Unit 3b Division 3 PROJECT ASSESSMENT REPORT No:33/2006

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: .....Date.....

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

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SUMMARY

In 2002 AWE submitted the Trident Modified Disassembly[1] Safety Case (TMDSC). 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] in the meantime and with the restriction of [redacted] in Gravel Gerties. In mid 2003 a further 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 was not completed and forecasts at the time indicated that it would not be completed until April 2007. On the basis that sufficient progress had not been made toward completion of the RA and the ongoing PRS had indicated a number of shortfalls to the facility and plant LI [redacted] was issued in August 2006 to allow AWE to [redacted] already held at AWE(B), only following written confirmation from DNSR that the [redacted] were necessary in support of the UK Strategic Deterrent. The AWE(B) letter (ref.1)requesting LI [redacted] was annexed by a Schedule of Deliverables (SD)(ref.2), which was agreed by NII prior to the granting of the LI. This schedule required AWE(B) to introduce some risk reducing measures in the short term, including the development of that part of the TMDSC which included the significant contributors to the overall risk of disassembly operations, before any further LIs would be granted.

AWE(B) initially intended to request an LI in [redacted] to continue to [redacted] However, AWE(B) is now seeking earlier permission to [redacted] but not [redacted] a number of units (ref.4). DNSR has confirmed by letter (ref.3) that an [redacted] of a minimum of [redacted] is necessary in support of the UK Strategic Nuclear Deterrent. DNSR agreed to be advised by NII on the adequacy of the progress with the SD requirements particularly with respect to the RA for the [redacted] Should NII deem the progress to be adequate DNSR will advise NWIPT accordingly to sanction further [redacted]

AWE, as part of its submission for a Licence Instrument, has supplied an 'evidence file' (ref.5) which contains information on progress made against the individual elements of the Schedule of Deliverables (SD) that impact the AWE(B) [redacted] facilities. NII has reviewed progress with this work and for this specific request for [redacted] has concentrated on assessing those aspects of the SD that have a direct bearing on the use of the [redacted] and the [redacted] facilities, these being required for inloads and placement in work in progress storage. Further assessments will be carried out on all aspects of the SD for any subsequent request for an LI including that required for [redacted] intended for [redacted] In addition the letter of application includes a commitment to carry out a fundamental review of the programme to replace

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

the [redacted] with an alternative [redacted] and have the output of that review agreed with NII prior to 10 January 2006.

AWE has made good progress against the requirements of the SD particularly with respect to the RA and inspection and testing of the civil and mechanical structures in [redacted] and [redacted]. Not all the work is complete but progress is deemed sufficient to recommend that a Licence Instrument be granted for the [redacted] However, AWE has to continue to complete the RA and, through the PRS remedial programme, continue to reduce risks associated with disassembly operations. It is recognised that the current facilities fail to meet modern standards and only the design, construction and operation of new facilities will ensure that modern safety standards are met.

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 3 limited agreements LI Nos. [redacted] and [redacted]

AWE has now requested that NII agrees to the [redacted] of further [redacted]. 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 3 previous Project Assessment Reports PAR 02/05 (dated [redacted] PAR 74/2003 (dated [redacted] and PAR 25/2006 (dated [redacted] it focuses on the AWE progress made against the SD.

AWE has prepared an 'Evidence File' which provides confirmation of progress made against elements of the SD that impact on the inloading process. Since the granting of LI [redacted] NII inspectors have monitored progress toward completion of the requirements of the SD, with particular attention being paid to the development of the RA and the application of civil and mechanical engineering inspection and testing regimes.

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 LI [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 LI [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 confirmed that a new risk assessment was required 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 for the granting of LI [redacted] 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. LI [redacted] was granted in [redacted] which permissioned the [redacted], [redacted] This LI was issued on the basis that DNSR confirmed that the work was necessary in support of the UK Strategic Nuclear Deterrent. LI [redacted] also committed AWE to complete a Schedule of Deliverables which included the production of that part of the new

RA, 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. NII is satisfied that the significant contributors to the risk relating to [redacted] have been identified in support of the application for LI [redacted]. Following pressure from NII, AWE also issued a detailed RA programme, which has recently been amended to include the provision of a deterministic element to the RA.

