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AWE Proposal for TP1 for the Implementation of the Nuclear Warhead Capability Sustainment Programme

VOLUME 1

AWE Programme Plan

[redacted]

AMENDMENT RECORD

Amendment Number	Date Issued	Amended by (signature)	Pages Affected
Draft 0.01	19/12/06	[redacted]	Full Revision
Issue 1.0	27/04/07	[redacted]	Full Revision

Originated by: [redacted] Date: 27/04/07

Approved by: R A Fletcher Date: 27/04/07

DISTRIBUTION

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CONTENTS

EXECUTIVE SUMMARY

1. The Nuclear Warhead Capability Sustainment Programme (NWCSP) provides AWE's response to MoD's requirements to maintain confidence in the continuity of the UK's nuclear deterrent, the key elements of which are summarised below:

   - Strengthen the UK's capability to underpin the safety and performance of the nuclear warhead stockpile.
   - [redacted]
   - [redacted]

2. This volume, and the associated Annexes, presents the programme information supporting the NWCSP. The Commercial volume (volume 2) of the submission details the costing, financial, confidence modelling, risks, assumptions and other finance related data.

3. This programme plan builds on the joint MoD and AWE re-baselining of the programme that concluded on 29 August 2006. This re-baselining enabled the re-alignment of the programme to focus on those capabilities required to protect the [redacted] recommended in the Warhead Options Study: [redacted] This re-alignment took advantage of an improved understanding of the programme interdependencies and risks and embodied planned benefits of projects underway to transform the way AWE operates and delivers its programmes. These, together with the implications of the Warhead Options Study, enabled an £860m reduction in cost over the period 2009 to [redacted] whilst continuing to deliver the programme requirements.

4. The next phase of the programme to [redacted] contains a number of key deliverables critical to achieving the overall programme objectives:

   - confirmation of the ability of the Trident warhead to achieve a [redacted] year life, with critical analysis of the confidence to underwrite longer [redacted] year life;
   - provision of a capability to [redacted] Trident warheads per year, if required;
   - delivery of the approval submission for the introduction of the Mk4A changes into service;
   - demonstration of a successor design capability to [redacted] and

- provision of key evidence to support an Initial Gate decision for the warhead in 2010.

5. In August 2006 cost modelling was undertaken to determine the affordable baseline of **£4.84Bn** for the period 1 April 2008 to 31 March 2013. Utilising this model for TP1, the programme costs remain at **£4.84Bn**, but exclude the Hydrus cost increases.

6. Utilising the same model, the baseline costs in August 2006 for the period 1 April 2008 to 31 March 2025 were [redacted] For TP1, the comparable costs are [redacted] excluding the Hydrus cost increases.

7. Compared with the August baseline assumptions, the revised Hydrus position is that the costs are unaffordable and the project is delivering late against the required schedule. On this basis AWE intends to engage urgently with stakeholders to agree a minimum set of requirements with the aim of driving both cost and schedule back to that set out in the August baseline. This is a high priority task for AWE that will deliver its recommendations by end-May.

8. In addition to Hydrus a number of key issues remain within the programme to which AWE is committed to working with MoD to achieve resolution including:

   - the resolution of Contract Year 9 affordability issues which will be incorporated into the AWE management challenge;
   - continued scrutiny of the programme and business change activities to ensure demonstrable value for money in delivery of the minimum necessary programme;
   - development of [redacted] arrangements that provide maximum overall benefit to the UK programme;
   - resolution of issues within the availability of hydrodynamic trials facilities that currently put achievement of the [redacted] date in [redacted] at risk;
   - The implication of the fallback plan if the [redacted] is not achieved.

9. AWE will work to build on the partnering platform developed so far to ensure the continued success of the programme, in particular: joint development of contract arrangements; support to the production of the Investment Appraisal Board (IAB) business case submission due in the autumn and the continued joint management of risks.

10. This summary report is supported by a wealth of detailed plans which will be used to continue to manage the ongoing delivery and maintain configuration control of the programme.

INTRODUCTION

1. This proposal together with volume two and their associated annexes are AWE's response to the Incentivised Milestone TP1 (issue 3.05)[1] to develop a single costed plan covering the period 1 April 2007 to 31 March 2025. The documentation addresses the scope of the milestone but, as required by MoD, specifically excludes those items identified in the "caveats and exclusions" of the Milestone description, for example closure costs. The plans presented here for the period 1 April 2008 to 31 March 2013 will form the basis for the discussions on the pricing for the next phase of the contract.

2. Since the agreement of the programme baseline with NWIPT on 29 August 2006, AWE has continued to refine and develop its view of the forward programme. The most significant change in planning the programme has been the use of the modified work breakdown structure (WBS). The revised WBS better reflects the project and programme nature of the work undertaken and facilitates better management of the work, when compared with the previous WBS which was more aligned along organisational lines. This submission represents AWE's current view of the programme agreed at the August 2006 Baseline review. In moving the programme to the new WBS, AWE has taken every effort to ensure that the affordability agreed in August has not been compromised and that the overall size and shape of the programme has remained unaltered. As a result of these activities, AWE has high confidence that the programme presented here matches closely that presented in August 2006.

3. Another major planning change since the August Baseline is the assessment of staffing requirements. In August the bottom-up assessment of staffing requirement did not take account of the anticipated benefits of the change programme, for example projects Unite and Connect. In August therefore, corporate top-down staffing numbers were applied to the plans and associated costs. These numbers were, however, not driven down into the individual projects. In the plan presented in this proposal full recognition of the change programme and the Strategic Manpower Plan has been made. Significant efforts have been made to match the staffing requests of the demanding projects with the capabilities of those supplying organisations. While a total staffing balance has not been achieved in the plan, the imbalance is significantly less than has been achieved previously and will be managed as part of normal business.

4. Since the August Baseline, a number of changes to projects have been agreed using the AWE Change Management process and these have been incorporated into the latest plans. NWIPT has been informed of these changes to the programme and, in addition, they are listed as part of this

submission. As well as these changes AWE has continued to show the MK4A UA procurement cost at the levels included in the August 2006 Baseline. As agreed with NWIPT, TP1 identified the [redacted] US expenditure e.g. PALDs and NIF, but these costs are excluded from the TP1 cost summary.

5. The programme presented in this plan meets MoD's requirements, as described in version 2.1 of the System Requirements Document (SRD)[(2)], to:

   - continue to underwrite the Trident warhead;
   - deliver the [redacted] readiness programme while simultaneously protecting a [redacted] should this be required;
   - uplift the sites' infrastructure.

6. However, the programme does not include any potential [redacted] activities.

7. This volume of the proposal consists of a Programme Plan and the following detailed Annexes:

   - Annex A - Compliance Matrix
   - Annex B - SRD Compliance report Issue 5.0 and TP1 Addendum
   - Annex C – Approach to [redacted] and the Role of [redacted]
   - Annex D - [redacted] considerations
   - Annex E - Level 2/3 schedule and Critical Activities List
   - Annex F – Matrix Mapping from the New WBS to the Previous Structure
   - Annex G - A summary of changes between April 2007 and August 2006
   - Annex H - The Capability Curve and Rationale
   - Annex I - The Manpower Staffing plan
   - Annex J – The Aldermaston and Burghfield Nuclear and Explosives Safety Programme

8. The planning for this proposal was undertaken using the data capture tool (DCT) which was the extant corporate planning tool when the data were being generated. However, from 2 April 2007, AWE implemented its major change programme, project Unite, which uses a [redacted] Since the generation of the plans in the DCT the AWE planning teams have been working directly with the members of the Unite project team to ensure that the plans reflected in the DCT have been transferred into [redacted] key

dates and cost profiles have been maintained. NWIPT can therefore be reassured that the plan presented in this submission mirrors that being worked to and managed against in project Unite.

9. When transferring the plans from the DCT to [redacted] the higher level plans, costs and timescales have been maintained and protected. However, some individual project costs differ from those presented here because of the method of allocating and collecting costs in project Unite. These differences will not compromise the plans and overall will have a negligible impact. AWE is proposing to accommodate these minor changes with a global change note once they have been clearly identified. AWE will discuss this change with NWIPT.

10. In generating this plan a number of issues have been identified. The most significant of these are the 'overheat' in the plans in contract year nine (CY9) (2008/09) when compared with NWIPT affordability and the proposals for the Hydrus project, which has undergone a major change in approach recently. These issues are discussed in detail as part of the Key Risks, Issues and Opportunities section.

11. Director Nuclear Weapons (DNW) has written to AWE [3] identifying those issues he wishes to be answered in the TP1 documentation. Annex A is a Compliance Matrix detailing how the issues have been addressed.

12. The outline content of this proposal, as required by the Incentivised Milestone documents, was presented to and discussed with the NWIPT in December 2006 to help ensure its contents meet MoD's requirements. Since December further discussions have been held between NWIPT and AWE to address specific issues and the progress of TP1 generally. AWE will continue to support MoD in the generation of its Business Case and any other documentation associated with AWE's programme.

13. There are two underlying management activities that are seen as important to the success of the programme. AWE intends to ensure that these form part of all activities. These are:

    - Continued development of the close partnering relationship between MoD, AWE and other stakeholders to ensure that MoD is kept informed of all programme developments helping to maintain the "no surprises" culture.
    - The proposed programme continues to support and satisfy MoD's operational, technical and affordability requirements.

PROGRAMME RATIONALE

Introduction

14. In October 2002, the MoD's Chief Scientific Advisor (CSA) concluded a study into the UK's nuclear warhead capability[4] with the following recommendations:

    - *"The stockpile stewardship programme should be strengthened to maximise our ability in advance and develop solutions to problems that might undermine the safety and reliability of the stockpile."*
    - *"We should safeguard our ability to manufacture as-new Trident warheads, the ultimate guarantee of our ability to retain the current warheads in-service, throughout the lifetime of the whole system."*
    - *"We should also* [redacted] *SDR requirement to retain the capability to design and manufacture a successor warhead."*

15. A programme and associated business case[5] embodying these recommendations was approved by the Defence Management Board (Nuclear) (DMB(N)) in June 2003. Whilst subsequent MoD business cases have dealt with desired refinements to the programme and the endorsement of funding provision and contracting arrangements, the programme remains fundamentally based on the original recommendations made in CSA's report of October 2002.

16. The NWCSP was placed under contract with AWE effective from 1 April 2005 for an initial three year priced period. Over this timeframe, the programme has been delivered to time and cost providing MoD with assurance in the recovery and retention of key capabilities necessary to deliver the programme requirements embodied in the SRD.

17. Over this initial period, the programme has accrued further benefits that provide increased confidence in the forward programme. AWE has been able to support MoD in developing an improved understanding of key programme risks and implementing action for their effective mitigation. One specific example is the investment already undertaken to build confidence in the design, cost and timing of major capital investments.

18. In April 2006, MoD selected the [redacted] the capability for which was to be protected through the NWCSP. This clarification was provided through the Warhead Options Paper[6] and was subsequently embodied in the SRD.

19. In addition to supporting Trident and [redacted] the NWCSP provides the UK with a National Nuclear Security capability to:

    - support the UK intelligence communities in nuclear matters;
    - enable the UK to fulfil its obligations in monitoring the Comprehensive Test Ban Treaty (CTBT);
    - conduct research into arms control verification techniques;
    - respond to weapon accidents and nuclear terrorist threats.

