Office for Nuclear Regulation

Heysham 1 Reactor 1 Periodic Shutdown 2020

ONR Agreement for Extension of Operating Period for Heysham 1 Reactor 1

Project Assessment Report ONR-OFD-PAR-19-016
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EXECUTIVE SUMMARY

Title

ONR Agreement for Extension of Operating Period for Heysham 1 Reactor 1.

Permission Requested

EDF Energy Nuclear Generation Limited (NGL) has requested Agreement from the Office for Nuclear Regulation (ONR) to extend the operating period of Heysham 1 Power Station Reactor 1 (R1) by a period of 71 days to no later than16th June 2020. This request is made in accordance with Licence Condition (LC) 30 (Periodic Shutdown) of the station's nuclear site licence.

Background

Nuclear site licensees are required to comply with conditions attached to the nuclear site licence. LC 30 Clause (1) states that for the purpose of enabling examination, inspection maintenance and testing of any plant or process, the licensee shall, when necessary, ensure that any such plant or process is shutdown in accordance with the requirements of the plant maintenance schedule.

LC 30(2) gives ONR the authority to Agree to an extension of a plant's operating period based on an adequate safety justification from the licensee.

The current operating period for R1 will expire on the 06 April 2020. NGL wish to extend this operating period until the 16 June 2020. The reason for this extension request is due to the delays with completing post R2 defueling outage activities as a result of the necessity to exchange the west side fuelling machine long travel wheels. The subsequent pre-outage fuelling process activities are now not expected to be completed until mid to late May 2020.

Additionally, following the successful injection of oxygen into Reactor 2 (R2) in October 2019 and as part of the failed fuel mitigation activities, Heysham 1 intend to carry out modifications to the gas circulator IGV differential pressure impulse lines during the statutory outage. This is an enabling activity for a potential future R1 oxygen injection campaign. An outage start date in April 2020 could result in the preparatory activities for the impulse line modifications not being completed on time.

Finally, an outage start date in April 2020 overlaps with the current statutory outage at Heysham 2. While the pressure on resources is being managed, delaying the Heysham 1 outage would assist in reducing pressure on those staff supporting both outages.

NGL claim this extension will have no impact on the safe operation of R1.

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

NGL's safety justification for the extension of the operating period of Heysham 1 (R1) until 16 June 2020 was examined by the following discipline specialists; civil engineering, structural integrity, graphite, mechanical engineering, electrical engineering, control & instrumentation and security.

Following the examination it was decided that no detailed assessments were considered necessary in addition to the evidence provided by NGL.

Matters arising from ONR's work

During the assessment, ONR was informed by NGL that a number of control rod standpipes and gas circulator penetration liner welds are overdue examination in accordance to the current written scheme of examination (WSE) necessary to comply with the Pressure System Safety Regulations 2000 (PSSR) 9(1) obligations. Enforcement associated with this breach of conventional legislation will be considered separately by ONR through the application of ONR's enforcement management model.

ONR's assessment did not reveal any nuclear safety concerns that would prevent agreement to the extension of the R1 operating period by 71 days. The assessment conclusions were supported by evidence that:

- NGL had sought input from relevant suitably qualified and experienced personnel;
- Agreement was reached with the PSSR competent person regarding any proposed postponements of inspections.

Conclusion

ONR's assessment concluded that, NGL has carried out an adequate safety assessment demonstrating the safety of the proposed extension of Heysham 1 Reactor 1 operating period and supported the issue of ONR Agreement to NGL's request.

The conventional health and safety breach relating to PSSR regulations 9(1) will be considered separately through the application of ONR's enforcement management model.

Recommendation

I recommend that ONR issue Licence Instrument 627 under LC30(2) for Nuclear Site Licence 60 giving ONR's Agreement to extend the operating period of Heysham 1 Reactor 1 until 16 June 2020.

