls on safety-significant maintenance activities).

- Monitoring the minimum staffing levels required to deliver an adequate response in the event of an accident or emergency on the site.

Consequently, we consider that the site has managed its response to the pandemic during the period in a manner that, so far as is reasonably practicable, protected its own staff and ensured that there was no degradation in nuclear safety.

In this period, the following site routine inspections were undertaken:

Heysham 1

Licence condition 28 (Examination, inspection, maintenance and testing) and Pressure Systems Safety Regulations 2000 (PSSR) compliance.

The aim of this inspection was to ensure that adequate arrangements have been put in place to achieve sustained PSSR compliance at Heysham 1.

Our inspection team reviewed progress against the licensee's PSSR recovery plan; evaluated the status of PSSR audit findings; examined arrangements for sustained PSSR compliance; and sampled the Licensee's Asset Management System (AMS) utilised to manage maintenance activities.

We inspected the following systems:

- Camera cooling compressor;
- Liquid nitrogen storage and vaporisation plant;
- Atmospheric gland steam condenser; and
- Sub-atmospheric gland steam condenser.

We noted that the licensee had:

- Carried out a thorough review of PSSR compliance arrangements;
- Completed many outstanding inspections;
- Updated the Written Schemes of Examination (WSE);
- Replaced components where necessary (for example, safety relief valves and bursting discs);
- Established new maintenance routines; and
- Improved process and oversight arrangements.

We concluded that the improved PSSR arrangements were sufficient to allow our regulation of PSSR at Heysham 1 to return to a routine level of oversight.

Emergency Arrangements (Licence Condition 11)

The purpose of LC 11 is to ensure that the licensee implements adequate arrangements for dealing with any accident or emergency arising on the site and their effects.

We sampled licensee emergency arrangements associated with:

- Learning From Experience (LFE) / Operational Experience (OpEx);
- Audit and assurance arrangements; and
- Internal assessment of emergency exercises.

We noted that:

- There is a formal review and approval process to ensure that the emergency arrangements are valid and practicable;
- The emergency arrangements are subject to a programme of internal (and external) audits;
- LFE/OpEx from relevant events both internal and external to the organisation are considered and used to ensure the emergency arrangements continue to be robust;
- There is a process for managing change to the emergency arrangements; and
- Emergency exercises and tests are critical assessed with an action plan to actively manage and implement any findings.

There were no regulatory issues generated as a result of this inspection and we judged from the sample of evidence inspected that the licensee adequately demonstrated compliance with the requirements of LC 11.Therefore, we rated this inspection as Green (no formal action).

Heysham 2

Transport Inspection - Carriage of Class 7 (Radioactive Materials) Dangerous Goods

This intervention was carried out to assess the licensee's compliance with requirements of Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (CDG 2009) and the legislation these regulations introduce into Great Britain's (GB) legal system. The intervention addressed the requirements for civil transport of class 7 dangerous goods (radioactive materials). It built on information gathered from a similar intervention at Heysham 1 (reported last quarter) which provides the Heysham Site's RadSafe Level 2 response capability for a transport radiation emergency.

Due to the COVID19 pandemic, this intervention was conducted remotely. This involved requesting information on training and consigning class 7 materials from Heysham 1 Power Station together with structured discussions by video-conference with station staff involved in consigning class 7 materials. The intervention also examined class 7 transport emergency arrangements and transport security.

Following inspection of sampled evidence and from discussions with staff, we judged that the licensee was compliant with transport legislation required for the carriage of class 7 dangerous goods (radioactive materials).

Other work

As reported last quarter, Heysham 2 Reactor 7 statutory outage commenced on 14 May 2021. The site inspector and our specialist inspectors carried out the inspections detailed in section 1 above and other assessment activities to establish that:

- requirements set out in the Station's Plant Maintenance Schedule (PMS) have been complied with;
- work has been carried out in accordance with arrangements for identified structures, systems and components to the required quality by competent persons;
- safety issues identified during the reactor outage have been adequately addressed with suitable and sufficient justification provided to allow a regulatory judgement to be made that start-up of the reactor is safe.

Inspections and assessments started during Period 2 of 2021 (April – June) and continued during this period.

