



2015 Magnox Reprocessing Periodic Shutdown

Consent under Licence Condition 30 (3) to resume feeding of irradiated fuel to the B***
dissolver following the 2015 Magnox Reprocessing periodic shutdown

Project Assessment Report ONR-SEL-PAR-15-010
Revision 1
January 2016

© Office for Nuclear Regulation, 2016

If you wish to reuse this information visit www.onr.org.uk/copyright for details.

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.

EXECUTIVE SUMMARY

Title

Consent under Licence Condition 30 (3) to resume feeding of irradiated fuel to the B*** dissolver following the 2015 Magnox Reprocessing periodic shutdown

Permission Requested

Sellafield Limited, the licensee of Sellafield site, has requested that the Office for Nuclear regulation (ONR) issues a Consent to resume feeding of irradiated fuel to the B*** dissolver following its planned periodic shutdown under Licence Condition (LC) 30 'Periodic shutdown'.

Background

In 2002, the Nuclear Installations Inspectorate, the predecessor regulator to ONR, issued a Specification under LC 30 (3) that requires the licensee to seek consent prior to resuming feeding of irradiated fuel to the B*** dissolver following any full plant washout of B*** (part of the Magnox Reprocessing facilities on the Sellafield site) for the purposes of LC 30 (3).

Periodic shutdowns provide an opportunity for the licensee to maintain, test and inspect plant and equipment that is inaccessible during reprocessing operation. The radioactive inventory of B*** is typically 'washed-out' to facilitate maintenance, testing and inspection activities.

During 2015, ONR reviewed and significantly revised its approach for regulating Magnox Reprocessing periodic shutdowns, taking account of ONR's strategy for regulating the Sellafield site which was significantly revised in 2014. Under the revised approach, ONR would retain regulatory interest in the results of the examination, maintenance, inspection and testing activities, given the age of B*** and the potential on-site and off-site consequences of significant faults. ONR would additionally support the licensee's internal regulatory function to develop a proportionate and targeted assurance plan for the 2015 Magnox Reprocessing periodic shutdown that ONR could take credit for when determining whether issuing a Consent is justified.

The licensee has written to ONR requesting a Consent under LC 30 (3) to resume feeding of irradiated fuel to the B*** dissolver. In the letter the licensee confirmed the planned work due to be undertaken during the periodic shutdown has been delivered with a small number of exceptions, non-delivery of these items have been justified as not impacting adversely on nuclear safety or on plant restart. The licensee has confirmed that it has followed its due process to ensure that the plant is safe to return to service. The licensee's internal regulator supports the request for a Consent to restart.

This Project Assessment Report (PAR) presents the findings of ONR's assessment to determine whether issuing a Consent is justified.

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

In advance of the periodic shutdown, ONR defined and shared areas of regulatory focus with the licensee. In line with the revised regulatory strategy for Sellafield, ONR focussed on the results of examination, maintenance, inspection and testing of the Magnox Reprocessing plant, and supporting the licensee's internal regulatory function to develop a proportionate and targeted assurance plan.

ONR undertook one inspection during the shutdown, targeting inspection and maintenance activities on systems, structures and components that it considered had a significant nuclear safety function. There were no significant findings from this inspection preventing the resumption of feeding of irradiated fuel to the B*** dissolver. Furthermore, ONR is satisfied the licensee's internal regulatory function has undertaken proportionate and targeted assurance activities during the periodic shutdown, which resulted in no significant findings that would prevent resumption of Magnox Reprocessing operations.

Consequently, ONR has satisfied itself that the licensee's judgement that the plant is safe to restart is well-founded, and there are no significant issues that would prevent resumption of Magnox Reprocessing operations.