The ongoing PRS process has identified a significant number of shortfalls that have been categorised. Work has recently started to remediate these shortfalls. 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 SD linked to LI [redacted] required AWE(B) to consider and adopt such measures and although the work is not yet fully completed with respect to written schedules of inspection and testing good progress has been made in this area.

AWE has developed 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 and more detail of the engineering solutions is developing as work proceeds.

NII Assessment

NII assessment has been primarily been directed at confirming the adequacy of AWE(B)'s completion of the SD requirements as these apply to the facilities for inload and in particular the [redacted] being a high risk contributor. This has been done in stages through review and by assessment. The work has been carried out by specialist inspectors in fault studies/PSA, mechanical and civil engineering. Each has prepared an assessment report/note which are referenced in this report.

Fault Studies/PSA (ref. 6)

The SD required the production of that part of a new Trident Disassembly 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 that the risk is below the BSL. As the request for an LI is restricted to [redacted] only the PSA/Fault Studies assessor findings on the Interim Risk Assessment are as follows:

In terms of overall progress, the licensee appears to have utilised an adequate process. Fault trees have been used for some of the [redacted] faults. A number of improvements have been made to the [redacted] such as an [redacted] and improved maintenance and testing, which provide evidence that a genuine ALARP process has taken place.

From its development of the new RA, AWE concludes that both public and worker risk are below the respective BSOs. The worker risk criteria uses

conventional risk limits, rather than nuclear limits. This aspect is worthy of further discussion, but it does not significantly affect the overall picture that AWE's predicted risks are low.

Seismic risk forms a significant fraction of the total annual risk, this figure is based on a time-at-risk reduction factor of 1 hour in 365 days (1.1e-4). The worker fatality point-in-time risk is calculated by AWE to be 1e-3 /yr, which places this in the intolerable region of SAP P43 if the fatality is attributable to radiation dose. On the basis of NII's ALARP guidance T/AST/005 the time-at-risk should not ideally be intolerable at any time as such the high point-in-time risk means that a rigorous demonstration that risks are ALARP is required before the [redacted] is used, which should include the following:

- Documentation detailing the optioneering process that demonstrates there are no further options that are reasonably practicable to reduce risks further in the short term.

(note from AWE(B) NII site inspector; AWE confirms in ref. 5 that an ALARP process has been undertaken for the [redacted] which resulted in improvements to the [redacted] These are described in detail in the mechanical engineering assessment section of this report).

- Documentation that details a clear longer-term plan to manage and reduce the risks within a period that is as short as is reasonably practicable.

(note from AWE(B) NII site inspector; linked to the LI issued on the basis of this PAR, AWE is to scrutinise and review the project and programme for delivery, installation and commissioning of the [redacted] to identify and recommend all opportunities for reducing the overall programme timescales to a minimum whilst achieving the Requirement. ref.12)

- Documentation that demonstrates that, during any period in which the risk is elevated from a seismic event, risks are controlled ALARP. This should include a demonstration that the period of elevated risk is as short as reasonably practicable, which may need to be reflected in the operating instructions.

(note from AWE(B) NII site inspector, all nuclear significant operations in [redacted] are supervised by a DAP. These operations are undertaken within appropriate timescales, such that the risks are suitably managed. [redacted] and then positioned outside the shadow of the [redacted] Each one is then separately decanted. Once the decanting operation has commenced the process will be followed through to conclusion and transfer of the [redacted] This information is included in the [redacted] Building Operational Safety Data Document AWE/BASY/A/97/BOSD/[redacted]/015 (ref.5 Section 5)).

- Documentation that demonstrates that all reasonably practicable steps have been taken to eliminate or mitigate a radiological hazard.

(note from AWE(B) NII site inspector, AWE has responded to queries on this issue by the NII specialist PSA/fault studies reviewer as follows (ref.5):

Generally: An explosive event in [redacted] is not explicitly listed in the Licensed Site Facilities Emergency Response Plan as a reasonably foreseeable event. However, the plan and the arrangements therein are extendable to a number of the incident scenarios identified as part of the risk assessment work for [redacted] These arrangements would include establishment of the Zone Control Point, deployment of various emergency response teams, and establishment of contamination control barriers. The annualised risk calculated is such that he would not expect the emergency plan to address this fault explicitly.

