Unit 3b Division 3 PROJECT ASSESSMENT REPORT No: 25/2006

HEALTH AND SAFETY EXECUTIVE

HM NUCLEAR INSTALLATIONS INSPECTORATE

PROJECT: Report to justify the Agreement to the implementation of the Trident modified disassembly process, Burghfield.

SITE: AWE Burghfield

CONSENT/APPROVAL NO: N/A

LICENCE INSTRUMENT No: [redacted]

LICENCE and CONDITION Nos: 78, LC 22(1)

AUTHOR: [redacted] SIGNED: [redacted] Date: [redacted]

APPROVED: [redacted] SIGNED: [redacted] Date: [redacted]

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SUMMARY

In 2002 AWE submitted the Trident Modified Disassembly[1] Safety Case. NII had concerns over the methodology and asked for a revised risk assessment (RA) to be carried out. Licence Instrument [redacted] was issued to allow limited [redacted] the meantime and with the restriction of [redacted] in Gravel Gerties. In mid 2003 a second LI [redacted] was granted allowing further limited [redacted] with the same constraint. At this time NII understood that the RA was continuing to be developed. In March 2004 NII reiterated in writing that a new RA was necessary and that further LIs would only be granted when adequate progress had been demonstrated. AWE programmed the RA for completion in April 2006, however, it has not yet been completed and latest forecasts indicate this will now be April 2007. AWE is confident that by November 2006 all significant contributors to the overall risk will have been analysed and that this analysis will demonstrate that the risks associated with the disassembly process are tolerable.

The limit allowed by LI [redacted] is nearing completion and despite the lack of development of the RA, AWE has requested a further LI to allow [redacted] of [redacted] additional units. NII asked AWE and DNSR whether the existing programme could be delayed until November 2006 by which time the RA would be significantly more mature. DNSR, however, has confirmed that these [redacted] are necessary in support of the UK Strategic Deterrent (ref.1). Despite the lack of completion of the RA, NII fault study specialist assessor has confirmed that the work is progressing and the process being used is appropriate. However, AWE is not yet in a position to clearly demonstrate that the risk from the process is below the BSL. From the assessments carried out on the deterministic aspects it is clear that risks have not been reduced ALARP.

Over the period of developing the RA, AWE has undertaken a PRS, based on the original safety case (with its own weaknesses), of the AWE(B) operations/facilities which has highlighted a significant number of shortfalls. Very limited remedial work has been undertaken to date.

AWE, as part of its submission for a Licence Instrument, has supplied two programmes relating to the development and completion of the new RA and the facility safety case respectively. NII consider that these are sufficiently detailed to allow the monitoring of AWE's progress towards delivery of the RA. In addition the letter of application includes a Schedule of Deliverables[2] that detail AWE's undertakings that need to be completed prior to the issue of any subsequent LI. These introduce some risk reducing measures in the short term.

In addition, and because of the particular concerns with respect to the [redacted] NWIPT has agreed not to schedule any [redacted] without DNSR

[1] Whilst AWE(B) carries out both assembly and disassembly of Trident Warheads it is generally accepted that [redacted]

[2] See Annex 1 to this PAR.(ref.5)

Agreement. DNSR has agreed to advise NII before changing its advice to NWIPT.

INTRODUCTION

The continuing use of Trident as the deterrent beyond the initial design lifetime is underwritten by the ability to maintain the serviceability of the existing stockpile. To achieve this AWE needs to carry out disassembly and examination of units to maintain stockpile confidence and capability. Units need to be broken down for stockpile surveillance and other related reasons and to maintain Government commitments on warhead numbers.

A modified process for Trident disassembly at AWE(B) has been developed, which has incorporated a number of improvements compared to the original Trident disassembly process.

AWE has been using the Trident Modified Disassembly Process (TMDP) under the previous 2 limited agreements (Ref 2 and Ref 3)

AWE has now requested that NII agrees to the [redacted] of [redacted] (Ref 4). This PAR provides a record of the basis upon which the regulatory decision has been reached. Rather than restate in any detail the arguments presented in the 2 previous Project Assessment Reports PAR 02/05 (dated [redacted] and PAR 74/2003 (dated [redacted] it focuses on the developments that have taken place in the interim particularly with regard to the development of the risk assessment and the increase in the information on the condition of the facilities and plant.