Matters arising from ONR's work

No matters preventing issue of Licence Instrument 891 arose from the work undertaken by ONR inspectors in relation to the Magnox Reprocessing 2015 periodic shutdown

Conclusions

It is my opinion that the licensee has provided a satisfactory level of assurance and evidence that:

1. The shutdown was adequately planned and managed.
2. All maintenance, inspection and testing scheduled during the periodic shutdown has been completed and any exceptions justified.
3. There are no significant findings that should prevent safe commencement of the next Magnox Reprocessing campaign.
4. Further substantiates the continued safety of the Magnox Reprocessing plant.

Interventions by ONR have identified no significant issues that should prevent safe restart and operation until the next periodic shutdown. The licensee's Management Safety Committee has, having reviewed the work undertaken during the periodic shutdown, confirmed the plant is safe to restart and operate safely until the next periodic shutdown. The licensee has therefore requested a Consent from ONR to resume feeding of irradiated fuel to the B*** dissolver. The licensee's internal regulatory function supports this request.

Recommendations

I recommend that in accordance with the licensee's request, ONR should issue Licence Instrument 891 against LC 30 (3) to give Consent to resume feeding of irradiated fuel to the B*** dissolver for the next Magnox Reprocessing campaign.

LIST OF ABBREVIATIONS

EA	Environment Agency
EIMT	Examination, Inspection, Maintenance and Testing
LC	Licence Condition
ONR	Office for Nuclear Regulation
PAR	Project Assessment Report
PMS	Plant Maintenance Schedule
SSC	Systems, Structures and Components
TIG	(ONR) Technical Inspection Guide

TABLE OF CONTENTS

1	PERMISSION REQUESTED.....	7
2	BACKGROUND.....	7
3	ASSESSMENT AND INSPECTION WORK CARRIED OUT BY ONR IN CONSIDERATION OF THIS REQUEST	8
4	MATTERS ARISING FROM ONR'S WORK.....	11
5	CONCLUSIONS	12
6	RECOMMENDATIONS	12
7	REFERENCES	14

1 PERMISSION REQUESTED

1. Sellafeld Limited, the licensee of Sellafeld site, has requested [Ref. 1] that the Office for Nuclear Regulation (ONR) issues a Consent to resume feeding of irradiated fuel to the B*** dissolver following the planned 2015 Magnox Reprocessing periodic shutdown under Licence Condition (LC) 30 'Periodic shutdown'.

2 BACKGROUND

2. ONR's guidance on LC 30 'Periodic shutdown' [Ref. 2] confirms that the purpose of LC 30 is as follows:
 - LC 30 (1) – to ensure that, where it is necessary to do so, a licensee periodically shuts down plant in order to carry out any LC 28 requirements that require plant to be out of service.
 - LC 30 (2) allows ONR to agree an extension of the period between such regular shut downs.
 - Where a Specification under LC 30 (3) has been issued and ONR has to formally consent to the restart, this consent will only be given when the licensee has both satisfied itself and ONR that the plant may be safely started up and operated until the next periodic shutdown.
3. Under LC 30 (3) a Specification was issued in 2002 [Ref. 3] that requires the licensee to seek a Consent to resume feeding of irradiated fuel to the B*** dissolver following any full plant washout of B*** for the purposes of LC 30 (3).
4. Periodic shutdowns provide an opportunity for the licensee to maintain, test and inspect plant and equipment that is inaccessible during reprocessing operation. The radioactive inventory of the plant is typically 'washed-out' to facilitate maintenance, testing and inspection activities.
5. This Project Assessment Report (PAR) presents the findings of my assessment to determine whether issuing a Consent is justified.