LIST OF ABBREVIATIONS

ALARP	As low as reasonably practicable
EA	Environment Agency
EIMT	Examination, Inspection, Maintenance and Testing
EMM	Enforcement Management Model
HYA	Heysham 1 nuclear power station
HYB	Heysham 2 nuclear power plant
LC	Licence Condition
MS	Maintenance Schedule
NGL	EDF Energy Nuclear Generation Limited
ONR	Office for Nuclear Regulation
PICA	PSR Identified Corrective Actions
PSSR	Pressure Systems Safety Regulations
R1	Reactor 1
R2	Reactor 2
WSE	Written Scheme of Examination

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1 PERMISSION REQUESTED

1. EDF Energy Nuclear Generation Limited (NGL), the operator and Licensee of Heysham 1 nuclear power station (HYA), has written to the Office for Nuclear Regulation (ONR) requesting Agreement to an extension of Reactor 1's (R1) operating period up to 16 June 2020 under Licence Condition 30(2) (Ref. 1).

2. This ONR project assessment report has been produced to record regulatory views and judgments in consideration of NGL's request for the extension of the operating period for Heysham 1 R1.

2 BACKGROUND

3. The nuclear site licence requires the Licensee to periodically shutdown plant under Licence Condition (LC) 30: Periodic Shutdown to enable examination, inspection, maintenance and testing (EIMT) to take place in accordance with the requirements of its plant maintenance schedule (MS) referred to in LC28(4) EIMT.

4. Requirements of the MS are derived from claims made in the station's safety case (required under LC23: Operating Rules), along with other regulatory requirements, such as Pressure Systems Safety Regulations (PSSR), and requirements from equipment manufacturers.

5. For safety case claims for the operation of equipment, these normally relate to potential concern given the presence of damage mechanisms such as creep, fatigue or corrosion. Time-based EIMT requirements are identified in the MS derived safety case requirements to ensure appropriate monitoring of equipment takes place and forewarning of failure can be achieved. Such time-based intervals are referred to as operating periods.

6. The operating period for the two reactors at Heysham 1 is identified in the MS preface, which is an approved document under LC28(4). This requires that each reactor is shut down after a maximum period of three calendar years following the Consent of ONR to the start-up of the reactor after a routine periodic shutdown. The previous start-up Consent Licence Instrument (LI) 612 (Ref. 2) for Reactor 1 is dated 07 April 2017. This would require the shutdown of Reactor 1 on or before 06 April 2020.

7. LC 30(2) gives ONR the authority to Agree to an extension of a plant's operating period based on an adequate safety justification from the licensee.

8. NGL has submitted Heysham 1 Engineering Change EC367102 (Ref. 3) as safety justification for extending Reactor 1's operating period up to the 16 June 2020, with the periodic shutdown planned to commence on mid to late May 2020.

9. The reason for this extension request is due to delays with completing post R2 defueling outage activities as a result of the necessity to exchange the west side fuelling machine long travel wheels prior to the start of the R1 statutory outage. Additionally, following the successful injection of oxygen into Reactor 2 in October 2019 as part of the failed fuel mitigation activities, Heysham 1 intend to carry out modifications to the gas circulator IGV differential pressure impulse lines. An outage start date in April 2020 could result in the preparatory activities for the impulse line modifications not being completed on time. Finally, an outage start date in April 2020 overlaps with the current statutory outage at Heysham 2. While the pressure on resources is being managed, delaying the Heysham 1 outage will help to reduce pressure on those staff supporting both outages.

10. NGL consider that the proposed change does not affect nuclear safety and it is judged by NGL that there are no changes to Nuclear Safety Principles. The safety justification (Ref. 3) was presented at category 2 which therefore required a formal independent nuclear safety assessment (Ref. 4)

3 ASSESSMENT AND INSPECTION WORK CARRIED OUT BY ONR IN CONSIDERATION OF THIS REQUEST

11. The NGL safety justification for extending the Heysham 1 R1 operating period focussed on:

- Maintenance, inspection and testing schedule (MS) requirements;
- Component life assessment;
- Specific commitments made in previous return to service ECs;
- Periodic Safety Review (PSR) Identified Corrective Actions (PICAs);
- Planned modifications in support of safety cases;
- Safety case commitments and caveats including Engineering Changes (ECs), Justifications for Continued Operation (JCOs) and Interim Justifications for Continued Operations (IJCOs);
- Written Schemes of Examination (WES) for Pressure Systems Safety Regulations (PSSR);
- Environmental Maintenance, Inspection and Testing Schedules (EMITS).