Provenance and Utility of the SRD and Compliance

SRD Provenance

20. Since August 2004, AWE and NWIPT have jointly developed the SRD that forms part of the AWE Management and Operations (M&O) contract. This document defines the scope of the MoD customer needs and has provided valuable support to define fully the AWE capabilities required to satisfy the User Requirements Document (URD). The SRD provides the definitive statement of what NWIPT requires to be done and the agreed acceptance criteria defining what AWE has to do to demonstrate that each requirement has been verified. The aim is to ensure that all MoD requirements are being addressed and that all work conducted by AWE supports the fulfillment of these requirements. The level of detail within the SRD is such that the NWIPT has adequate confidence that all key aspects, including associated measurements of performance, are addressed.

21. Requirements management provides a methodology that will help to ensure that all work undertaken in support of NWCSP can be directly linked to the MoD URD. Conversely it helps ensure that work is not undertaken if it cannot be linked to the MoD URD. The approach will also provide valuable support towards the production of the SRD/Technical Specification.

Compliance Report

22. The purpose of the Compliance report is to develop Customer confidence that AWE is delivering the SRD requirements and will continue to do so. The current Compliance report (Annex B) provides, for each requirement, a compliance statement supported by any issues that may affect current or future compliance. Work is currently underway to align verification details to the report that will enable AWE to log and report tangible evidence of success. Compliance reports are produced on a quarterly basis; every report is approved by both NWIPT and the AWE Functional Owners and is endorsed by the AWE Executive Board.

23. A key element of AWE's compliance management activities is to continue to demonstrate that AWE can achieve ongoing cost reductions and efficiencies while continuing to meet the requirements of the SRD.

24. Currently, a total of 370 requirements are expressed within the SRD and at present AWE is compliant with all but three of these requirements. This reflects the commitment and priority the company places on satisfying our customer's needs. Full details of compliance reporting can be found in the latest version of the SRD Compliance Report in Annex B.

Overall Programme Rationale

25. The programme, independent of which [redacted] delivers a combination of:

    - in Service Support to reduce the risk of a premature withdrawal of the Trident warhead from service;
    - a capability programme to deliver a successor warhead should one be required by the Government.

26. Both of these are very closely interlinked and support the same underlying capability.

27. Support for the In Service warhead is focused around the confidence in predicting future Trident warhead lifetimes through continued surveillance and supporting programmes and in demonstrating a future capability to rebuild the stockpile. A capability to produce [redacted] will be provided. The demonstration [redacted]

28. The readiness programme is focused on demonstrating, under CTBT constraints, the capabilities for the necessary support to [redacted] and the ability to [redacted] are described in greater detail below.

Trident

29. The objective of the Trident warhead part of the programme is to position AWE to maintain the current Trident warhead design in service. In order to achieve this the programme will provide:

- an increased understanding and early warning of the effect of changes to the warheads, including ageing, on safety and performance to achieve confidence, [redacted]
- [redacted]
- [redacted]
- refurbishment of all stockpile warheads to incorporate [redacted] component changes [redacted] programme has been developed, with MoD advice, to reflect the most likely programme to be undertaken.

[redacted]

30. The objective of the [redacted] element of the programme is to provide a [redacted] In the short-term the capability will support [redacted] of the Warhead Options Paper[6]. In order to achieve this, the programme will provide capabilities that enable AWE to:

    - undertake the Coordinating Design Authority role for a [redacted]
    - demonstrate a [redacted] warhead design to [redacted] under CTBT constraints consistent with the potential to carry that design through to an [redacted]

31. AWE has assumed that the [redacted] which is currently separately funded will be incorporated into the AWE programme of work to continue the development of AWE's System Integration capability.

32. The above objectives are described in the Figure 1 below.

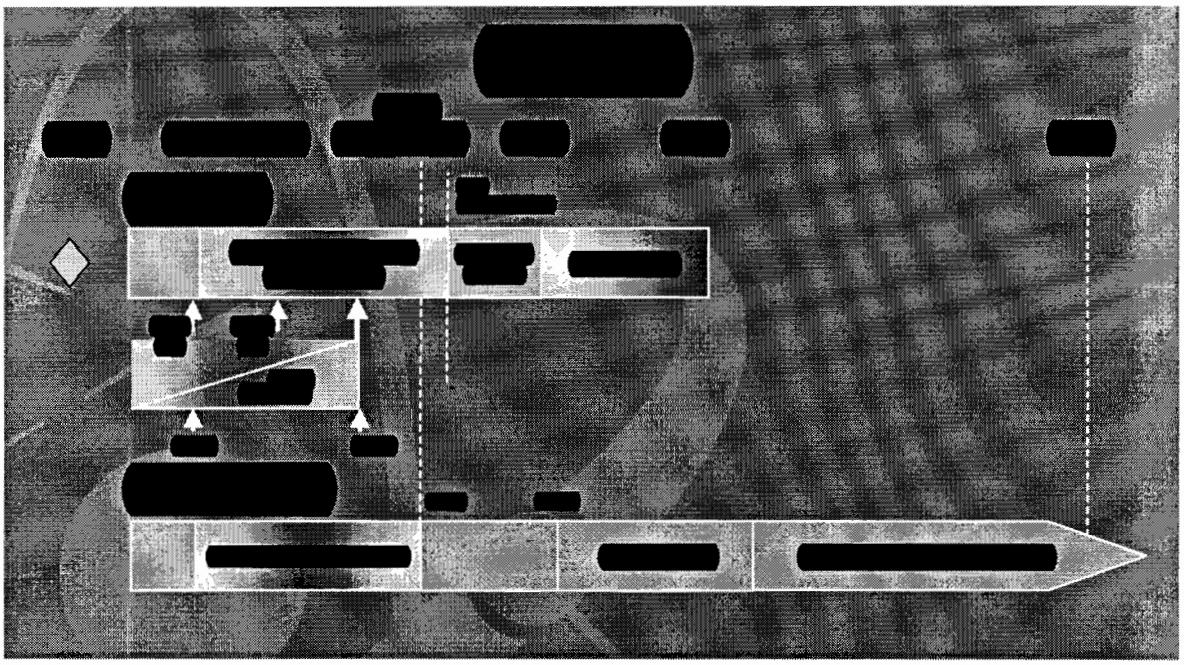


Figure 1: Trident and Readiness timelines

Future Warhead Options

33. In April 2006 MoD, supported by AWE, concluded a study into [redacted] This study reviewed [redacted]

34. The conclusions of this study were endorsed and the capability implications embodied into the NWCSP SRD. Fundamentally the conclusions were:

    - [redacted]
    - [redacted] provide best value approach for risk.
    - An integrated programme combining the benefits of both [redacted] provides best risk reduction for no additional costs prior to Initial Gate (IG) in c.2010.
    - A separate [redacted] will be initiated that AWE will support but which is not included in the NWCSP.

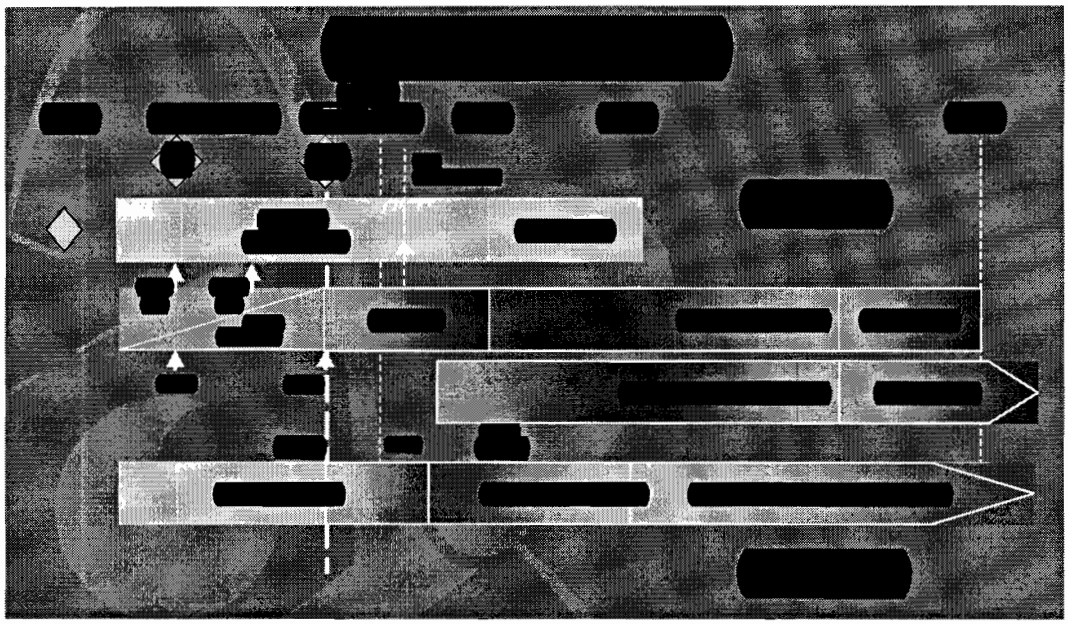


Figure 2: [redacted]

35. AWE has therefore been charged with preserving [redacted] while protecting the ability to [redacted] should this be required.

36. Detail of [redacted] are provided below:

[redacted]

37. [redacted]

[redacted]

[redacted] **Trident Warhead Portfolio**

38. [redacted] assumes a [redacted] out of service date (OSD) for the current In-Service warheads. In this case, [redacted] An extensive materials ageing programme must underpin this, together with a strategy for the [redacted] and modelling. A statement has been generated by AWE in 2007 on the confidence of achieving a [redacted] A further statement on [redacted] will be provided in [redacted]

39. AWE will demonstrate its [redacted] necessary to minimise the age of warheads in the stockpile and to support known [redacted] for the submarine programme for a [redacted] OSD. AWE will be [redacted]

40. In order to support the component life prediction work, AWE will conduct the active stockpile science and surveillance programme already notified to MoD.

[redacted]

41. The [redacted] Trident warhead portfolio will use planning dates of [redacted] for the retirement of the current Ship Submersible Ballistic Nuclear (SSBN) fleet. Continuous At Sea Deterrence (CASD) is to be achieved through the [redacted] the capabilities for which have been delivered through the [redacted] Technology Demonstration Programme, Technical Demonstrator Programme (TDP) [redacted]

42. The SRD calls for [redacted] of the [redacted] This will need a maturity level of [redacted] Annex C examines the feasibility of achieving this by [redacted] through improved model based processes so that a [redacted] becomes possible. [redacted]

[redacted] The [redacted] on TDP [redacted] and must be compliant with the [redacted] enduring expertise at AWE to provide necessary UK assurance of safety and reliability.

43. [redacted]

44. The programme will seek to maximise benefits of [redacted] The development of a systems approach to through life management will ensure system interfaces, technology insertion, engineering, materials and manufacture methods are linked with certification and verification methodologies.

45. The TDP [redacted] programme will position AWE as the [redacted]

46. Establishment of programme management methods in anticipation of a 2010 decision, together with establishment of Design Authority (DA) capabilities will be a major thrust within the [redacted] portfolio.