Seismic: In the event of a [redacted] within [redacted] the Licensed Site facility would be limited in its ability to respond. The Burghfield Emergency Controller would initiate the 'Off-Site Plan' and call a 'Weapon Accident', which would call up national arrangements for dealing with a major nuclear accident.

The AWE(B) NII site inspector and the PSA/fault studies assessor conclude that these responses are appropriate and can be considered to address the issues. The PSA/Fault Studies assessor, on the basis of his report, has no known reason in his discipline area to object to the issue of a further LI.

Civil Engineering Assessment (ref.7)

The SD required the preparation of a programme of regular inspections of the following structures to ensure continuing fitness for purpose: [redacted] any other operational areas highlighted by the new risk assessment and the Introduction of an Operating Rule, or other suitable arrangement, to ensure that operations are not undertaken within [redacted] Evaluation of risk associated with unit occupancy in such conditions. This would consider [redacted]

The licensee has prepared a procedure for carrying out inspections of civil engineering structures which is based on the NII Line to take and provided as advice to AWE. The procedure sets out an inspection regime based on a tiered approach. More frequent inspections are carried out by Facility Managers and less frequent, or special inspections, are carried out by Chartered Civil or Structural Engineers. The system is based on comprehensive checklists and these have been prepared by Chartered Civil Engineers. The checklist system also provides a means of keeping records. Following the inspections all records are reviewed by Facility Engineering staff who implement recommendations for further inspection or remedial works. All recorded inspections, which include those carried out weekly by the Building Manager upto and including 5 yearly inspections, are recorded on Datastream (the AMS recording system). The Building Inspection Log provides a record of

the current building status. This includes photographs and records of defects, remedial works etc.

The weekly inspections programme is due to start in November. Building and Facility Managers have had, or are undergoing, training. It expected that inspection of the Loading Bay and Newer Gravel Gerties will be in place by end November 2006, with the remainder of the main buildings by end Jan 2007.

Information provided at a preliminary meeting in October 2006 has been used by the assessor who also attended a progress meeting at site on 9 November and received a presentation of progress followed up by verbal technical discussion. From this it is considered that adequate progress has been made to comply with the requirements of the SD in respect of the inspection of civil engineering structures.

The SD also required the Introduction of an Operating Rule, or other suitable arrangement, to ensure that operations are not undertaken within [redacted] The [redacted] has previously been identified as having a [redacted] During the progress meeting on 9 November 2006, a verbal update on assessment of the structure was provided and this was followed up by a short technical discussion. The calculations have not been reviewed, observations and recommendations are based on the meeting and discussion on 9 November.

The licensee has carried out a set of calculations for the structural elements to establish the [redacted] for the structural withstand based on the capacity of the structural elements. The calculations work back from the section capacity applying all code material and load factors to establish the [redacted] This is reported as [redacted] The licensee has recognised that it may be possible to raise this value by refining the calculations on the limiting elements. However this work is still under consideration and the assessor was advised that the calculated [redacted] will be used in developing the operating rule or other suitable arrangements. [redacted] is appropriate for use in developing the operating rule on the basis that the calculations have been carried out and checked in accordance with the AWE procedures and that a suitably conservative approach has been used. The calculations are based on code requirements and no attempt has been made to remove conservatisms in the calculations at this stage although it is possible that the licensee may wish to carry out a refinement of the calculations with a view to increasing the [redacted] as part of the PSA/Fault Studies review, considers the unmodified arrangements to control work in the [redacted] to be inadequate. Issues surrounding the specification of appropriate [redacted] to be used for operational purposes have been considered. NII expectations for are set out in the civil engineering assessment report.

AWE will develop an adequate operational strategy for the use of facilities at Burghfield [redacted]. Prior to this the use of [redacted] for nuclear operations will be restricted to those periods when the [redacted] (measured or predicted, whichever is the most onerous) for the duration of operations is [redacted]. On this basis the NII assessor is content that the SD requirement is satisfied for this LI.