12. ONR Specialist Inspectors from the ONR Heysham 1 R1 2020 periodic shutdown team examined NGL's safety justification.

- Civil Engineering (Ref. 5);
- Structural Integrity (Ref. 6);
- Graphite (Ref. 7);
- Mechanical Engineering (Ref. 8);
- Electrical Engineering (Ref. 9);
- Control and Instrumentation (Ref. 10)
- Security (Ref. 11).
- PSA (Ref. 12).

13. Following ONR Specialist Inspector examinations, it was decided that no detailed assessments were considered necessary.

4 MATTERS ARISING FROM ONR'S WORK

4.1 EC367102 Proposal for the Deferral of the Reactor 1 2020 Statutory Outage 025R1

14. The primary safety claim made by NGL is that the deferral of the statutory outage for up to 71 days will not reduce the reliability or availability of nuclear safety systems or PSSR-related protection systems and will not lead to an increase in the frequency of plant faults as initiating events during the extended period of operation. NGL support this claim with the following arguments:

- The potential impact of the deferral on degradation mechanisms related to physical parameters such as temperature, irradiation, pressure etc. is negligible.
- The potential impact of the deferral on other known time-related degradation mechanisms is very small, and any increase in risk would be negligible.
- Safety case commitments and caveats made to support safety case claims, including JCOs, IJCOs and Availability Assessments, will not be affected by the proposal.
- There are no commitments from the previous return to service EC that will be affected by the deferral.
- There are no outstanding PSR related items that will be affected by the deferral.
- There are no activities associated with the Environmental Maintenance Schedule that cannot be deferred.
- There are no pressure boundary components or pressure protection

systems that could be adversely affected by the deferral.
- There are no active components that would be significantly affected by the delay to the outage start date.

15. The risk of continued operation of R1 for up to 71 days beyond 6th April 2020 is ALARP. This view is based on:
    - A negligible increase in risk due to a 71 day deferral to the outage start date.
    - Significant safety benefits in delaying the R1 statutory outage including the opportunity to include oxygen injection modifications in the scope of the 2020 outage and enable the repair of the fuelling machine defects prior to the outage commencement.
    - Reasonably practicable risk reduction measures have been considered.

4.2 ONR review of outage deferral request

16. During the assessment, ONR was informed by NGL that a number of control rod standpipes and gas circulator penetration liner welds 1B1 and 1B2 are overdue examination in accordance to the current written scheme of examination (WSE) necessary to comply with the Pressure System Safety Regulations 2000 (PSSR) 9(1) obligations. Enforcement associated with this breach of conventional legislation will be considered separately by ONR through the application of ONR's enforcement management model.
17. Each of the ONR specialist inspectors; civil engineering, structural integrity, graphite, mechanical engineering, electrical engineering and control and instrumentation, examined the NGL safety justification for the outage deferral. Overall the specialist inspectors considered that the deferral would have no, or negligible, impact on nuclear safety and they all supported, or had no objections to Agreeing to the extension to the operating period for R1.
18. Their judgements were supported by the evidence that:
    - NGL had sought input from relevant suitably qualified and experienced personnel;
    - Agreement was reached with the PSSR competent person regarding any proposed postponements of inspections (Ref. 13);
19. No concerns were raised by any of the specialist inspectors and the request for the extension of the operating period was considered reasonable.

4.3 Engagement with other Government Agencies

20. The Heysham 1 Environment Agency (EA) site inspector was informed that ONR intended to issue an LI giving its agreement to the extension of R1's period of operation. The EA confirmed that it had no objections to the deferral proposal and ONR issuing an agreement to extend the R1 operating (Ref. 16).