47. Although the short-term focus will be for a [redacted] for TDP [redacted] the SRD requirement is not to [redacted] for possible future generations of successor warheads. The programme will also demonstrate [redacted] which incorporate advanced [redacted] (e.g. through [redacted] TDP [redacted] will offer [redacted] advantages through [redacted] on the UK [redacted] and [redacted] with a range of [redacted]

48. The TDP [redacted] programmes alone are insufficient to maintain the AWE science and technology base. The Future Technologies programme will address deterrent concepts, warhead concepts, innovation and creativity, underpinning capability development, manufacture methods and process development, shorter product lifecycles, enhanced certification techniques,

and continued staff development in warhead technology and systems engineering. The study of advanced and innovative science and technology will be supported through the AWE Technical Innovation Fund (ATIF).

49. Funding for the NWCSP does not include that which would be necessary to pursue [redacted] as a project.

[redacted]

50. Pursuing the capability to deliver [redacted] also protects the ability to deliver [redacted] which assumes that Trident will remain in service until [redacted] During this time [redacted] to [redacted] which will incorporate the [redacted] identified in [redacted] The detailed design of a [redacted]

[redacted] **Trident Warhead Portfolio**

51. [redacted] requires Trident [redacted] RBAs to remain in service until [redacted] and is dependent upon the assumption that that the Trident [redacted] can be retained until [redacted] This will be achieved through maintenance, including incorporation of the [redacted] and through a phased [redacted] closely linked to the missile (and submarine) assumptions to ensure continuous at sea deterrence (CASD).

52. AWE will re-certify the [redacted] through CTBT methodologies. AWE plans to complete the rebuild through a programme commencing in [redacted] and completing in [redacted] AWE is assuming that [redacted]

53. To keep Trident warheads in service until [redacted] AWE will invest in existing and new facilities to:

- provide the capability to deal with [redacted]
- make those components for the Trident warhead that were previously manufactured in the UK;
- ensure the safety and performance of the Trident warhead in service;
- respond to any systems changes through life.

54. [redacted]

[redacted] Portfolio

55. [redacted]

56. [redacted]

57. AWE will maintain a continuing successor readiness capability to [redacted] to ensure the [redacted] project start can be realised with viable warhead design options for a replacement ballistic vehicle.

58. The design considerations and science programmes described under the [redacted] portfolio under [redacted] will also be essential for [redacted] and they will be maintained.

59. Funding for the [redacted] (other than [redacted] is not included nor is funding for any new warhead project.

Impact of [redacted] on the NWCSP

60. The central feature of Project Option 2b is the [redacted] if, for example, [redacted] It assumes that the [redacted] under such circumstances. Close collaboration between [redacted] is also essential to avoid the costs of a [redacted]

61. The NWCSP currently excludes any implications that the pursuit of [redacted] could have on cost, schedule or risk. Whilst the NWCSP provides sufficient capability to act as a CDA for [redacted] and to participate in [redacted] it does not provide an ability to take [redacted] or the ability to [redacted]

62. The Warhead Options Study estimated the cost to implement projec[redacted] at about an additional [redacted] The additional [redacted] compared to [redacted] comprised:

    - [redacted] for additional development;
    - [redacted] for additional qualification, including specialist component testing facilities, such as an [redacted]
    - [redacted] for setting up the necessary manufacturing facilities, some of which would be with UK industry.

    The Study noted that there might be higher programmatic risk than for [redacted] and, [redacted] for the [redacted] to project timescales. It assumed that the UK-manufactured [redacted] would be required if that assumption proved to be invalid, with very significant cost and risk implications: no allowance has been made for this eventuality.

63. [redacted] would provide some protection for the UK should [redacted] might also militate against cost increases through [redacted] for example [redacted]

Initial Gate Decision Factors

64. AWE has designed the programme in order to provide the ability to support MoD decisions at Initial Gate (IG) and Main Gate (MG) alongside other non-NWCSP controlled factors, such as the status and intent of the [redacted] programme.

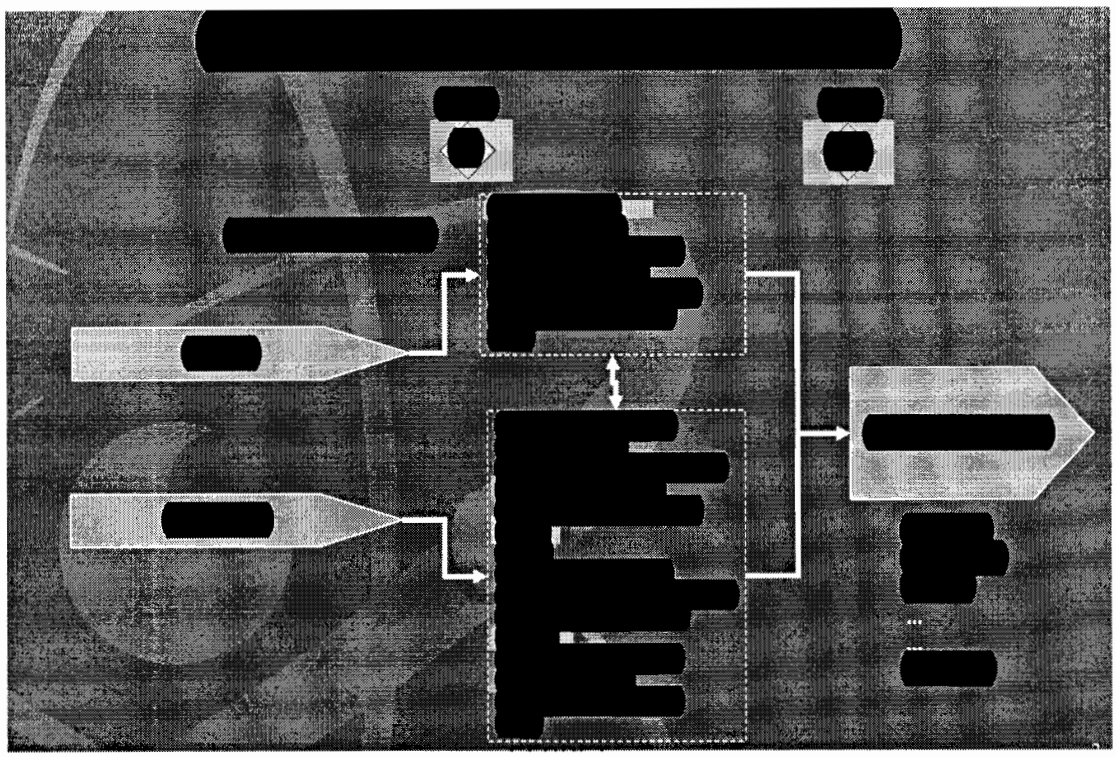


Figure 3: AWE supplied information (yellow) to support MoD Initial and Main Gate submissions

65. Figure 3 shows, in yellow, those items that AWE believes MoD requires inputs from AWE to support Initial or Main Gate decisions for IG in 2010, AWE will provide MoD with the following key inputs:

- ***confidence in Trident warhead life*** – this will determine the need to initiate a rebuild or withdrawal;
- [redacted]
- ***warhead changes*** – confidence in the implications of planned changes to Trident on meeting longer term deterrent needs;
- ***collaboration*** – the ability and willingness of the [redacted]
- [redacted] ***availability*** – confidence that a supply of qualified [redacted] can be achieved;
- ***capability development*** – programme progress and confidence will determine readiness to [redacted]

- ***UK industry capability*** – the ability of UK industry to support the programme in the timeframe needed;
- ***cost*** – confidence in the AWE related costs of options.

Programme Plan

66. The programme plan in the form of a level 2/3 Gantt chart is detailed in Annex E to this volume. In the Gantt chart the following principles have been embodied:

- ***Level 0*** – the integrated business plan;
- ***Level 1*** – the Portfolio level representing a collection of programmes that together result in the delivery of a core business objective;
- ***Level 2*** – Programme level representing a co-ordinated set of projects and non-project work which utilise the same resources i.e. people, materials and equipment;
- ***Level 3*** – programme element level-this level describes the usual MoD reporting level. Contained at this level is the work previously defined as programme element and facility projects.

PROGRAMME OUTPUTS

67. A high level view of the key programme outputs, as proposed by AWE are shown in the timescale diagram below. Each item is briefly described in the subsequent paragraphs.

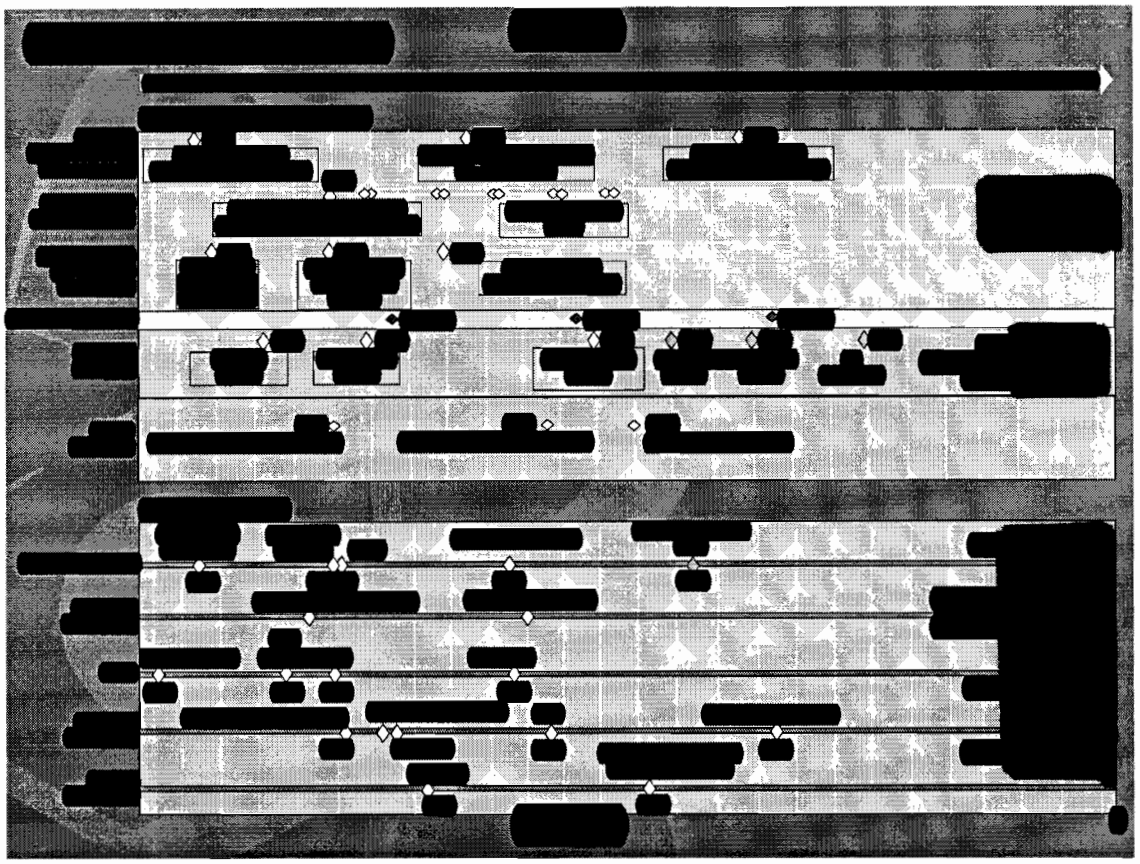


Figure 4: The NWCSP High Level Plan illustrating the key programme outputs

Trident Warhead Protection

68. [redacted] Reviews will report the implications of design changes on the performance and safety of the stockpile.