The LI requests a permission to [redacted] into the [redacted] This includes transit along the corridor system. Issues relating to the maintenance and inspection of civil engineering structures include these buildings with the previous comments above being relevant.

The licensee's assessment of the corridors has not been reviewed. However, the licensee's assessment of the [redacted] building which is contained in a Design Assessment Report (DAR) has been reviewed as part of the civil engineering assessment. Detailed assessment calculations have not been reviewed at this stage.

There are a number of identified shortfalls for the [redacted] building. It is recognised that there are NII queries, not yet raised with AWE, relating to the assessment of the [redacted] building. Normally, NII would require that queries are answered satisfactorily prior to issue of a licence instrument, however, in this case the assessor has taken account of:

The fact that there are other units already [redacted] in the [redacted] building, NII has allowed the use of this building for a considerable time and there has been insufficient time to establish sufficient facts to support preventing use of the facility. On that basis the assessor reported that there is no reason to prevent use of the [redacted] facility.

Mechanical Engineering Assessment (ref.8)

This assessment has primarily been produced to report on the progress being achieved against the deliverables contained in ref. 2 requiring the improvement of maintenance and inspection activities to ensure that all reasonably practical improvements in the operation, testing and inspection of all lifting and handling equipment in the short term have been made.

AWE has made considerable progress in developing these procedures and in addition has developed some engineering modifications in the [redacted]

Unfortunately, AWE has been unable to complete the full programme of work across the complete facility and adequately document all the procedures and records. AWE has however undertaken significant work on the [redacted] and in the licence application ref.4 confirmed that prior to the next [redacted] the following actions will have been completed.

- AWE will have implemented an improved inspection regime that adequately reflects any reliability claims made in its the new risk assessment and have documented the results.

- AWE will have satisfactorily commissioned the Technical Safety Improvements (Short Term) Reference DMP/GG/LL 19805002.

- AWE will have tested immediately prior to use all control equipment on [redacted] including brakes and emergency stops and isolators.

- AWE will ensure that the work will be undertaken by suitably SQEP personnel.

Based on the above the assessor is satisfied in respect of the [redacted] that AWE has considerably improved its approach to inspection and testing from those previously used, albeit some records and procedures are yet to be completed, and therefore meets the SD requirement in this area.

It is noted that much of the documentation associated with the [redacted] work is currently at draft stage and has yet to be finalised. However, AWE has already undertaken to fully document its new procedures in all these facilities by January 2007 ref.7.

It should be noted that whilst the current programme of work considerably enhances the maintenance and inspection work on the existing [redacted] in the short term, it does not remove any major shortfalls identified in the PRS where the ALARP review has already identified a requirement for remedial work or replacement. For example, issues related to the [redacted] paths integrity and the [redacted] seismic capability will remain unaddressed until this equipment is replaced.

As indicated in the assessors previous assessment report NSD DIV 3 AR No. 24/06 Status of Safety Case any decisions to agree to continue with these operations should only be taken in the full knowledge of the existence of the shortfalls, the potential outcome and with the full agreement of the MoD regulator, who should confirm the requirement for and the importance of such operations. The number of any such operations should be strictly limited. A judgement therefore regarding the tolerability of these operations and the MoD's necessity for such operations should be taken.

The above report relates to the [redacted] and does not address the supporting building structures that have been addressed separately in the civil engineering assessment.

Whilst there has been considerable work on the [redacted] the progress in other areas against the requirements of the SD appeared limited with only a brief mention of the [redacted] inspections. AWE was already aware of the assessor's concerns regarding the potential failure modes of the screw jacks. AWE indicated that this issue had been raised and addressed some years ago and appropriate procedures for inspection had been introduced. It also

indicated that the screws were subject to routine grease lubrication. Given the more likely passive failure of these [redacted] believe this is an issue that can be assessed at a later stage.

Additionally AWE was required to evaluate the possible use of shock-absorbing materials beneath sensitive handling operations that could minimise the shock loads following mechanical failure. The assessment concludes that AWE have investigated the use of shock absorbing materials and there are no immediate measures that could be taken to significantly mitigate any of the hazards from these operations in the short term. This aspect of SD is considered completed by NII.