A keyway root crack was found during the station's inspections of the graphite core. Heysham 2 and Torness have a different graphite brick design to other AGR stations which gives a theoretical possibility of debris forming in channels that have a keyway root crack. A revised safety case covering this issue has been written by EDF.

Following our assessment of this safety case, inspections and assessment by the following disciplines below, Reactor 7 was given a Consent to restart on 9 September 2021.

- Civil Engineering
- Structural Integrity
- Graphite
- Fault Studies
- Mechanical Engineering
- Electrical Engineering
- Control and Instrumentation
- Internal Hazards
- Conventional Safety

Electrical Safety Intervention

As a result of a number of safety rule events (near misses) at Heysham 2 over the last few months and a number of electrical events in the wider nuclear industry, ONR held a station based electrical safety intervention. The aim was to understand and/or improve electrical safety performance and the related electrical safety arrangements at the station and across the fleet.

Following this intervention, we did not raise any new regulatory issues as we considered that there were no matters of significant safety concern that were not already being addressed or are the subject of actions to take corrective measures within the EDF Energy NGL arrangements.

System Based Inspections (SBI)

In addition to the programme of site licence compliance inspections, ONR also inspects operating reactors based on safety related systems. Each site has a safety

case, which identifies the important aspects of operation and management required for maintaining safety. For both stations at Heysham, the key systems important to nuclear safety will be inspected against the requirements of the safety case over a five-year period. ONR considers that this will provide additional assurance that operations on the Heysham site are safe. Each of these system inspections considers the relevant licence conditions (where relevant) below:

- Licence condition 10: Training
- Licence condition 23: Operating rules
- Licence condition 24: Operating instructions
- Licence condition 27: Safety mechanisms
- Licence condition 28: Examination, inspection, maintenance and testing
- Licence condition 34: Leakage and escape of radioactive material and radioactive waste

Heysham 1

Fuel Route

The purpose of the inspection was to determine that the operations and management of the nuclear fuel and the reactor core fuel cycle and its implementation satisfied the requirements of the safety case, and in particular:

■ That the core fuel cycle design arrangements are adequately robust in meeting the requirements of the reactor safety case;
■ That the fuel is received, managed, stored, inspected and built such that the fuel assemblies loaded meet the requirements of the fuel safety case and the fuel's critical safety functions; and
■ That criticality safety is managed accordance with the safety case throughout the fuel route.

As part of the intervention, we inspected the following areas:

■ Fuel Receipt Facility;
■ Additional New Fuel Store (ANFSF);
■ Additional New Fuel Preparation Room (ANFPR);
■ Additional Fuel Build Facility (AFBF); and
■ Fuel Plug Unit Maintenance Facility (PUMF).

We made the following observations as part of the intervention:

■ The licensee has implemented suitable and sufficient arrangements to monitor and record fuel build status. The fuel build quality plans were effective in ensuring activities important to safety were clearly being planned, monitored and controlled;
■ Criticality and radiological control arrangements were evident throughout the facilities inspected; these appeared in line with safety case requirements; and
■ Licensee staff were helpful and knowledgeable. In general housekeeping on the facilities inspected was to a good standard although some shortfalls were identified in

some areas. However, in ONR's view these didn't represent a significant safety concern and the representatives of the licensee took action to address these appropriately.

From the evidence sampled during this inspection, we consider that the front-end operations of the nuclear fuel route satisfied the requirements of the site safety case. Several observations were raised during the inspection (eg. labelling and status of lifting equipment, frequency of some plant walkdowns, some occurrences of poor housekeeping standards); however these did not represent a significant safety concerns and the licensee has provided assurance that action will be taken to address these observations.

Overall, we judged that the arrangements for the receipt, inspection, assembly, and refuelling of reactor fuel assemblies met relevant good practice and therefore an intervention rating of 'green' in relation to compliance with LCs 10, 23, 24, 27, and 28.

Heysham 2

Fuelling Machine SBI

The purpose of this inspection was to determine the adequacy of implementation of the safety case claims made in respect of the fuelling machine at Heysham 2.