69. [redacted]

- Stage 1 approval of modified design to incorporate the [redacted]

- By 2010, confirmation of confidence in [redacted] for warheads.
- By [redacted] confirmation of confidence in [redacted] for warheads.
- By 2010, be able to implement a Trident warhead production throughput of [redacted] if required.
- By [redacted] be able to implement a Trident warhead production throughput of [redacted] if required.
- By [redacted] have manufactured [redacted] Trident warheads.

[redacted]

70. [redacted] is as defined in Annex A to the NWCSP business Case dated 27 Feb 2004[8]; namely:

[redacted]

71. The above dates are consistent with an ability to field a successor warhead, should one be required, in the following timeline:

[redacted]

72. The MoD has investigated the benefits, costs and risks for UK warhead [redacted] As detailed previously, [redacted] are held open through the Concept Phase to an Initial Gate decision around 2010. [redacted] and will reduce overall MoD programme risk and cost.

73. The Programme that AWE has developed assumes significant [redacted] and

[redacted] However, NWCSP is a [redacted] and development programme for the warhead and does not include any of the costs associated with a [redacted] Specifically, NWCSP would provide the capability to take a [redacted] Annex C discuss the approaches to address meeting [redacted] with an associated Main Gate in [redacted]

74. [redacted] To this end new Management Arrangements for conducting [redacted] collaborations under the 1958 Agreement have been developed that include the setting up of a new Government-to-Government Second Level Group. These arrangements are due to be considered for approval in the near future.

75. The new Management Arrangements cover three main [redacted]

- [redacted]
- [redacted]
- [redacted]

76. [redacted] The generic, non-system specific nuclear weapon science and technology collaborations will continue along lines of technical discipline as now. The [redacted] proposed by the United Kingdom address three key areas:

- [redacted]
- [redacted]
- [redacted]

77. The specific [redacted] identified are:

- [redacted]

78. Details of the role of [redacted] are provided in Annex C.

CAPABILITY GROWTH

Introduction

79. Key to the successful delivery of the NWCSP is the planned growth in AWE capability. This section:

- outlines the recent significant achievements by AWE and are fundamental to capability growth achievement in the future;
- presents the wider, long-term capability in the future, and the benefits to date;
- outlines the support that the AWEML parent companies will provide to ensure that AWE has the requisite capabilities to deliver the programme successfully.

Recent Achievements

80. [redacted]

81. In support of the confidence in the lifetime of the Trident warheads and the programme drive towards a [redacted] two major achievements have been delivered:

- AWE has [redacted]
- [redacted]

82. Work is also progressing well to deliver the Mk4A refurbishment and this continues to be an excellent example of partnership in practice. The AWE programme manager is leading a co-located joint MoD/AWE team.

83. Progress on the [redacted] programme is evident through the availability of the refurbished plating shop, the [redacted] trials and the excellent progress made on system integration.

84. National nuclear security continues to be a key element of AWE's activities and the responsiveness required to support this has been highlighted by the recent operation Whimbrel.

85. The enabling programmes continue to deliver improvements on the way AWE conducts it business:

- the new AWE Business System went live for the whole business in early April 2007 as planned and will deliver key benefits in the future. These include improved efficiency and better management capabilities;
- the closure of the Pangbourne pipeline and the operation of the award-winning Waste Treatment Plan demonstrate AWE's commitment to environmental improvements;
- the reduction in long term site liabilities has been greater than the investment made, an achievement that has not been delivered elsewhere in the nuclear industry;
- risk reduction activities continue to be undertaken to help protect programme deliverables;
- AWE and MoD have worked together to generate an affordable baseline in August 2006 and the integration of the approvals activities, including MoD representation at PRB meetings have yielded significant confidence and momentum benefits.

86. These achievements are summarised in Table 1. There are many opportunities for further achievement in these and other areas. It is particularly important that AWE and MoD continue to work together in the established close partnering relationship to deliver the changed requirements to satisfy the new scrutiny requirement of the DE&S.

87. In addition to understanding the programme delivered, MoD retains an interest in the programme costs and Table 2 shows the distribution of costs for the period 2005/6 to 2007/08 across the fundamental areas of staffing, facilities, contractor support and materials procurement. Project Orion is identified separately from the other facilities because of the specific contracting arrangements for this facility.

The Benefits of Achievements to Date

Trident Production Protection	Fall Back plan issued [redacted] retention and recovery [redacted] in CY7) & obsolescence remediation Procurement of [redacted] & protection of relevant UK capability
Trident Life Confidence	Life assessment completed [redacted] commissioned & operated Orion construction underway [redacted] 3D parallel yield HPC capability
Implement Trident Changes	[redacted] breakdowns for component recovery Mk4A programme integration Mitigation of timing dependency [redacted]
[redacted] Protection	Systems integration capability Design confidence statements Procurement of [redacted] and successful [redacted] Plating shop [redacted]
Nuclear National Security	Enhanced support to Home Office operations– e.g. Operation Whimbrell Revised flexible and responsive emergency response capability
Enabling	PPL closure & WTP operation Accommodation for 1450 people Site Development & Sustainability Plans issued to LPA Enhanced sites security Cost efficient reduction in long term MoD site liabilities Business systems – *Unite*
Risk reduction	Affordability – programme cost reductions Confidence – facility programme maturity & programme baselining Programme delivery – Jacobs, design houses, change programme, Parent Company support Programme Governance – enhanced project scrutiny, MoD/AWE integrated approvals Regulator – agreed NESP linked to programme

Table 1: Benefits achieved to date by high level category

88. AWE recognises that this programme is challenging and will need to incorporate significant efficiency savings. However AWE is confident in its achievability and its proven track record in delivering the NWCSP over the past three years underpins this confidence.

PROGRAMME COSTS 2005/06 TO 2007/08					
AWE Planned Cost (£M)	[redacted]	[redacted]		[redacted]	**Commentary**
Staffing	[redacted]	[redacted]	[redacted]	[redacted]	Staff increased by 400 staff in 05/06; approximately 320 in 06/07 and 350 in 2007/08 (planned); Recruited over 250 scientists and approximately 550 engineering and manufacturing specialists. Costs have been controlled through baselining salary
Facilities – new build and refurbishment	[redacted]	[redacted]	[redacted]	[redacted]	A45 life extended through re-kit programme: machining operations re-commenced. [redacted] Refurbishments and additional accommodation capacity. Environmental programme progress including new Waste Treatment Plant, sludge cementation and ILW stores modification. Extensive demolition to facilitate future building for example for the new office accommodation and [redacted]
Orion (Separate IAB Approval)	[redacted]	[redacted]	[redacted]	[redacted]	Construction underway
Contractor costs	[redacted]	[redacted]	[redacted]	[redacted]	Extensive support for site services, project and programme management, demolition and facility build and refurbishment Major contracting agencies; Emcor, Jacobs, Costain, Hertel, Zander, Waco, Maclellan, Mittie, Scantec and Steels.
Materials procurement	[redacted]	[redacted]	[redacted]	[redacted]	Improvements to AWE's high performance computing capabilities with the procurement of Larch. Improvements to AWE's supporting IT infrastructure; Central site services; [redacted] A90 re-kit
Total	441	636	730	1808	

Table 2: Programme costs 2005/06 to 2007/08

The Capability Curve

89. While the tables of programme benefits and costs to date help explain how NWCSP funding is being spent and what is being delivered, this format does not provide a coherent view of achievement against a programme capability baseline. This information is supplied by the Capability Curve which has been developed by AWE in conjunction with MoD and produces a combined view of the achievements-to-date and the benefits delivered by the future programme set against a normalised growth in capability.

90. The Capability Curve (Annex H) consists of three curves which are used to demonstrate Trident warhead capability, [redacted] capability and overall NWCSP capability. It provides a strategic view of the programme capability and demonstrates graphically the increased capability that is being delivered by the NWCSP. Currently the curves are generated by a number of key programme indices. To provide a more comprehensive view it is anticipated that the curves will evolve to be more representative of the complete programme.

91. The current Capability Curve and its associated rationale are at Annex H to this volume. The paragraphs below describe the parameters that are used to generate the curves.

92. [redacted]

93. The [redacted] profile is generated from the [redacted] achievement, with the score increasing as each [redacted] point is reached.

94. The Capability profile comprises:

- achievement of the facilities programme – calculated as the percentage of facilities, over time that pass through FEL gates 1, 3 and 5. All facilities have equal weighting to provide an average of capability;
- delivery of the numbers identified in the Strategic Manpower Review.[12] The parameter is calculated against the achievement of the staffing plan of new employees (graduates, professionals, craftsmen, process operators and students/trainees) year-on-year modified by a factor to allow for new recruits to reach full productivity. This parameter is applied until the staffing requirement is satisfied by 2011;
- delivery of the Site Development Plan[13] which is built up from the number of work spaces available, as a percentage of anticipated total; the demolished area available for development as a percentage of the site required; the percentage of resolved areas of environmental concern and a utilities capabilities index;
- an underpinning technology profile which measures progress in AWE's capabilities to deliver [redacted] which is estimated to increase steadily as key parts of the programme are achieved; Trident life issues which are underwritten with data from various aging processes; future design themes as [redacted] are achieved, and engineering technology advancements achieved as a result of the production of complex 3-D models;
- delivery of the manufacturing demand profile which tracks the production and disassembly of warhead components at unit level.

95. Each time the Capability Curves are updated, a revised data set is created (where appropriate) thereby creating a record of performance. Upon publication, each version produced is archived. It is proposed that the Capability Curves will be updated as an integral part of future baseline reviews and whenever a significant change to the programme, accepted through the AWE change control process, affects the positioning of the curves. Furthermore it has been agreed with NWIPT that the Capability Curves will be reviewed and updated every six months when no other drivers have mandated a change in the meantime.

96. There is a link between the Capability Curves and the risk and confidence modelling undertaken as part of this review. The data that are used to generate the Capability Curves reflect the fifty per cent confidence data generated from the 3PE calculations. Therefore as the confidence in the programme outputs changes so do the Capability Curves.

97. However even with this link it must be stressed that the curves represent the programme outputs in a relatively simplistic and high level manner and should be taken to reflect the overall progress of the NWCSP rather than detailed, specific increases in capability.

Independent Capability Assessment

98. In addition to using the Capability Curve, AWE assesses its capability by measuring the health of the technical capability in a number of specific areas.

99. AWE also provides an annual independent assessment[1] of technical capability which concentrates on forward looking statements with respect to the health and prospects of AWE's technical capability as well as sponsoring external peer reviews of specific capabilities.

Summary

100. These assessments of capability described above examine AWE's capability from differing aspects. The independent capability assessment considers the health of the programme, examining whether AWE is doing the right work and to the correct level. The Capability Curves predict how our capability will increase as we deliver the programme but itself makes no judgement on the validity of the programme. A future activity planned for later in 2007 is to examine how these two assessments of AWE's activities can be linked to provide a co-ordinated assessment of AWE's capability.

101.