Deliverable not addressed in the above Assessments

The SD requirement to ensure that arrangements are in place to ensure that [redacted] during periods of operation is adequately covered by the [redacted] BOSDD which [redacted] to be [redacted] at any time ref. 5 (Section 5). Operations within the [redacted] area are controlled by a DAP at all times during [redacted]. On this basis the SD requirement is satisfied.

With regard to the demonstration why the replacement [redacted] by an alternative lifting system is satisfactorily dealt with the outcome of the AWE reviewwhich is to take place on 4 December 2006 ref 7. Ref 7 is linked to the request for LI document at ref.4.

CONCLUSIONS

AWE has utilised an adequate process in developing the interim Risk Assessment of the [redacted]. Fault trees have been used for some of the [redacted] faults and a number of improvements have been made to the [redacted] such as an [redacted] and improved maintenance and testing, which provide evidence that a genuine ALARP process has taken place. AWE's work indicates that the public and worker risk are below the BSO. NII's comments from its assessment on Time-at-Risk have been addressed satisfactorily.

Significant progress has been made in the specification and introduction of inspection and test programmes for [redacted] and [redacted] areas for both mechanical devices and civil structures.

The NII assessment concludes that adequate progress has been made to comply with the requirements of the SD in respect of the inspection of civil engineering structures. With respect to the control of operations in [redacted] AWE will develop an adequate operational strategy for the use of facilities at Burghfield in [redacted]. Prior to this the use of [redacted] for nuclear operations will be restricted to those periods when the [redacted] (measured or predicted, whichever is the most onerous) for the duration of operations is [redacted] or less. On this basis the NII assessor is content that the SD requirement has been met for this [redacted]

With respect to mechanical engineering AWE has made considerable progress in developing these procedures and in addition has developed some engineering modifications in the [redacted] AWE has not been able to complete the full programme of work across the whole facility, however, AWE has undertaken significant work on the [redacted] and the extent of the full inspection programme has been defined.

The possible use of shock-absorbing materials has been considered beneath sensitive handling operations that could minimise the shock loads following mechanical failure. AWE has investigated the use of shock absorbing materials and there are no immediate measures that could be taken to significantly mitigate any of the hazards from these operations in the short term. This aspect of SD is considered completed by NII.

The SD requirement to ensure that arrangements are in place to ensure that [redacted] during periods of operation is adequately covered by the [redacted] BOSDD which [redacted] at any time ref. 5 (Section 5). Operations within the [redacted] area are controlled by a DAP at all times during [redacted]

On the basis of the above it is considered that adequate progress has been made regarding the elements of the SD that impact on inloading.

RECOMMENDATIONS

It is recommended that:

NII should issue Licence Instrument [redacted] agreeing to the [redacted] of [redacted]

NII should not issue further Licence Instruments until AWE meets all the requirements of the Schedule of Deliverables ref.2

NII should not issue a further LI for additional [redacted] unless AWE meets the requirements in the licensee's letter requesting LI [redacted] (ref.4)

REFERENCES

1. AWE letter requesting LI Ref. EDMS1/800DC0EB/LS/N0400 dated [redacted]
2. Schedule of Deliverables Ref. EDMS1/800DEA78/B/LS/SC0101 Issue 1, dated 18 August 2006.
3. Letter DNSR/13/08 dated 10 November 2006 to NII. AWE Burghfield Future License Instruments – Use of [redacted]
4. AWE letter requesting LI Ref. EDMS1/800EE452/B/LS/N0400 dated [redacted]
5. AWE 'Evidence File' DMC LS File No. N0701
6. PSA/Fault Studies Aspects [redacted] dated 14 November 2006.
7. AWE letter Ref. EDMS1/800EEA50/B/LS/N0400 dated [redacted] Licence Instrument Schedule of Deliverables
8. NSD DIV 3 AR No.31/06 Dated [redacted] Licence Instrument Assessment Report (Civil Engineering) Nov 2006.
9. NSD DIV 3 AR No. 32/06 Dated [redacted] Status of Deliverables Associated with LI [redacted]