AWE has prepared a document entitled 'Status of the AWE(B) Licensed Site Safety Case and Basis for Continued Operations' document ref. EDMS 1/800D9E67/B/LS/SC0101 Draft A Issue 2 (ref.6) that is intended to justify continued warhead processing. This document was revised to Draft B (ref.7) and issued to NII at AWE(A) on 14 August 2006. This assessment also takes these changes into account.

BASIS FOR DECISION

Regulatory Background

AWE acknowledged that the operator risk associated with the original disassembly process was only acceptable for a limited throughput associated with surveillance and assembly rectification. A review of the original disassembly process was undertaken in 2002 to take account of experience with the disassembly of units of a [redacted] in tooling and handling and to make improvements to procedures. These changes were used by AWE to justify claims of reduced operator and public risk from disassembly operations. The resulting Pre-Operational Safety Report, categorised as Cat A under the licensee's arrangements went through due process including endorsement by the NSC within AWE for that category of change.

NII's initial assessment of the POSR raised a number of issues which encompassed concerns about human error probabilities, fault study issues like the Lines of Defence screening methodology and uncertainty in [redacted] probabilities. The initial NII assessment of the revised POSR resulted in the granting of Licence Instrument [redacted] which gave agreement to process [redacted] and restricted operations to allow for [redacted] in the Gravel Gerties. These assessment concerns were revisited prior to the granting of Licence Instrument [redacted] and, although there were some remaining reservations, none were considered sufficient to prevent NII agreeing to continued adoption of the TMDP whilst awaiting the new RA. In addition this would allow AWE time to develop a comprehensive risk assessment for the TMDP and over the same time period become more informed regarding the condition of the plant and facilities through the PRS process.

In March 2004 NII reiterated in writing that a new risk assessment was required (ref.8) and that 'further agreements would be dependent on demonstrating adequate progress'. (AWE letter ref NII 2246R dated 13 April 2005 and NII letter BUR 77156N dated 15 July 2005 both linked the completion of the RA with the issue of the next LI). A new RA was started but progress has been unacceptably slow. AWE had initially programmed completion of the RA for April 2006 which would have provided sufficient time for NII to fully assess the information and be in a position to make a judgement on its adequacy and its level of development. When this date was not met the completion date was revised to November 2006. However, in August 2006 AWE declared (telecon [redacted] 09/08/07) that the fully completed RA would not now be available until April 2007. Work, however, continues with AWE being confident that all the significant contributors to the risk (ie over 95% of the risk) will have been analysed and available to NII by November 2006. Following pressure from NII, AWE has very recently issued a detailed RA programme as a precursor to NII considering its application for agreement to process [redacted]

In the intervening period AWE embarked on its PRS process and much of the analysis is now complete. The process has identified a significant number of shortfalls that have been categorised but little remedial work has been undertaken so far. NII specialist inspectors have closely monitored the PRS process and have identified and informed the licensee of practical risk reduction methods that could quickly be applied in advance of any proposed engineering modifications. The consideration and adoption of these measures has to date been disappointing. AWE is currently developing programmes of work, based around the AWE(B) operations programme, to rectify the shortfalls. NII and AWE continue to discuss the details of the remedial work programmes. NII has been pressing AWE for discussions on the remedial work details such that a judgement can be formed on its adequacy. To date AWE has provided little information and implemented only a small amount of remedial work. The production, and provision to the NII, of a schedule of descriptions of the detailed work packages, which will be adopted as remediation against the shortfalls is one of the deliverables required prior to the issue of any subsequent LI.

NII Assessment

AWE document at reference 6 titled 'Status of the AWE(B) Licensed Site Safety Case and basis for Continued Operations' has been assessed by fault studies, mechanical and civil engineering specialist assessors. The Draft B version of this document has also been considered by the fault studies assessor. Each has prepared an assessment note or report. It has been difficult for AWE to prepare a document for submission as no revised safety case has been developed since the documents assessed by NII in issuing the previous LIs. This document deals with a number of related issues relevant to the consideration for continued operation but this cannot be viewed in isolation of other factors.