The fuelling machine has a number of functions, including the transfer of new and irradiated fuel elements into and out of the reactor. Whilst connected to the reactor, the fuelling machine forms part of the primary circuit pressure boundary. Currently only Off-load Depressurised Refuelling (ODR) is permitted by the Heysham 2 safety case, therefore ODR was the focus of this inspection.

A plant walk down of the systems was also carried out which confirmed that the plant items were being maintained, with few recorded defects and good housekeeping standards.

We were satisfied that the safety case requirements were identified within the Technical Specifications.

To perform ODR various set points on the fuelling machine need to be changed. This is controlled through a system of interlock keys. We reviewed the interlock logic and found it to be robust.

Overall we judged that, from the evidence sampled and discussions with plant operators and plant/procedures inspected that the safety cases for the fuelling machine had been adequately implemented to fulfil their required safety functions. We judged the maintenance and training to be adequate.

A few minor shortfalls and advisory points (related to the increased potential for snagging of fuel due to the age of the core) were noted that were captured under a single regulatory issue. These related to:-

- Minor admin errors in quality plans;
- Provision for providing fuelling machine technical advice out of regular office hours;
- Maintenance of the manual hoist override.

3 Non-Routine Matters

Licensees are required to have arrangements to respond to non-routine matters and events. Our inspectors judge the adequacy of the licensee's response, including actions taken to implement any necessary improvements.

Heysham 1

Investigation following the loss of 400kV offsite supplies and reactor trips.

On the 22 July, at approximately 2.57pm , a current transformer located offsite within a National Grid compound failed. The resultant loss of 400kV offsite supplies caused both reactors to automatically shut down (trip) and enter into a period of independent on-site powered post trip cooling.

We were on site at the time and observed site teams respond to the site incident. Although effective post trip cooling was automatically established and the reactors were safely shutdown, a number of post trip safety related issues were revealed. The challenges placed by these issues were adequately managed by licensee personnel.

ONR's investigation lines of enquiry focussed on the performance of the post trip logic control equipment and the management of demineralised water stocks.

In summary, our investigation:

- Did not reveal any issues with the maintenance and testing of the gas turbines (independent source of electricity supplies) or emergency boiler feed pumps;
- Did not reveal any shortfalls with the competence or actions taken by licensee staff or it's contractors;
- Did not reveal any shortfalls in compliance; and
- Confirmed that the licensee were taking appropriate measures to learn from the incident through the introduction of improvements with:

  - Demineralised water stock management including the permanent availability of a demineralised water production trailer to improve water treatment plant resilience, improved water stock management decision-making instructions, and additional reactor control room simulator training scenarios;
  - The post trip logic equipment.

Return to Service Readiness Inspection

The purpose of the inspection was to gain assurance that the licensee had adequately investigated the challenges introduced by the 22 July loss of 400kV offsite supplies incident and, where appropriate, had implemented reasonably practicable improvements to systems and arrangements in preparation to restart both reactors.

We inspected the following systems and arrangements:

- Demineralised water stock management used for post trip cooling purposes; and
- Emergency boiler feed post trip logic equipment.

We confirmed that Heysham 1 had adequately managed the stocks of demineralised water following the total loss of 400kV supplies on the 22 July. However, the licensee recognised that improvements to water stock management were necessary and have introduced and trained shift staff on the use of improved decision making instructions in order to reduce losses within the system. In addition, we confirmed that a permanent demineralised water trailer is now on site which will add resilience to the capability of the existing make up water treatment plant. We are content with measures taken by the licensee to improve the management of demineralised water on site.

We confirmed that the licensee had also carried out modification to the post trip logic associated with the starting of emergency boiler feed pump systems to improve the resilience of the automatic nature of this feature. We inspected this modification, it's justification, substantiation and testing, and were satisfied with the licensee's due process to adequately implement the modification. We were content with measures taken by the licensee to improve the post trip logic associated with the emergency boiler feed pumps.

We concluded that the intervention did not reveal any regulatory issues which would prevent the licensee from restarting both reactors at Heysham 1.

Heysham 2

Loss of 400kV offsite supplies and reactor trip. (INF1 2021/562)

The loss of offsite supplies on the 22 July also affected Heysham 2, albeit to a much lesser extent than Heysham 1. The loss of offsite power caused Reactor 8 to automatically shut down (trip) and enter into a period of on-site powered post trip cooling. (Reactor 7 was already shutdown for the statutory outage).