2.1 Overview of the facility and hazards

6. The Magnox Reprocessing plant presently operating on the Sellafeld site was commissioned in 1964 and is scheduled to complete reprocessing operations within the next five years. Continued Magnox reprocessing is fundamental to progressing hazard and risk reduction on the Sellafeld site. The principal function of the Magnox Reprocessing plant is to chemically separate spent fuel rods received from Magnox reactors into their component parts of uranium, plutonium and fission products.
7. Magnox fuel is chemically reactive; reprocessing is currently the only available route to condition this material into a product that is suitable for long term storage and ultimate disposal.
8. The fuel rods arrive for reprocessing with their cladding already removed. They are then dissolved in nitric acid in the B*** dissolver. The dissolved uranium, plutonium and fission products are then split into different liquid streams by a solvent extraction process, which separates the constituent mixture. The uranium, plutonium and fission product streams are subsequently transferred to other facilities for further processing and ultimate conversion to uranium trioxide, plutonium dioxide and vitrified high level waste.
9. The design of the plant and the radioactive nature of the plant inventory limit the licensee's ability to undertake certain Examination, Inspection, Maintenance and

Testing (EIMT) whilst the plant is operating. As a consequence, the licensee periodically shuts down the plant (and washes out the inventory) to undertake necessary EIMT.

10. The Magnox Reprocessing plant contains radioactive materials that require cooling, containment and criticality controls to be in place to ensure protection of the public and the workforce. In addition, there are a number of non-nuclear chemo-toxic and hazardous materials used within the plant, including nitric acid and sodium hydroxide.

2.2 Overview and intent of the periodic shutdown

11. During 2014, the licensee started to plan the activities to be completed during the 2015 periodic shutdown. The main purpose of the shutdown was to:

- a) Undertake a full plant washout; to
 - Ensure safe operations are maintained – the criticality safety case assumes the routine removal of radioactive sludge and debris from the process systems.
 - Perform a physical inventory stock take and verification of nuclear matter within the plant (for the purposes of fissile material accountancy and safeguards).
- b) Perform statutory and routine LC 28 EIMT that cannot be undertaken during an operational campaign, such as:
 - Examination and inspection of specific Systems, Structures and Components (SSCs).
 - Aspects of the Statutory Inspection of Equipment that is covered by the Pressure Systems Safety Regulations 1999.
- c) Completion of engineering projects that will result in improved plant safety and performance.

12. The licensee set out the scope of the periodic shutdown within their intentions papers [Ref. 4] with activities scheduled via a controlling programme [Ref. 5].

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

13. ONR's strategy for regulating the Sellafield site [Ref. 6] was significantly revised in 2014, with a focus on stimulating, facilitating and expediting hazard and risk reduction. Consequently, during 2015, ONR reviewed and significantly revised its approach [Ref. 7] for regulating Magnox Reprocessing periodic shutdowns. Under the revised approach, ONR will retain regulatory interest in the results of maintenance, inspection and testing given the age of the plant and the potential on-site and off-site consequences of significant faults. ONR will additionally support the licensee's internal regulatory function to develop a proportionate and targeted assurance plan for the 2015 periodic shutdown. ONR could then take credit for this work when determining whether issuing a Consent is justified. ONR will issue a Consent only when a sufficient level of assurance has been obtained from the licensee regarding the condition of the plant and its ability to operate safely.

14. It is not practicable, proportionate or consistent with ONR's revised regulatory strategy for the Magnox Reprocessing periodic shutdown for ONR to carry out interventions on all the periodic shutdown activities. Sampling was used to focus primarily on areas of

higher safety significance, since any weakness in these areas is potentially very serious.

15. In advance of the shutdown, ONR discussed, defined and shared regulatory expectations with the licensee [Ref. 8].
16. ONR undertook a specialist inspector led assessment in support of this consent. This targeted the examination and inspection of specific SSCs. The aim was to gain a satisfactory level of assurance and confidence that the plant accords with the safety case for resuming Magnox reprocessing operations.
17. In line with ONR's revised regulatory strategy for the periodic shutdown, ONR worked with the licensee's internal regulatory function to develop a proportionate and targeted assurance plan, and supported the internal regulatory function to deliver this. The work of the licensee's internal regulatory function gives ONR assurance and confidence that the periodic shutdown was adequately planned and managed, and the planned scope of work was delivered.