It would be imprudent to take a regulatory decision on the basis of adequate progress in developing a RA without taking account of the condition of the facilities and plant to which the RA applies. The engineering assessments go beyond the information presented in the document and cover issues that have arisen on the site since the last Licence Instrument was issued. This assessment has been useful in pulling together a number of issues in support of the regulatory decision in this instance. Consequently NII has more information regarding the actual condition of the plant than at the time of previous assessments. This additional scope is considered in addition to the degree of progess made in developing the risk assessment. Additionally, the fault analyst attended a meeting to discuss some of the issues raised in the first justification document.

Ref. 6 also provides a positional statement regarding the site's ongoing Periodic Review of Safety (PRS) which deals with the identification of engineering shortfalls through the engineering substantiation process. It also reports on the findings to date of ongoing risk assessments which indicate that the total risk across the facility is below the BSL. The document also indicates the amount of work yet to be completed in developing the new risk assessment. The NII fault studies assessor considered the amount of work yet to be done as significant and following a meeting with AWE the licensee provided an updated justification document that again failed to detail the programme to completion of the work. The revised full completion date is April 2007.

There is general agreement within NII that the identification of shortfalls as part of the PRS process has been carried out in a professional manner. Remedial work programmes are being developed and if properly applied should result in significant safety improvements and should provide the basis of a deterministic element of the facility safety case. It is the current plant condition that concerns NII assessors.

Fault Studies/PSA

The assessment note dated 09 August 2006 is held on File NUC 70052/78/2 Pt1 Enclosure 12 (ref.9).

The initial assessment of draft A of the AWE justification document raised issues relating to the derivation of risk figures for 2 significant elements of the process as these did not take into account recent detonation probabilistic refinements and the poor progress with the RA, particularly the lack of a detailed programme to completion. The NII fault studies assessor attended a meeting on the 4th August 2006 with AWE to discuss these concerns (ref.10). AWE agreed to provide an update of the justification document which would address these issues. A revised document (ref.7) was provided to NII at AWE(A) on 14 August.

The revised document, however, does not include a detailed programme for the RA and the risk figures for the 2 significant elements are replaced by a more generic statement that risks relating to the process are below the BSL.

The justification document, supported by the fault studies assessor's knowledge of the developing RA, does not provide any demonstration, at this point, that the risks associated with the disassembly process are tolerable since there is a significant amount of work still to be done to arrive at the risk figures. However, AWE considers risks to be below the BSL. This assertion is based on the original safety case, and the subsequent PRS work carried out using this safety case. This was criticised in 2002 for screening out significant risk contributors to the process (for example the [redacted], now known to be one of the largest risk contributors) was nearly omitted from the analysis. Additionally it is not clear that the recent work on [redacted] probabilities has been factored into risk figures.

AWE, on the 18th August 2006, provided two programmes relating to the development and completion of the new RA (ref.11) and the facility safety case (ref.12) respectively. The first of these relates specifically to the TMDP assessment of main risk contributors. The programme clearly identifies the key elements of the process and the deliverables at each stage which are then used as the inputs to the next. This phase of the work will be completed by 28 November 2006. The second programme encompasses the first and lists the activities and timeframes to deliver the facility safety case by 27 September 2007. These programmes are considered adequate in indicating AWE's commitment to the work. The NII fault studies assessor remains concerned that the RA programme is very optimistic despite assurances from AWE that the output can be achieved to programme.

The fault studies assessment advises that, to ensure regulatory leaverage, any Licence Instrument should link and thereby limit the number of units to the satisfactory completion of the RA.

The assessment also recognises that there are outstanding questions to be answered from a deterministic perspective. These are addressed in the subsequent sections.

Civil Engineering Assessment

A detailed assessment of the civil and structural aspects of the facilities used to carry out disassembly is provided in AR No.23/06 (ref.13). The assessment identifies measures to reduce the hazard.