5 CONCLUSIONS

21. ONR has undertaken assessment of NGL's safety justification for extending the operating period of Heysham 1 Reactor 1.
22. NGL have requested this extension due to delays with completing post R2 defueling outage activities as a result of the necessity to exchange the west side fuelling machine long travel wheels prior to the start of the R1 statutory outage. Also the need to include modifications to the gas circulator IGV differential pressure impulse lines within the outage scope and due to the outage start date in April 2020 overlapping with the current statutory outage at Heysham 2 and will help to reduce pressure on those staff supporting both outages.

23. NGL considered that the extension would have no significant impact on nuclear safety and that it is ALARP to continue operations for the additional period.

24. The conventional safety breach of Pressure System Safety Regulations 2000 (PSSR) (9(1), in association with nine control rod standpipes and gas circulator penetration liner welds for 1B1 and 1B2 will be considered separately through application of ONR's EMM.

25. ONR's assessments of the proposed extension to the operating period judged that the outage deferral would have no, or negligible, impact on nuclear safety and supported, or had no objections to, Agreeing to the extension to the operating period.

6 RECOMMENDATIONS

26. I recommend ONR issues Licence Instrument 627 under LC30(2) for Nuclear Site Licence 60, giving ONR's Agreement to extend the operating period of Heysham 1 Reactor 1, so that the periodic shutdown commences no later than 16 June 2020.

7 REFERENCES

1. NSL/HYA/50863(Y). Request for Agreement letter for the extension of the Heysham 1 Reactor 1 operating period (CM9 2020/77451).
2. Licence Instrument 612, Consent Granted under Condition 30(3) of Schedule 2 attached to Nuclear Site License No 60 Heysham - (CM9 2017/143094).
3. EC No 367102 Proposal Version 03 – Proposal for the Deferral of the Reactor 1 2020 Statutory Outage 025R1 (CM9 2020/63411).
4. EDF Nuclear Generation Ltd Milestone Full INSA Approval Statement (CM9 2020/77451).
5. ONR-OFD-AN-19-090 RE: Heysham 1 Outage Deferral, Civil engineering – 18/03/2020 (CM9 2020/86605).
6. ONR-OFD-AR-20-01 _ RE: Heysham 1 Outage Deferral EC 367102 – Structural Integrity – 02/04/2020 (CM9 2020/101761).
7. Email from _ to _ – RE: Heysham 1 Outage Deferral EC 367102 – Graphite – 11/03/2020 – (CM9 2020/77644).
8. Email from _ to _ – RE: Heysham 1 Outage Deferral EC 367102 – Mechanical Engineering – 23/03/2020 (CM9 2020/91550).
9. Email from _ to _ – RE: Heysham 1 Outage Deferral EC 367102 – Electrical Engineering – 25/03/2020 (CM9 2020/91988).
10. Email from _ to _ – HPE CM: RE Outage Deferral EC 367102– Control and Instrumentation 12/03/2020 (CM9 2020/79276).
11. Email from _ to _ – RE: Heysham 1 Outage Deferral EC 367102 - Security – 06/03/2020 (CM9 2020/77208).
12. Email from _ to _ – RE: Heysham 1 Outage Deferral EC 367102 –PSA – 23/03/2020 (CM9 202091554).
13. E/TSK/HYA/15867/19.03 - Heysham 1 Reactor 1 2020 Statutory Outage Deferral – PSSR CPV Penetrations Thorough Examination Implications (CM9 2020/100984).
14. E/TSK/HYA/5037 HYA R1 Outage Deferral - RPV Pre-stressed Concrete Structures PSSR Letter. 2020/96892.
15. HYA/197/PW 50866 Postponement of PSSR Inspections for Heysham 1 unit statutory outage 025 (CM9 12020/96863).
16. Email from _ to_ – RE: Heysham 1 outage deferral – 11/03/2020 CM9 (2020/77374).