3.1 Assurance work undertaken during the periodic shutdown

3.1.1 Assurance work undertaken by ONR

18. Prior to the commencement of the periodic shutdown, the licensee initiated a review of LC 28 compliance activities within Magnox Reprocessing in response to concerns raised by ONR as a result of inspection findings. No nuclear safety significant shortfalls were identified affecting the present decision, but a number of issues were found that require longer term rectification. These will be progressed by the licensee as normal business, with progress being monitored by ONR during routine regulatory engagements. I am satisfied (Ref. 9), based on the evidence presented by the licensee, that there does not appear to be significant breaches of LC 28 within Magnox Reprocessing.
19. At an early stage in the periodic shutdown (Ref 10), ONR, the licensee and the licensee's internal regulatory function discussed and agreed how assurance activities (by ONR and the licensee's internal regulatory function) would be conducted during the periodic shutdown. ONR, the licensee and the licensee's internal regulatory function have engaged regularly throughout the periodic shutdown to share and discuss progress with the periodic shutdown and the outcome of assurance activities. This routine engagement was valuable in that any issues raised could be resolved in a timely manner.
20. A specialist structural integrity inspector has assessed [Ref. 11] the adequacy of the licensee's EIMT activities that in his opinion have significant structural integrity content. These activities relate principally to inspections of process vessels and pipework. The assessment was conducted in three stages:
 - A review of the licensee's LC 30 EIMT scope of work.
 - Site inspection undertaken during the shutdown to sample the inspections, associated documentation, meet with relevant site personnel and inspect EIMT work on site.
 - Monitor LC 30 EIMT work undertaken after the site inspection, particularly the findings and sentencing of inspections.
21. The specialist structural integrity inspector was satisfied that the inspections sampled from the licensee's scope of work has been undertaken in line with the Plant Maintenance Schedule (PMS) requirements and that the licensee has followed its due

process in assessing and sentencing the findings of the inspections. The licensee's initial assessments of the inspection findings from the four major inspection activities sampled was that all met the acceptance criteria and should not preclude start-up on completion of the Magnox Reprocessing periodic shutdown. The specialist inspector's evidence supported the licensee's initial assessments.

22. The specialist structural integrity inspector recommended, based on his sampling inspection, that ONR should give Consent for the licensee to resume feeding of irradiated fuel to the B*** dissolver on completion of the 2015 Magnox Reprocessing periodic shutdown.

3.1.2 Assurance work undertaken by licensee's internal regulatory function

23. The licensee's internal regulatory function has undertaken a proportionate and targeted programme of assurance work [Ref. 12] during the 2015 Magnox Reprocessing periodic shutdown and concluded:

- The assurance activities undertaken provided the internal regulators assurance that Magnox Reprocessing was safe to restart and operate safely until the next periodic shutdown. Although some issues were identified (including on instruction use and adherence, personnel competence and asset care), the extent of condition of these was not sufficient enough to delay restart of operations.
- The issues identified by the internal regulator are not specific to periodic tasks. However, Magnox Reprocessing is actively working through conduct of operations improvements, which the internal regulator will continue to monitor.
- The broad themes from the issues stated will be captured in a post job review (PJR), conducted by the licensee to ensure that learning is collated and incorporated into future work planning and control.
- The internal regulator concluded that Magnox Reprocessing is safe to commence restart operations.

24. The licensee's internal regulatory function had no significant findings that would prevent ONR from giving a Consent to resume feeding of irradiated fuel to the B*** dissolver on completion of the 2015 Magnox Reprocessing periodic shutdown.

3.2 Application for consent to resume operations

3.2.1 Summary of restart submission

25. The licensee has requested a Consent [Ref. 1] to resume feeding of irradiated fuel to the B*** dissolver on completion of the 2015 Magnox Reprocessing periodic shutdown. The request for a consent provides written confirmation the:

- a) Pressure systems are in a satisfactory state to recommence operations.
- b) Requirements of the PMS have been met, with exceptions reported and justified. Statutory examinations and inspections are all in date to support the next operational phase.