The case for the licence instrument relies to some extent on the engineering substantiation work carried out in support of the PRS. The assessment of the civil engineering structures for the PRS has revealed various shortfalls in withstand capability for normal and hazard loads. The safety case relies on an 'incredibility of failure' argument being made for the structures because the units are sensitive to major insults. The NII assessor considers that such an 'incredibility of failure' argument cannot be made on the basis of the current information. It is, however, possible that measures could be taken to mitigate the risk due to structural failure/collapse. The assessment provides some practical solutions that AWE should consider implementing to reduce risk due to insult of the unit from civil engineering structures.

In the longer term the PRS improvements will be expected and these will be in addition (or incorporate) these recommendations.

Remedial work, which could be readily implemented and reduce the risk, that the assessor has judged to be necessary for operations for which the defence imperative is claimed could be readily implemented are:

- the development of an Operating Rule preventing use or [redacted],
- regular programmed inspections of the structure and
- the installation of deflection monitoring to provide early warning of any movement.

These have been discussed further with AWE and commitment has been given to implement these before the issue of subsequent LIs.

Mechanical Engineering Assessment

A detailed assessment of the mechanical engineering aspects of the facilities used to carry out disassembly is provided in AR No.24/06 (ref.14). The assessment report has been produced to provide a review of the status of the ongoing mechanical engineering assessment of the Periodic Review of Safety being conducted at AWE Burghfield in accordance with LC 15.

As part of Periodic Review of Safety process AWE has undertaken a significant review of the Burghfield safety case and the plant and equipment

that contributes to it. This extended review has been necessary as AWE moves from using an essentially pure judgemental probabilistic approach to safety assessment to one based more on deterministic engineering design and analysis supported by probabilistic assessment and judgement. This is consistent with the basis of this assessment of not looking at the probabilistic case in isolation of the deterministic element.

As would be expected from a more rigorous approach to safety analysis this work has proved problematical and has revealed a large number of potential shortfalls.

AWE has therefore been progressively categorising all shortfalls, subjecting them to an ALARP review process and this will eventually capture the more important issues within a planned remedial works programme. This work has been performed in two stages with Stage 2 yet to be issued to NII.

Continued operation of these facilities is therefore largely based on AWE's assessment of the current shortfalls, their original risk assessment and their judgements outlined in ref.6.

The assessment identifies a number of recommendations some designed to be implemented in the short term these are:

- the consideration of enhanced inspection, maintenance and testing, where it is not possible to make immediate modifications, for the equipment found to have shortfalls from the PRS process.
- to ensure that all lifting and handling equipment is inspected and tested in accordance with a written scheme of work and immediately before work periods.
- to justify the non-usage of shock-absorbing materials beneath sensitive handling operations which could minimise the shock loads following mechanical failure.
- to demonstrate that persons sheltering within the Assembly Area following an emergency involving the release of radioactive materials will be adequately protected.

It is recognised that others will be taken account in the AWE remedial work programme.

The assessment makes the point that in view of the nature and number of the shortfalls, NII would normally expect that these operations would be suspended until all the significant issues had been fully reported and were shown to be ALARP, both in the short term and following some remedial work. Any decisions to continue with these operations should only be taken in the full knowledge of the existence of these shortfalls and any potential outcome. The true benefits from such ongoing operations can only be fully assessed by the MoD and can only therefore be fully evaluated by it.

CONCLUSIONS

AWE has made some progress, albeit slowly, in developing a new risk assessment. AWE considers the risks associated with the disassembly process to be tolerable, however, this has not been clearly demonstrated to NII. In the short term, on the basis of information received from DNSR, [redacted] of [redacted] is necessary to support the UK Strategic Deterrent. Taking these Defence needs into account NII considers that it can support the [redacted] of [redacted]

In addition to the development of the RA to demonstrate that the risks are tolerable there are some reasonably practical measures that AWE must take, in the short term, to further support AWE's claims that these risks are acceptable, prior to the issue of any subsequent LI. These are listed in Annex 1.

RECOMMENDATIONS

It is recommended that;

NII should agree to the limited continuation of the TMDSC process at AWE(B) in respect of the [redacted] identified by DNSR.

NII should not agree to further [redacted] operations unless AWE can demonstrate that it has achieved the items listed in the Schedule of Deliverables at Annex 1.