AWEML Contribution

102. The structure of the AWEML M&O contract delivery is one of leadership, direction and governance. The key benefit of this is the ability to bring together the best of the industrial and academic skills from around the world to strengthen the capabilities of AWE plc.

103. To date, where key areas of augmentation at AWE have been identified as a result of the requirements of a changing and dynamic programme, the AWEML shareholders have taken effective action to ensure that the appropriate skills and expertise are made available to AWE, in order to provide AWE with an in-built capability going forward. The most high-profile example of this is the introduction of Jacobs Engineering as a strategic partner to provide AWE with facility construction management capability.

[1] The independence of the assessment is in relation to being independent of the actual programme delivery.

104. In addition, AWEML in conjunction with AWE plc, has carried out an analysis of the programme and this has shown a need for strengthening of the following key capabilities at AWE:

- [redacted]

105. AWEML and AWE plc have also identified the period of the programme over which each of these capabilities will be required, as well as how AWEML parent or other contributor (commercial and /or academic organisations) would be able to provide AWE with the skills, expertise and ultimately the capability required. Having identified the capability requirements, both AWEML and AWE plc are now working to ensure that the capability gaps are filled in full and when required. A major benefit to AWE plc is the ability of its parents to initiate new capability within AWE and to ensure on-going, long-term governance thereafter.

RESOURCING - STAFF

Introduction

106. AWE has identified a strategic staffing level, endorsed by the AWE plc board that meets the programme requirements and which incorporates improved efficiencies and effectiveness. Over the past two contract years AWE has successfully recruited nearly 1,200 new staff: a net increase in headcount of 731. The AWE programmes continue to require an increase to the overall staff headcount for the next few years. After this peak there is a decline clearly demonstrating the incorporated benefits of the Connect and Unite Projects. These projects are embedding efficiencies throughout the period but the results are more evident after the peak construction period.

107. The most significant impact on the sub-contracted personnel numbers is the facilities programme. Forecasts suggest that there will be an increase to the total numbers of personnel working on construction from the current 1500 to a total of just over 2,500.

Background / Current Position

Staffing

108. In line with the contract placed with AWE ML by the MoD, AWE's staff profile declined from 4293 in April 2000 to a low of 3463 in May 2003. This has now increased, as a result of the NWCSP, to 4428 staff. AWE successfully recruited 621 staff in the CY6 and 562 in CY7 reflecting the requirement on AWE to recruit the right skills to meet programme demands.

109. Table 3 summarises the recruitment and losses in CY 7 in the four summary disciplines that are used for regular reporting to the NWIPT.

110. AWE has been able to find appropriate skills for all areas of concern but in certain instances the volume has been the significant factor. One of the key concerns recruiting manufacturing skills but AWE has been successful in recruiting from for example MG Rover and Peugeot. Overall recruitment has been successful and the programme has been maintained.

Discipline Area Baseline Review	*Baseline Document Indicative Nos*	*Recruitment 2006/07*	*Losses 2006/07*	*Nett Position to date*	*Variance to Baseline Document*
Science Total	**59**	84.5	38.5	**46**	**-13**
Engineering & Manufacturing Total	**177**	270	116.5	**153.5**	**-23.5**
Business Services Total	**62**	120.5	52	**68.5**	**6.5**
Technical Support Total	**52**	87	36.5	**50.5**	**-1.5**
AWE Total	**350**	**562**	**243.5**	**318.5**	**-31.5**

Table 3: Staffing recruitment and loss data

111. AWE's total staff turnover rate in CY7 was 5.7%, which compares very favourably with the Strategic Manpower Plan assumptions. This also compares well against outside industry: the Chartered Institute of Personnel and Development (CIPD) indicates that turnover in the "engineering, electronics and metals" industry is 11.4% and in "other public services" is 16.0% total turnover with 8.5% unplanned.

112. Recruitment success and maintaining high retention rates have been an area of management activity over the period of the NWCSP and will continue to have a prominent role. Loss rates are scrutinised regularly and adverse trends analysed and appropriate actions taken. Recruitment performance will continue to be a topic for discussion within AWE and with MoD.

Integrated Personnel / Task-based sub-contractors

113. Integrated personnel are sub-contracted personnel, required for the short to medium term, and generally with specific competencies that fall outside AWE's core expertise. They are tasked directly and are managed through the AWE management chain. Task-based personnel are sub-contracted personnel where day-to-day management is performed by the sub-contracted company. Examples are:

- Emcor personnel who perform the facilities maintenance;
- Eurest personnel who operate the staff restaurants;
- building contractors who provide an undefined number of personnel to perform specified tasks.

114. During the early years of the AWEML contract, the number of integrated and task based personnel was relatively constant. However, the facility

programme in the NWCSP required the number of integrated personnel to increase and to work within the expectations of that skill sector and cost control. Annex I provides details of the resources required over the NWCSP period:these are closely linked to the facilities delivery programme.

115. To augment staff numbers to an appropriate level AWE has embarked upon an outsourcing strategy that has already reached a robust level of reliability. Since 2002, framework contracts have been in place with several major UK consulting and contracting firms with long term experience of major projects in a highly regulated safety environment.

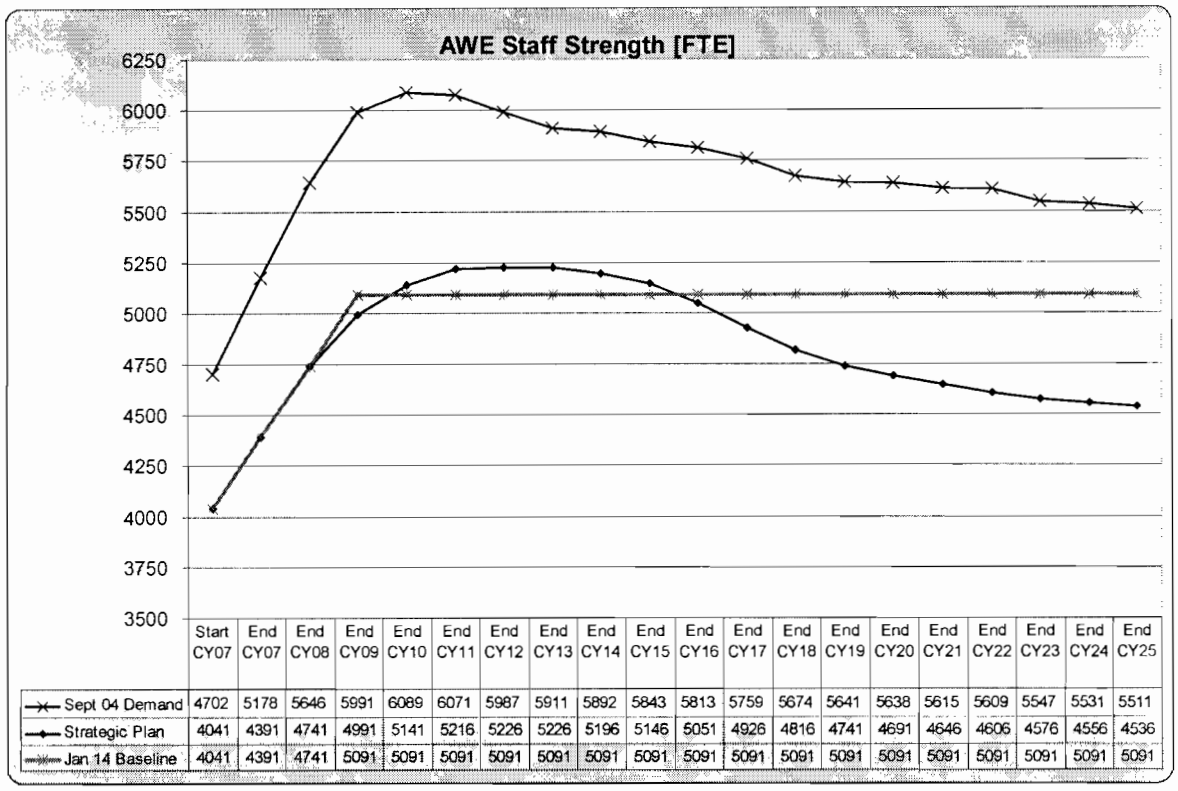
116. In addition to the design and project controls consultants already employed in 2005, AWE invited several major providers in the engineering management consultancy sector to submit qualifying tenders for a 'Managing Agent' role. Jacobs Engineering has been contracted on a 'strategic partner' basis to provide AWE with a range of facility plan management services working in close collaboration with the supply chain and AWE. This approach will ensure effective programme and project management techniques are utilised to plan and deliver facilities whilst making the most effective use of in-house and bought-in resources.

Future Requirements

Staffing

117. The top-down approach to the manpower plan seeks to encapsulate the benefits of the Connect and Unite Projects across the business and identify the synergies which may be missed through a bottom up planning approach. The January 14 2005 submission[14] anticipated savings in manpower, which were reiterated in the 29 August 2006 Baseline Review, as a result of the implementation of an integrated business system. AWE Report 628/04[15] proposed an end of CY9 headcount of 5991 and a peak in CY10 of 6089, as shown in Figure 5.

118. The staffing numbers in Figure 5 when compared with the position in January 2005 reflect the improved maturity of the programme and the associated resource skill requirements underpinned by a commitment to driving through efficiencies. A reduction in the March 2025 staffing level of 550 compared to the 14 January 2005 baseline has been identified. Annex I provides further detail on the skills mix underpinning these numbers.



	Start CY07	End CY07	End CY08	End CY09	End CY10	End CY11	End CY12	End CY13	End CY14	End CY15	End CY16	End CY17	End CY18	End CY19	End CY20	End CY21	End CY22	End CY23	End CY24	End CY25
Sept 04 Demand	4702	5178	5646	5991	6089	6071	5987	5911	5892	5843	5813	5759	5674	5641	5638	5615	5609	5547	5531	5511
Strategic Plan	4041	4391	4741	4991	5141	5216	5226	5226	5196	5146	5051	4926	4816	4741	4691	4646	4606	4576	4556	4536
Jan 14 Baseline	4041	4391	4741	5091	5091	5091	5091	5091	5091	5091	5091	5091	5091	5091	5091	5091	5091	5091	5091	5091

Figure 5 – Comparison between successive staffing plans

119. For the future, AWE is adopting a proactive approach in encouraging individuals to join the company, targeting those with the necessary skills set. Initiatives include university sponsorship; an active outreach programme to engage with universities, colleges and schools and contributions to independent nuclear skills bodies tasked with ensuring that the nuclear industry has the level and depth of skills required.

Integrated Personnel / Task-based sub-contractors

120. AWE maintains estimates of future manpower requirements utilising parametric forecasting techniques. Many of the seventy-five major projects are still in the concept and option development stage and the long-term requirements will mature over the next two to three years. The peak manpower demand is within the 2010/2011 timeframe when AWE estimates approximately 2500 people, including construction labour, will be required. The total requirements for Integrated personnel will remain relatively stable but the number of task-based individuals will depend on the individual project activities.

121. Task based, construction labour requirements are estimated using standard metrics. This 'top down' approach, mapped against the planned facilities

programme schedule indicates a construction labour manpower requirement of between 500 at present building to just over 1500 people. Project management and design manpower requirements are dependent on the maturity of the various facilities projects. Details of skills breakdowns and requirements are shown in Annex I.