- c) Any outstanding scope does not have an adverse influence on the plant restart and subsequent Magnox reprocessing operations.

3.2.2 Restart meeting

- 26. A restart meeting was held on Monday 5th October, the meeting was formally minuted [Ref. 13]. I attended the meeting and concluded that there were no issues of significance that would prevent the licensee proceeding to submit their application for a consent to resume feeding of irradiated fuel to the B*** dissolver.
- 27. The decision on whether it is safe to start up Magnox reprocessing and resume feeding of irradiated fuel to the B*** dissolver is a matter for the licensee's Management Safety Committee (as described below).

3.2.3 Restart reports

- 28. The licensee has issued a series of papers [Ref. 14] to underpin their request for a Consent which have been considered and endorsed by the licensee's Management Safety Committee. The papers cover shutdown operations, EIMT, and Health and Safety. They provide an overview of the work scope undertaken during the periodic shutdown, compare the undertaken work against the intended scope, and seek to demonstrate the continued safety of the plant in support of its safety case for restart and the next operational campaign.
- 29. The licensee will produce a 28 day report after plant restart. This will include an update on plant performance post start-up.

3.3 Consultation with other government agencies

- 30. The Environment Agency (EA) was consulted at an early stage to provide an understanding of the licensee's intentions for the 2015 Magnox Reprocessing periodic shutdown. EA was consulted during the periodic shutdown to confirm there were no areas of joint regulatory interest.
- 31. EA was asked to confirm whether there was any objection to ONR issuing a Consent to resume feeding of irradiated fuel to the B*** dissolver. EA confirmed [Ref. 15] it had no objection to ONR issuing a Consent.

4 MATTERS ARISING FROM ONR'S WORK

- 32. Under ONR's revised strategy for regulating Magnox Reprocessing periodic shutdowns, the level of regulatory involvement has significantly reduced relative to previous periodic shutdowns with ONR taking account of the assurance work undertaken by the licensee's internal regulator in determining whether issue of a Consent is justified.
- 33. ONR has undertaken one intervention during the periodic shutdown focussing on the structural integrity of SSCs, to gain assurance that the condition of the plant supports a safe restart and continued safe operation until the next periodic shutdown. The intervention was consistent with ONR's revised strategy for regulating the 2015 Magnox Reprocessing periodic shutdown and provided proportionate oversight of the licensee's EMIT activities.
- 34. Additionally, ONR has liaised with the licensee throughout the periodic shutdown as part of routine regulatory interactions, and is satisfied the licensee has followed its due process for periodic shutdowns (which have been followed for previous periodic shutdowns). A key element in the due process is the licensee's Management Safety Committee reviewing the work undertaken during the periodic shutdown, and

confirming they are satisfied that the plant is safe to restart and operate safely until the next periodic shutdown.

35. The licensee's internal regulatory function has undertaken a proportionate and targeted programme of assurance work throughout the periodic shutdown and shared the output pro-actively with ONR. This assurance work considered a range of broad topics that would have been previously examined by ONR, including delivery of scheduled EIMT, control and supervision, and learning from experience.
36. The licensee has confirmed completion of its due process for managing the periodic shutdown, culminating in the request for a Consent to resume feeding irradiated fuel to the B*** dissolver.
37. Interventions by ONR have identified no significant issues that would prevent safe restart and operation until the next periodic shutdown. The licensee's Management Safety Committee has, having reviewed the work undertaken during the periodic shutdown, confirmed the plant is safe to restart and operate safely until the next periodic shutdown. The licensee's internal regulatory function supports the application for a Consent. On this basis, I am satisfied the plant is suitably safe to restart and operate until the next periodic shutdown and there is no reason to withhold Consent to resume feeding of irradiated fuel to the B*** dissolver.