REFERENCES

1. Letter DNSR/13/08 dated 11 August 2006 to NII. AWE Burghfield New License Instrument for continued operations.
2. Licence Instrument [redacted] AWE(B) Agreement to Implement the Trident Modified Assembly Process dated [redacted] BUR 77117N
3. Licence Instrument [redacted] AWE(B) Agreement to Implement the Trident Modified Assembly Process dated [redacted] BUR 77142N
4. AWE letter requesting LI Ref. EDMS1/800DC0EB/LS/N0400 dated [redacted]
5. Schedule of Deliverables Ref. EDMS1/800DEA78/B/LS/SC0101 Issue 1, dated 18 August 2006.
6. AWE document EDMS1/800D9E67/B/LS/SC0101 Draft A Issue 2 Dated 25 July 2006. Status of the AWE(B) Licensed Site Safety Case and Basis for Continued Operations
7. AWE document EDMS 1/800D9E67/B/LS/SC0101 Draft B Issue 2 Dated 14 August 2006. Status of the AWE(B) Licensed Site Safety Case and Basis for Continued Operations
8. NII Letter BUR77146N AWE, Burghfield – NIA, 1965 – LC 14/15 Assembly Area.
9. Assesment Note; AWE Burghfield Licence Instrument PSA/Fault study Aspects. Dated 09 August 2006.
10. Contact Report No. 93 dated 08 August 2006 [redacted]
11. NSD DIV 3 AR No. 23/06 AWE Burghfield Licence Instrument Assessment Report (Civil Engineering) Project File NUC 128/1/1/1P10 E 54
12. NSD DIV 3 AR No. 24/06 AWE Burghfield Status of Safety Case Project File NUC 128/1/1/1 P10/E55
13. TMDP Assessment of Main Risk Contributors, Document Ref: LL 18016256. [redacted]
14. AWE (B) Licensed Site Indicative Safety Case Programme, Document Ref: LL18015348. Created 18 august 2006.

ANNEX 1

Schedule of Deliverables

To be supplied prior to the August Licence Instrument request

Programme for Risk Assessment

- AWE to supply a detailed programme with clearly identified milestones up to and including supply of a new safety case in September 2007. The programme to include the deliverables described in issue 2 to the justification document and any other pertinent steps in the process.

The following information to be included as a schedule to the LI request letter submitted in August 2006 requesting permission to undertake the [redacted] agreed [redacted] vised by NWR.

Following issue of the August LI and prior to request of any further LIs, AWE to supply:

- In November that part of the new risk assessment which targets those areas of operation which AWE currently believes to be the main risk contributors in such a form and with suitable evidence to demonstrate that the risk is below the BSL.

- Operating Rule or other suitable arrangement to ensure that operations or [redacted] within [redacted] do not occur during periods of [redacted] speed. Evaluation of risk associated with [redacted] in such conditions. This would consider risks from building and crane collapse.

- Operating Rule or other suitable arrangement to ensure that only one unit is under the [redacted] during periods of operation

- Prepare and implement an appropriate programme of regular inspections of the following structures to ensure a continuing fitness for purpose:

  1. [redacted] in particular on a batch-by-batch basis
  2. [redacted]
  3. [redacted]
  4. (and any other operational areas highlighted by the new risk assessment)

- Prepare and implement an appropriate programme of regular [redacted] and other relevant inspections of the GGs to ensure a continuing fitness for purpose (to give early warning of catastrophic failure/collapse). These should include acceptance criteria and an action plan in case of adverse indications.

- Inspect and test all lifting and handling equipment in accordance with a written scheme of examination, and also before periods of use. This should pay particular attention to braking and control systems, highly stressed components and other items which could become loose or detached.

- Evaluate the possible use of shock-absorbing materials beneath sensitive handling operations which could minimise the shock loads following mechanical failure.

- AWE to demonstrate that persons sheltering within the Assembly Area following an emergency involving the release of radioactive materials will be adequately protected.

- AWE to supply a schedule of the descriptions of the detailed work packages which will be adopted as remediation against the shortfalls identified within the PRS and a programme showing when it is to be undertaken. Where the detail engineering design is not yet available, AWE to supply the output of the optioneering process used to assess which solution is favoured.

- AWE to demonstrate why the replacement of the [redacted] by an alternative [redacted] cannot be achieved sooner than currently planned.