Issues

122. Candidates withdrawing whilst awaiting a start date is being managed by Candidate Management Teams who keep contact with candidates informing them of progress, for example, with security clearances.

123. Depletion of the local work pool is managed by maintaining a high profile in the local area and actively seeking out other opportunities such as the Rover closure.

124. Retention of new staff is reinforced through an improved induction process and establishing new entrant focus groups to give feedback on the recruitment and assimilation processes.

125. The market place for supply chain resources will become more competitive leading up to the Olympics in 2012. By maintaining a strong core of staff and Integrated personnel, AWE will be able to secure progress to baseline plan and budget.

126. The AWE strategy is to ensure optimum personnel safety as well as effective delivery of the projects designed to encourage construction labourers to resist the normal industry tendency to move from job to job.

RESOURCING – SUPPLY CHAIN MANAGEMENT

Improved Procurement Capability

127. In April 2007 AWE introduced a new enterprise resource planning (ERP) system based on [redacted] software solutions. This system will replace the current Cedar Financials business support system which is obsolescent and does not provide integration across the planning, human resource, control and reporting, financial and procurement functionality. The [redacted] new business support solution provides full integration across these functionalities and is the support platform for AWE to plan, manage and deliver the programme.

128. The Procure to Pay (iProcurement) element of [redacted] will enable AWE to alter the balance of activity from transaction procurement to strategic purchasing. iProcurement offers a web-based support package enabling demanders to trace requisitions, speed transaction flow and place catalogue type orders swiftly and efficiently. AWE already has a segmented approach to supplier management where suppliers are managed according to their strategic and financial value to AWE. However the introduction of the new procurement package will enable better planning, forecasting and confidence and enable procurement staff to leverage more value from the supply chain. The new business support solution provides AWE with a vastly improved platform for efficient and effective procurement. This has been taken into account in reductions in direct expenditure, contracting and uncertainty reductions.

129. Although system connectivity with external supply chain is currently constrained by security limitations, these barriers will be significantly reduced by Project [redacted] (due to be operational in September 2007) which will enable connectivity to the wider supply chain leading to further efficiencies through more effective and efficient communications leading to reduced delivery timescales, more accurate delivery of goods and increased confidence in delivery dates.

Supplier Based Optimisation

130. Over the last three years AWE has driven down its supplier base to ~1500 suppliers. Supported by better analysis of procurement data and better forecasts of demand, this process will continue throughout the life of the NWCSP. Optimisation, coupled with more access to Internet-style purchasing, will enable AWE to continuously leverage greater value from a reduced supplier base of material and commodity suppliers. Suppliers will also gain from improved business value, better cash flow, reduced administration and greater predictability of demand. Conversely there will also be significant pressure on AWE to source new suppliers of materials and services which have either not been required for some time or are novel. The [redacted] support solution will allow more time to be spent on these services rather than on administrative transactions.

Industry Engagement

131. AWE has analysed the positioning of UK defence companies in relation to a future submarine-based deterrent project. As a result, AWE has continued to forge and consolidate focused, relevant relationships with the five major UK defence companies likely to have a role in a future deterrent project.

LMI

132. AWE signed a partnering agreement with LMI to allow the companies to produce a joint proposal to establish aeroshell technology in the UK and develop an understanding of RBA integration. The partnership has allowed AWE to progress and a contract is expected to be placed by MoD after April 2007. Because of the primacy of the system integration aspects, which are core to AWE's business, AWE will seek to ensure that the contractual arrangements enable AWE to retain the technical lead.

[redacted]

133. [redacted] currently provides AWE with a range of services including, for example, the provision of specialist manpower, test ranges, and explosives research. The elements of this relationship have developed in a piecemeal fashion over time in response to a number of stimuli, including pressure from MoD. The TPMC has recently reviewed AWE's relationship with [redacted] Subsequently, AWE is appointing a relationship manager to coordinate the diverse elements so that a clear picture is maintained of the dependency on [redacted] and are able to obtain better value for money through integration of the currently fragmented workstreams.

[redacted]

134. During 2006, AWE began to develop a technical relationship with [redacted] as a potential designer and supplier of elements of a future [redacted] particularly [redacted] technologies. This beginning may consolidate into a long-term dependency, but it seems unlikely that it will broaden. Therefore, [redacted] look likely to remain a supply chain sub-contractor to AWE.

[redacted]

135. A year ago, [redacted] were an obvious potential UK industrial lead for a [redacted] AWE is continuing to explore their role as a supply chain sub-contractor to provide additional experienced systems integration manpower in particular, as well as maintaining links should the UK consider, in the longer-term, [redacted] systems.

[redacted]

136. MoD has commissioned three of the major UK companies that would be involved in a [redacted] to partner to address the through-life implications of design options [redacted] The three companies are [redacted] AWE is assessing the relevance of this work to its AWE's core business.

Dstl

137. Dstl, although a part of MoD rather than part of UK industry, is the UK custodian of certain, key defence capabilities. AWE already contracts for this expertise and will continue to make us of Dstl in the delivery of the NWCSP, where appropriate.

Science and Technology Outreach, Academic Partnerships

138. With the advent of the CTBT, new scientific and engineering methodologies have had to be developed to underwrite the safety and performance of the Trident warhead and to provide a successor to Trident, should it be required. The requirement to successfully implement these methodologies is a significant challenge to the AWE science and engineering community. To be successful it is essential that AWE employs high calibre scientists and engineers and engages with the external science and engineering communities in those key areas where their knowledge and expertise can benefit the nuclear programme. To this end AWE has developed a corporate technical outreach strategy. The main elements of this are to:

- enhance the interaction between AWE and a number of key universities through the use of strategic alliances and other mechanisms;
- collaborate with the UK national laboratories and research council, where there is benefit to be gained;
- extend the collaboration with government departments, when there is benefit to be gained;
- collaborate with UK industry, where there is benefit to be gained;
- enhance AWE's national and international science and engineering profile through increased interactions with the professional institutes and the wider science and engineering community.

Academia

139. Much of the emphasis of the AWE outreach programme has been, and will continue to be, building links with academia. In particular, strategic alliances are being developed with those universities with which AWE desires to have a long term partnership. Three such alliances are now in place, Heriot-Watt University, Cranfield University and Cambridge. A fourth, with Imperial College, is currently being developed. Within a few years it is anticipated that AWE will have about six such strategic alliances covering all those core capability areas where AWE requires links into academia. In addition to the strategic alliances, which engage a number of departments across the university, long term relationships are being developed with a number of specific university departments that have key expertise relevant to AWE, such as Surrey and Birmingham Universities. Consideration is also being given to setting up an AWE sponsored shock physics institute and how best use of ORION can be made in consolidating plasma physics links with academia.

Research Councils

140. AWE will continue to build up its interactions with the Research Councils. Through the AWE Outreach programme the profile of AWE scientists and engineers has been raised considerably over recent years and many are now engaged in Research Council business with considerable benefits to AWE, such as in developing those skills needed for the nuclear warhead programme. This needs to continue into the future. The potential for working more closely with the CCLRC has started to be explored and will continue.

Other

141. AWE continues to develop its interactions with Dstl with senior level meetings being held at six monthly intervals. There is a significant number of working level interactions between the two organisations and good progress is being made in developing these. Strong links are being developed with the MoD Nuclear Propulsion Integration Project Team (NPIPT) and their supporting research community. These interactions will continue to be developed. AWE is also supporting the work of Partnership Sourcing Ltd (a Dti/CBI initiative), which has enabled AWE to gain insight into best practice being widely adopted across UK business.

Summary

142. AWE has made good progress in developing its technical engagement with the UK science and engineering community. A number of long-term partnerships have been developed and these will be maintained. Other long-term partnerships are planned by AWE to engage key elements of academia and other research organisations, thus ensuring that AWE taps into the full potential of the UK science and engineering base in support of the NWCSP.

RESOURCING - FACILITIES

Facility Delivery

143. Approximately 35% of the programme cost is facility related and an effective facility delivery procurement strategy is essential to delivery of the overall programme. AWE has recognised that to deliver the required programme will require significant investment in new skills, processes and supply chain management. The latter is being addressed through the upgrading of the supply-chain management function.

144. Information on the de-conflicted, prioritised and integrated major project list is given in Project Summary Documents[9]. The facility project requirements, assumptions and links to the technical programme have been confirmed using the company's project sponsors working with the technical programme leads. Project scope and cost profiles are requirements-driven proposals that have been optimised during the baseline reviews that occurred during 2006. The integration and deconfliction of the programme has been part of this process.

Managing Agent

145. Jacobs Engineering has been engaged since 2003 to act as Managing Agent for facility delivery to incorporate world class processes for the design and delivery of facilities, AWE has acquired the experience and discipline required for successful facility delivery. Their role has three prime responsibilities:
    - strategic programme development (assisting AWE to develop delivery processes, balance the programme, align logistics, and improve cost reporting and project controls),
    - project delivery (with AWE, provide experienced Integrated Project Teams to deliver individual projects), and
    - to provide key skilled human resources (for example, construction managers and planning supervisors).

146. To date the provision of [redacted] Larch and ORION progress has heightened AWE's confidence in its ability to deliver new build and re-kit facilities successfully.

147. Jacobs is in effect a quasi 'fourth partner', fully incentivised and tied to successfully deliver the construction programme. Contracts with suppliers are placed by AWE and the Managing Agent earns fee from results not turnover.

Design Houses

148. AWE has considerably strengthened its facilities supply chain by bringing in new contractors under enabling agreements; principal among these are five prime design houses. AWE selected them competitively and allocated tasks on a skills, capability and value basis, whilst still ensuring a balanced resource programme. The prime design houses will provide continuity and integration across the life cycle of a project, albeit the size of their team will reduce as design options are selected and detailed definition with specialist lower tier designers engaged. For example, the lead designer for the new office accommodation has been novated to the prime building contractor to ensure continuity of design and design liability. In certain cases design liability is managed by AWE, for example, with refurbishment projects with existing safety cases.

Preferred Supplier Pool

149. In addition, AWE has increased the range and capability of specialist contractors in relation to functional construction and process to provide a supply chain pool of preferred suppliers. This contracting pool forms a matrix of suppliers from which project teams are able to draw. The pool is not exclusive and individual project strategies are developed on a best-fit basis. The pool of approved suppliers does, however, maintain a readily accessible source of suppliers with knowledge of AWE systems and requirements, continuity of labour force and benchmarked rates.

150. The contractual frameworks agreements with preferred suppliers represent the start of long term relationships with AWE and demand reputational investment by the contractors in ensuring success. Initial tenures are up to five years with prospect of renewal, or re-bid at three years, for an extended term. Contractors have been selected by AWE through a rigorous selection process in order to prove best value to the business, including but not limited to cost. They also have to have the required safety performance, delivery capability culture, quality and reputation.

151. The current pool of suppliers includes general builders, asbestos removal, demolition, Control & Instrumentation, Mechanical & Electrical. Further categories of suppliers will be added to the resource matrix as required. Currently, for example, AWE is selecting 'rekit integrators', the requirement for which is growing.

Regulatory Interface

152. AWE is continuing to work very closely with the Regulators to ensure that they understand the drivers and the timing for the NWCSP and in particular the timescales determining the delivery of those facilities of interest to the

various regulatory authorities. Close co-operation between AWE, MoD and the regulators is achieved through numerous interactions at many levels throughout the company. Formal discussions are held under the auspices of a series of Interface meetings. Level 1 meetings are held approximately every six months and involve the principals from MoD, AWE and the regulators. The next Level 1 meeting is scheduled for May 2007.