We were on site at the time of the incident and observed site teams respond to the incident. Post trip cooling was effective, and the reactors were safely shutdown.

The investigation lines of enquiry focussed on post trip logic control equipment defects, uninterruptable power supply (UPS) issues and the management of demineralised water stocks.

Reactor Trips of Reactor 7 during Start-up (INF-1141) & (INF-1148)

On 14 September during Reactor 7 start up after the statutory outage, a quadrant tripped due to a temperature transient on a transition joint metal temperature. The reason for the temperature transient is still under investigation. Due to the stage of the start-up, continuing operation on three quadrant was out with the Station Operating

Instructions, so a conservative decision was taken to manually trip Reactor 7 and put it into a known state.

On 16 September, Reactor 7 start-up was progressing steadily overnight when a problem was experienced with a sensor rod test during the period when the reactor was on manual control. As the central control room team were making preparations to manually trip the reactor, it tripped automatically. Normal post trip cooling was quickly established.

We conducted preliminary enquiries on site into the automatic trip consisting of one-to-one discussions with the personnel involved in the incident and a review on the procedures used. It was concluded that the site had responded appropriately and ONR has created a regulatory issue to track the actions that the site is undertaking.

4 Regulatory Activity

We may issue formal documents to ensure compliance with regulatory requirements. Under nuclear site licence conditions, we issue regulatory documents, which either permit an activity or require some form of action to be taken. These are usually collectively termed Licence Instruments (LIs), but can take other forms. In addition, inspectors may issue Enforcement Notices to secure improvements to safety.

Table 1
Licence Instruments and Enforcement Notices Issued by ONR during this period

Heysham 1

1. None

Heysham 2

Date	Type	Ref No	Description
9 Sept 2021	Consent	LI 635	Consent to the start-up of Heysham 2 Reactor 7 which was shutdown in pursuance of Condition 30(1)

While no reports detailing regulatory decisions were issued during the period, previous decisions can be found on our website at http://www.onr.org.uk/pars/.

5 News from ONR

Below are summaries of key activities over the last three months. Further detail is available on our website.

Enforcement action

- In July, we served an improvement notice on Devonport Royal Dockyard Ltd (DRDL) for shortfalls in its health and safety arrangements. The notice was served after DRDL failed to demonstrate consistent and effective arrangements to control and monitor the risks associated with working at height at its Devonport site. DRDL must comply with the requirements of the improvement notice by 31 March 2022.

- In August, we announced that Morgan Sindall Infrastructure Ltd had complied with an improvement notice served in January 2021 after workers came close to striking a live high voltage electric cable during excavation work at the Sellafield site. Since this incident occurred, Morgan Sindall has put in place measures to prevent similar occurrences, and we are satisfied that they have complied with the requirements of the improvement notice.

COVID-19: ONR Position

- We are continuing to obtain assurance that nuclear site licensees and other dutyholders are adequately resourced to continue to safely and securely carry out their activities. We remain satisfied with industry's response at this time; there has been no significant change to dutyholders' safety and security resilience.

- We have measures in place to try and prevent asymptomatic ONR staff unwittingly conveying the virus onto a regulated site. We require all staff to take a circular 1 health (C1H) antigen test in advance of them visiting a site. In addition to the C1H test, we also require them to take a lateral flow test on the morning of their planned site visit. We are keeping our COVID-19 testing guidance under regular review, in-line with the changing national context and any further developments in industry approaches to testing arrangements.

Other

- In July, our project to become the UK's domestic safeguards regulator was named the public sector's Project of the Year at the National Project Awards.

- In September we invited stakeholders to submit comments on our updated reference papers for Coastal Flood Hazards and Meteorological Hazards for Nuclear Sites. Although supplementary to our normal governance process, we are doing this due to stakeholder interest in these topics and our commitment to being an open and transparent regulator.

The reference papers provide additional detail on the analysis of the external hazards for nuclear sites and have been produced by our Expert Panel on Natural Hazards, a group of academic and industry technical specialists working under contract to provide us with independent expert advice. You can find out more about how to get involved and comment on these papers on our website.

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