5 CONCLUSIONS

38. I am of the view that the licensee has provided a satisfactory level of assurance and evidence that:
 - a) The shutdown was adequately planned and managed.
 - b) All maintenance, inspection and testing scheduled during the periodic shutdown has been completed with any exceptions justified.
 - c) There are no significant findings that should prevent safe commencement of the next Magnox Reprocessing campaign.
 - d) Further substantiates the continued safety of the Magnox Reprocessing plant.
39. Interventions by ONR have identified no significant issues that would prevent safe restart and operation until the next periodic shutdown. The licensee's Management Safety Committee has, having reviewed the work undertaken during the periodic shutdown, confirmed the plant is safe to restart and operate safely until the next periodic shutdown. The licensee's internal regulatory function supports the licensee's application for a Consent.
40. I am satisfied, based on the sampling activities undertaken by ONR, that the Magnox Reprocessing plant is suitably safe to restart and operate until the next periodic shutdown and there is no reason to withhold a Consent to resume feeding of irradiated fuel to the B*** dissolver.

6 RECOMMENDATIONS

41. I recommend that the ONR Sellafield Compliance, Intelligence and Enforcement Sub-Programme Superintending Inspector:
 - Signs this Project Assessment report to confirm acceptance of the ONR technical and regulatory arguments that will help justify issuing Licence Instrument 891.

- Signs this Project Assessment report approving its release, after redaction where appropriate.
42. I recommend that the Sellafield Programme Deputy Chief Inspector signs Licence Instrument 891, which grants Consent under LC 30 (3) for the licensee to resume feeding of irradiated fuel to the B*** dissolver on completion of the 2015 periodic shutdown.

7 REFERENCES

1. ONR/14/11542/11 'Application for consent to resume feeding of irradiated fuel to the B*** dissolver' [TRIM Ref. 2015/393103]
2. NS-INSP-GD-030 'LC30 Technical Inspection Guide', Revision 2 (http://www.onr.org.uk/operational/tech_insp_guides/index.htm)
3. SEL 75358N, Licence Instrument No. 405 'Specification under Condition 30(3): Requirement for a consent before resuming irradiated fuel feed to the B*** dissolver', 4th October 2002 [TRIM Ref. 2011/239832]
4. Magnox Reprocessing Periodic Shutdown 2015 Booklet [TRIM Ref. 2015/366974]
5. Magnox Reprocessing Periodic Shutdown Programme [TRIM Ref. 2015/366975]
6. ONR's Strategy for regulating the Sellafield site [TRIM Ref. 2014/141419]
7. ONR-SEL-PAR-14-019 'Review of Regulatory Approach for the 2015 Magnox Reprocessing Periodic Shutdown', March 2015 [TRIM Ref. 2015/42772]
8. Reprocessing Outage 2015 – ONR-SL Whiteboard Exercise [TRIM Ref. 2015/373462]
9. ONR-SEL-CR-15-187 'Update on LC28 Compliance across Magnox Operating Unit & Quarterly Magnox Operating Unit - ONR Level 4 Meeting', July 2015 [TRIM Ref. 2015/271730]
10. ONR-SEL-CR-15-188 'Magnox Reprocessing Periodic Shutdown – Planning & Assurance Activities' July 2015 [TRIM Ref. 2015/271624]
11. ONR-SEL-AR-15-006 'Assessment of the LC28 activities undertaken during the Magnox Reprocessing 2015 Periodic Shutdown' [TRIM Ref. 2015/361202]
12. AU009179 'Assurance Plan – 2015 Magnox Reprocessing Periodic Shutdown', Issue 1 [TRIM Ref. 2015/373488]
13. LC30 Periodic Shutdown Restart Meeting Notes [TRIM Ref. 2015/384972]
14. ONR_14_11542_12 2015 Periodic Shutdown Restart Documents [TRIM Ref. 2015/390433]
15. Confirmation of no objection from EA to ONR issuing a Consent to SL following the 2015 Magnox Reprocessing periodic shutdown [TRIM Ref. 2015/390556]