153. The monthly Level 2 Interface meetings are chaired by DA/AWE and are essential for ensuring that the regulatory authorities understand the programme drivers and that AWE and MoD understand the authorities' issues and concerns. This meeting has been re-vamped recently and now provides key information and facilitates meaningful discussions about the programme drivers and constraints.

154. During 2006 the NII generated a list summarising their key aspirations. In response to this listing, AWE has generated a status report summarising what has been achieved and what is planned to be delivered; this response has been discussed regularly at the Level 2 meetings. AWE has also produced a Nuclear Explosives Safety Programme (NESP) which provides visibility to MoD, the regulatory authorities and internally of all of the principal areas where a reduction in risk is both desirable and achievable. It has also identified areas for improvement to both the physical infrastructure and the management system against the Site Licence Conditions. The Nuclear Explosives Safety Programme (NESP – Annex J) has been the subject of considerable debate at the Level 2 Interface meetings and was endorsed at the meeting on 17 April 2007. The activities identified in the NESP are included in the NWCSP and presented in this submission.

155. AWE will continue to use the established interfaces with the regulatory authorities, in particular the Level 2 Interface meetings, to advise the stakeholders of the progress of the NWCSP as a whole and to inform them of the drivers for any approved programme changes.

CHANGE PROGRAMME AND CONTINUOUS IMPROVEMENT

156. AWE has a vigorous change programme operating across all aspects of the business. Planned benefits from these change programmes, notably project Unite and project Connect have already been assumed in the resources profiles for TP1. Further benefits will continue to be incorporated as they are identified.

157. AWE has initiated a number of change programmes to streamline AWE's business processes allowing the development of 'richer' options and enabling better informed decisions. The benefits of the programme include;

- Building confidence in our capability (from our customer, staff and other stakeholders' perspective.)
- Process, technology and other improvement activities across AWE.
- Maximising the use of resources.
- Maximising the capabilities of our people and other assets.

158. The Change Programme outcomes are delivered through constituent projects each having defined project outputs, deliverables and dependencies with a common benefits realisation methodology.

Business Excellence

159. Project Unite is central to change programme. It enables integrated programme management across AWE using a single management and documentation system. The core processes include; Control and Reporting, Fixed assets, People, Programme Controls, Procure to Pay and Commercial. The system went live, on schedule, on the 2 April, 2007.

160. Benefits realisation is at the heart of Change management at AWE. This aspect of managing change is often less well developed, consequently benefits may not be fully realised. To mitigate this risk, AWE has developed the 'benefits dashboard' to track benefits and their realisation. In future this will form the basis of continuous improvement activities to reap further benefits from programmes.

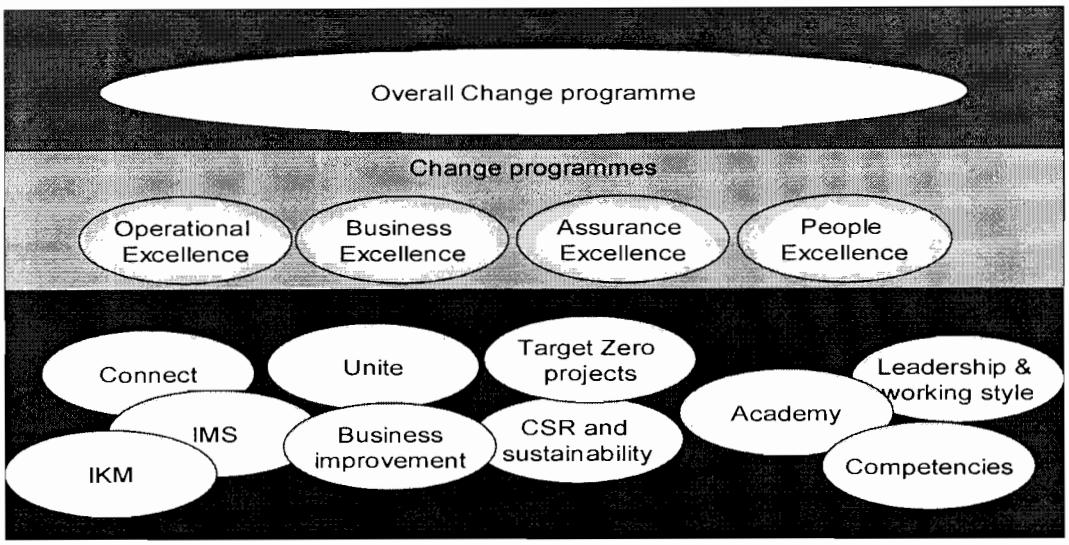


Figure 6: The relationship between the Change programmes and change projects

Operational Excellence

161. Foremost within AWE's Operational Excellence change programme is Project Connect which improves the warhead design-to-manufacture process and so reduces the lead time. The project integrates the design, engineering and manufacturing processes and will deliver cost savings through more effective processes.

162. Core to Connect is process improvement and the development of AWE's model based engineering capability to meet the requirements of AWE's technical strategy. Use has been made of Lockheed Martin's Lean and 6 Sigma capability in developing AWE's own capability in this area. Early pilots have been favourable indicating the potential for significant saving in, for example the time for Hydrodynamic trials.

Assurance Excellence

163. Target Zero is AWE's Assurance change programme designed to achieve no incidents or injuries and zero regulatory issues. AWE pays particular attention to continually improving efforts to prevent accidents, injury and ill health. Target Zero introduces ways of working to better protect AWE's people and the environment from harm. As the construction programme ramps up, AWE's focus on safety is extending from personal safety through to process and organisational safety.

People Excellence

164. The success of the NWCSP relies upon AWE having a suitable talent pipeline. The change programme contains a number of projects that deliver the required organisational capability and culture. Again, use has been made of the experience with parent companies to develop this programme. This includes Lockheed Martin's leadership model and Serco's Programme management capability. The Project Management Academy supports many of AWE's organisational change projects through the deployment of professional and personal development and education programmes and best practices. AWE's parent companies closely support the development, deployment and financial investment in the Academy. All have contributed their best practice, adding value to the heart of AWE.

165. Within this programme is the wide-ranging project designed to secure the right leadership, capability and culture for the current and future AWE organisation. This project captures the benefits of earlier work delivering operational and tactical leadership development. It encourages AWE leaders to focus on executive and strategic leadership, raising the expectations bar and broadening horizons.

INVESTMENT GOVERNANCE AND SCRUTINY

Programme and Project Review

166. Governance concerns control and direction of policy and operations. Scrutiny involves further reviews, often independent, that check the health and validity of activities and outputs (e.g. process audit, project review).

167. Within AWE, governance and scrutiny of the following are exercised:
- formulation, management and delivery of strategy;
- health and Safety;
- operational services;
- the supply chain;
- security;
- business development;
- contract management;
- organisational development;
- investments, programmes and projects.

For the purposes of this proposal, the scope will be limited to the investments, programmes and projects.

168. AWEML continues to have an important role to play with investment, governance and scrutiny of programme and projects. Since it was awarded the contract in 2000, the parent companies of AWEML have provided assistance and management support to a number of projects and programmes and initiatives. These have delivered savings to MoD estimated to be in the region of £1Bn.

169. In addition, support in areas of quality, health and safety performance, monitoring/management and governance have helped AWE to achieve standards of excellence in these areas. It is the intention of AWEML, with support from the parent companies, to continue to provide all the necessary support throughout this programme to ensure high standards continue to be achieved so that MoD is provided with the best value for money solutions.

170. Crucial to this programme will be ensuring AWE capability requirements are fulfilled. This is seen as AWEML's responsibility to manage.

171. Authority for the sanctioning of AWE investments has been delegated by the AWE ML board to the AWE plc board which in turn has given authority to the Investment Sanctioning Board (ISB (formerly the Project Review Board)). The ISB has delegated its authority to the project approval committees for all investments below £2m. All of AWE's £1374M programme, in the current three-year contract period with MoD, has been sanctioned by this process. To ensure full visibility between MoD and AWE, a member of the NWIPT sits on the ISB.

172. A system of sanction gates is operated by the ISB as shown in Figure 7.

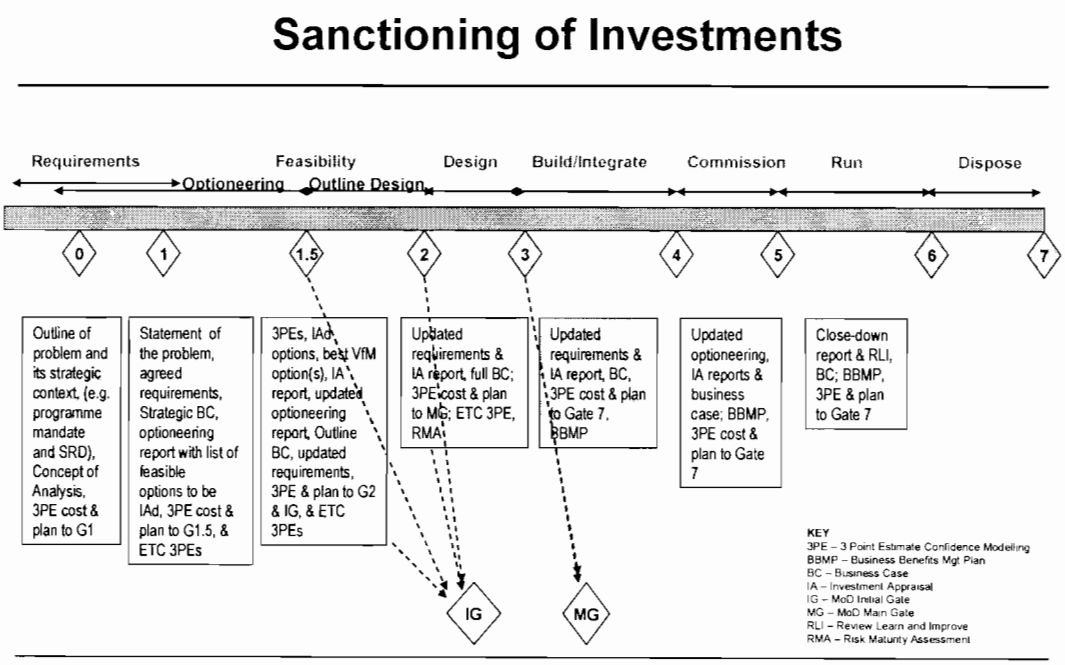


Figure 7: Investment Sanctioning Gates

173. The PRB is in operation in AWE plc to sanction investment and to control the flow of projects through the life of an initiative. Each of the gates is preceded by a Project Integrity Review (PIR) which is similar to the OGC's Stakeholder review; this is facilitated by AWE plc's Project Scrutiny team to review that provides independent appraisal of the propositions including:

- benefits;
- value for money;
- problem and requirements definition;

- estimates of cost, time and risk;
- the risk register and the business case;
- the concept of analysis;
- the optioneering analysis;
- the investment appraisal report;
- the design of the proposed technical and project solution, and the associated plans.

174. This system of sanctioning gates, as well as supporting AWE's governance, also supports the MoD's sanctioning process via the NWIPT's investment Approvals Board and the NWIPT's Facilities Review Board; deliverables for AWE's gates 1.5 and 2 help the NWIPT to gain readiness for the MoD Initial Gate and deliverables required for AWE's gate 3 help the NWIPT to gain readiness for the MoD main gate. A joint working group between AWE and the NWIPT manages the flow of materials between the two organisations' processes to assure synchronicity.

175. Further refinements of AWE's sanctioning process are under development. These address non-capital investment and secure greater consistency in the sanctioning of capital below the threshold for investments sanctioned by the ISB; these developments will be piloted in April 2007.

176. To help inform the ISB, each AWE sanctioning gate is preceded by a PIR which, by inspecting the project collateral and the gate deliverables and interviewing the project team, reviews the project and independently assesses its readiness and the validity of its projections. The chairperson of the PIR compiles a report which becomes a gate deliverable; the PIR chairperson is a member of the ISB and briefs the ISB on the findings of the PIR.

177. Work is underway to further strengthen the PIR with Earned Value Management reviews (e.g. Independent Baseline Review – IBR) and the use of Lockheed Martin's Independent Non-Advocate Review (INAR) techniques.

178. The ISB's & PAC's decision to invest, sets the budget to be provisioned and delegates financial authority to the respective manager who uses a Steering Board (similar to the MSP Sponsoring Group) to support the programme/project and its ongoing governance.

179. Once an investment decision has been made, subsequent governance is exercised at the programme level by the programme manager supported by

a Programme Steering Board and at the project level by the project manager supported by a Project Board. Each is informed by:

- monthly progress reviews;
- regular scrutiny reviews e.g. Operational Project Reviews,
- in-Depth Reviews conducted by our Directorate of Major Projects;
- risk reviews conducted by our Corporate Risk Team;
- EVM reviews;
- periodic independent reviews as required to scrutinise specific aspects (e.g. technical, strategy, logistics, resourcing, risk, safety, security, finances, commercial, etc.).

180. In addition, certain initiatives and commercial opportunities require direct AWEML sanction, e.g. a contract separate to the MoD M&O contract. AWE ML applies the INAR and ICE (Independent Cost Estimate) techniques to effect integrity reviews of the proposition prior to approving the proposition. The teams that conduct these integrity reviews are formed independently by AWEML and comprise members of the parent companies and other independent bodies (e.g. other subject matter experts) as appropriate. Whilst these review teams also advise the AWE plc steering boards and project teams of their findings, they report directly to the AWE ML board.

181. A further form of project scrutiny and governance concerns the approval of commercial propositions before they are submitted to customers. This process is in infancy but with the help of our parent company, it will mature; it uses Shipley review techniques (e.g. Blue Teams, Red Teams, et al) to assure the integrity of a commercial proposition as it develops, before securing approval by the AWE plc and ML boards for a commercial offer to be submitted.

AWEML Board and Committees

AWEML Board

182. In the exercise of its Corporate Governance responsibilities as the parent of AWE plc, AWEML holds regular Board meetings. These are attended by representatives of AWE plc, at which AWEML reviews progress in contract performance, programme delivery and regulatory compliance.

183. To assist it in this governance activity AWEML has established an Appointments & Remuneration Committee and an Audit Committee. The terms of reference for these committees include:

Appointments:

- to review the structure, size and composition including the skill, knowledge and experience of the AWE plc Board and the Audit Committee;
- to consider succession planning for members of the Board and senior managers of AWE plc as directed by AWEML Board;
- to identify and nominate candidates for vacancies as directed by AWEML Board;
- to keep informed of the relevant strategic issues and commercial conditions of the market.

Remuneration:

- To agree framework and policy for remuneration of directors and executive staff of AWE plc;
- To review ongoing appropriateness and relevance of remuneration polices to ensure that terms provide appropriate incentives to encourage enhanced performance;
- To ensure that the contractual terms on termination and any payments are fair and reasonable.

Audit:

- Financial reporting – monitor integrity of financial reports;
- Internal Controls & Risk Management systems – monitor the effectiveness of the systems;
- Confidential Disclosure – ensure arrangements allow proportionate and independent investigation;
- Internal Audit – monitor and review effectiveness of internal audit functions and responsiveness of management to findings and recommendations;
- External Audit – oversee all aspects of the relationship with the external auditors including selection and appointment;
- Reporting Responsibilities – the committee reports to the Board at least quarterly and otherwise as required.

AWEML Advisory Committees

184. To assist and enhance the operational performance of AWE plc, advisory committees in key areas of performance delivery have been established and

are funded by AWEML. The purpose of the committees is to drive AWE performance towards world-class without endangering the stability of the programme.

185. These committees are drawn from AWEML and AWE plc directors and representatives of the MoD customer with experienced independent individuals recognised for their knowledge and expertise in the areas of the committee responsibility.

186. The advisory committees cover the following areas:
    - Programme;
    - Environment, Safety and Health;
    - Projects;
    - Science and Technology.

187. These Advisory Committees are not involved in the delivery of the contract performance or of corporate administration. Their role is to bring external industry expertise and performance standards to AWE and ensure that the benefits are transferred into the AWE performance effectively and efficiently.

188. Programme Committee: The terms of reference include the following responsibilities:
    - monitor and review strategic assumptions and implementation of programme strategy;
    - maintain awareness of significant developments in relevant areas of science, engineering, technology, programme and project management and stakeholder requirements;
    - identify areas where additional external resources would support development of a cost effective programme strategy.

189. Environment, Safety & Health Committee: The terms of reference include the following responsibilities:
    - address strategy issues related to achieving world class performance;
    - monitor the implementation and progress of the ES&H strategy;
    - assist in anticipating required changes to AWE strategic policy;
    - identify areas of strategic importance for further study.

190. Projects Committee: The terms of reference include the following responsibilities:
    - review performance in the delivery and execution of the infrastructure and facilities projects and achievement of value for money delivery to the customer;
    - monitor and review integrity and implementation of project strategy and that the appropriate level of test and challenge has taken place;
    - keep under review the effectiveness of internal controls, operating procedures and risk management systems.

191. Science & Technology Committee: The terms of reference include the following responsibilities:
    - review strategic plans and progress and make recommendations to support the achievement of world class performance relevant to the programme;
    - identify areas where additional external resource will support the achievement of world class performance relevant to the programme;
    - facilitate contact with external specialists where this will be helpful to the programme.

CONCLUSIONS

192. The TP1 plan includes planned benefits from the AWE change activities including headcount reductions from previous peak forecasts. It incorporates significant improvements in cost and schedule confidence, which has been a benefit of the early increased programme investment. In addition AWE has reduced programme risk, specifically from external influences through the development of excellent working arrangements with Regulators and the Local Planning Authority.

193. The significant programme achievements made over the period since the 29 August review underpin AWE's confidence in their ability, to deliver the future programme. [redacted]

194. There are a number of strategic issues, including Hydrus, that require resolution. AWE believes that the strong programme integration that has been achieved in this plan provides the right platform from which informed decisions can be made jointly with MoD. AWE is committed to provide, as a matter of urgency, recommendations for the resolution of the schedule and cost issues with Hydrus. Until such time as there is an agreed way forward following a full stakeholder review of the programme requirements for Hydrus, costs have been retained at the same level as those incorporated in the August baseline.

195. Contract Year 9 affordability remains an issue. Although good progress has been by AWE to reduce costs in this year at the same time as absorb new requirements, AWE remains committed to work with MoD to further improve on this position.

196. MoD decisions in the next five-year phase of the programme will be critical to the direction of the long term programme. In particular, the success of the programme will be critically dependent on [redacted] with the [redacted] programme. AWE will continue to provide MoD with the necessary support to make these decisions through: support to ongoing [redacted] the development of relevant strategic industry relationships; and the

demonstration of AWE's warhead design, manufacturing and integration capability.

197. In summary, TP1 represents a minimum necessary plan to deliver MoD's requirements. AWE believes that, through a continued partnership approach with MoD, it is in a strong position to deal with the challenges in the programme whilst continuing to maintain excellent and cost-effective delivery performance.

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GLOSSARY

3PE	Three-Point Estimating
AASH	Annual Assessment of Stockpile Health
AF&F	Arming, Firing and Fusing
AGEX	Above Ground Experiment
ATIF	Aldermaston Technical Innovation Fund
AWE	Atomic Weapons Establishment
AWE ML	AWE Management Limited
CASD	Continuous At Sea Deterrence
CDA	Co-ordinating Design Authority
CIPD	Chartered Institute of Personnel Development
CSA	Chief Scientific Advisor
CTBT	Comprehensive Test Ban Treaty
D5	Trident missile
DA	Design Authority
DCT	Data Capture Tool
DG Strat Tech	Director General Strategic Technologies
DMB	Defence Management Board
DMB(N)	Defence Management Board (Nuclear)
[redacted]	[redacted]
EIVR	
[redacted]	[redacted]
ERP	Enterprise Resource Planning
EVM	Earned Value Management
FEL	Front-End Loaded
[redacted]	[redacted]
GFE	Government Furnished Equipment
[redacted]	[redacted]
HLC	High Level Capabilities
HMG	Her Majesty's Government
[redacted]	[redacted]
[redacted]	[redacted]
IAB	Investment Appraisal Board
IBR	Integrated Baseline Review
ICE	Independent Cost Estimate
IG	Initial Gate
[redacted]	[redacted]
IKM	Information Management System
IMS	Integrated Management System
INAR	Independent Non-Advocate Review
[redacted]	[redacted]
IPR	Integrated Programme Review

ISB	Investment Sanctioning Board (formally PRB)
ISD	In-Service Date
JOWOG	Joint Working Group
KT	Kilo tonnes
KUR	Key User Requirement
LLNL	Lawrence Livermore National Laboratory
M&O	Management and Operations
MDAL	Master Data & Assumptions List
MG	Main Gate
[redacted]	[redacted]
MoD	Ministry of Defence
NESP	Nuclear Explosives Safety Programme
NIF	National Ignition facility
NII	Nuclear Instillations Inspectorate
NNCS	Non Nuclear Components
[redacted]	[redacted]
NPIPT	Nuclear Propulsion Integrated Project Team
[redacted]	[redacted]
NWCSP	Nuclear Warhead Capability Sustainment Programme
NWIPT	Nuclear Weapons Integrated Project Team
OGC	Office of Government Commerce
OSD	Out of Service Date
PAC	Project Approval Committee
PALD	Procurement Aldermaston
PBI	Performance Based Incentive
[redacted]	[redacted]
PIR	Project Integrity Review
Pu	Plutonium
RBA	Re-entry Body Assembly
RR&A	Rolls Royce and Associates
[redacted]	[redacted]
RV	Re-entry Vehicle
SDR	Strategic Design Review
SRD	Systems Requirements Document
SRO	Senior Responsible Owner
SSBN	Ship Submersible Ballistic Nuclear
TCIF	Target Cost Incentive Fee
TDP	Technology Demonstrator Programme
TP1	Costed Plan for NWCSP to 2025
TPMC	Technical Programme Management Committee

URD	User Requirements Document
UK	United Kingdom
US	United States
WAS	Warhead Ancillary Systems
WBS	Work Breakdown Structure
WES	Warhead Electrical System