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Project: AWE REPPIR Submission 2011

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Author [redacted] Signed ..... Date .....
(Assessor)

Accepte[redacted] Signed ..... Date .....
(Unit 3C Superintending Inspector)

Distribution: DCI (Cover page & summary only)
Unit 3B SI
Unit 3D SI
Unit 3C SI
Unit 3E SI
Nominated Site Inspector
Other Inspectors
[redacted]

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The Office for Nuclear Regulation
Redgrave Court
Merton Road
Bootle
Merseyside L20 7HS

Summary

This report presents a technical assessment of the latest Hazard Identification and Risk Evaluation (HIRE) and Report of Assessment (RoA) for the AWE Aldermaston site as required under the Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR). Under Regulation 5(2) of REPPIR, operators of sites to which it applies should revisit their HIRE assessment on a triennial basis.

The Aldermaston HIRE and RoA were submitted to the HSE in July 2011, together with the RoA for the Burghfield site. The latter is largely unchanged from the 2008 submission. This report does not assess the technical basis for the Burghfield HIRE, which has not changed.

Based on previous REPPIR submissions, the detailed emergency planning zone (DEPZ) for the Aldermaston site is a circular area of radius 3 km with its origin at the site centre.

The HIRE for Aldermaston has been revised using a Reference Accident approach to derive bounding 5 mSv dose contours for individual facilities and for the site as a whole, based on reasonably foreseeable radiation emergencies. The bounding 5 mSv dose contour for the site is based on a seismic initiating event with return frequency of less than 1 in 10,000 years leading to radiological release from two facilities simultaneously. The area affected is assessed to be a circle of radius 2.125 km from the site centre.

This ONR technical assessment has examined the HIRE report for the Aldermaston site, with a focus on the methodology and data used to derive the bounding 5 mSv dose contour. The conclusion is a recommendation to ONR's Emergency Arrangements team to advise the Local Authority (LA) to prepare a detailed emergency plan to cover a circular area of at least 2.125 km radius, with its origin at the site centre. The ONR Emergency Arrangements team will use this assessment as input to the advice it provides to the LA concerning the detailed emergency planning zone.

In addition, this report recommends that the Reference Accident approach should also be adopted for the Burghfield HIRE and that AWE's dose estimate methodology and calculation route should be validated against similar methods employed by independent external organisations. Both of these recommendations relate to AWE's next round of REPPIR submissions.

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Introduction

1. As an operator of two sites licensed under the Nuclear Installations Act (1965), AWE has legal duties under the Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR), with regard to work with ionising radiation that may have the capability to produce a reasonably foreseeable radiation emergency.
2. The main aims of REPPIR are to establish a framework for the protection of the public through emergency preparedness for radiation accidents and to ensure the provision of information to the public in advance of, and during, any kind of radiation emergency that may arise.
3. Operators of sites with radionuclide inventories greater than the levels specified by Schedules 2 and 3 of REPPIR are required by Regulations 4, 5 and 6 to conduct a Hazard Identification and Risk Evaluation (HIRE) assessment, revisited on a triennial basis, and to provide a Report of Assessment (RoA) on the HIRE to the Health and Safety Executive (HSE). The purpose of the HIRE is to inform on-site and off-site emergency arrangements. The Office for Nuclear Regulation, an agency of the HSE, regulates REPPIR submissions from the operators of nuclear licensed sites.
4. Regulation 16(6) requires that the RoAs made available to the public, as soon as is reasonably practicable after they have been sent to the HSE. Schedule 5 of REPPIR, which is referenced from Regulation 6(4), specifies particulars that the RoA must cover. These include an assessment of the area likely to be affected by the dispersal of any radioactive substance, the time period over which the dispersal takes place, and the likely exposures to ionising radiation of any person, or class of persons, as a result.
5. Regulation 2(1) of REPPIR provides an interpretation of a *radiation emergency* as any sequence of events that is likely to result in any member of the public being exposed to ionising radiation in excess of the doses set out in Schedule 1 of REPPIR, which include a projected effective whole body dose of 5 mSv over one year following the event. (Schedule 1 also specifies threshold doses to the lens of the eye and per unit area of the skin, but the whole body dose is the bounding threshold in the majority of cases). In meeting this REPPIR requirement, operators often seek to define a bounding 5 mSv dose contour in order to envelope the area likely to be affected.
6. In July 2011, AWE submitted [1] a RoA [2] for the Aldermaston Site to ONR, together with a detailed HIRE report [3], which was based on a revised technical assessment using a Reference Accident approach. AWE also submitted a RoA for the Burghfield Site [4], which was largely unchanged from that submitted in 2008.
7. Under Regulation 9(1) of REPPIR, the Local Authority (LA), within which the site resides, is obliged to prepare an off-site emergency plan designed to restrict the exposure to ionising radiation of people who may be affected by any reasonably foreseeable radiation emergency. The HSE is empowered under Regulation 9(1) to advise the LA of the extent of the area in which any member of the public is likely to be affected. This area is referred to as the Detailed Emergency Planning Zone (DEPZ). Within the HSE, the administration of this legal duty is delegated to ONR's Emergency Arrangements team for nuclear licensed sites. The current DEPZs for the Aldermaston and Burghfield sites are circular areas of radius 3 and 1.5 km, respectively. This report does not assess the technical basis of the Burghfield DEPZ, which has not changed.
8. The objective of this report is to present a technical assessment of AWE's 2011 REPPIR submission for the Aldermaston site. The report concludes that the risk assessment conducted by AWE is adequate and recommends that ONR's Emergency arrangements team should advise the LA to adopt a circular DEPZ with a minimum radius 2.125 km, with its origin at the site centre.

Background

Previous AWE REPPIR submissions

9. AWE's first submissions under REPPIR were in 2002. They were judged by the Nuclear Installations Inspectorate (NII), on behalf of the HSE, to be acceptable. The triennial resubmissions, in 2005 and 2008 consisted of RoAs that recorded "no change of circumstances" as permitted under REPPIR Regulation 5(2)(b) and were also judged by the NII to be acceptable.

10. It is worth noting that for these previous submissions AWE requested that certain information, which is required under Regulation 6(4) and Schedule 5 to be included in the published RoAs was withheld with the permission of HSE on the grounds of national defence (as permitted under Regulation 16(6)). NII agreed to this, on behalf of the HSE, and the associated correspondence indicates that AWE provided a Route Map of Reference Information to record where the omitted information was located in reference material.

11. For its 2011 REPPIR submission, AWE has adopted a Reference Accident approach to bounding the area that may be affected by a reasonably foreseeable radiation emergency. This technical approach to HIREs has been developed and used elsewhere in the nuclear industry, notably by the Ministry of Defence. AWE has trialled this approach for the 2011 Aldermaston Site HIRE with the intention of applying it subsequently to Burghfield. Consequently, the 2011 RoA for Aldermaston site is informed by a revised HIRE based on a new technical assessment, whereas the 2011 RoA for Burghfield is a "no change of circumstances" submission, which is similar to the 2008 RoA.

Brief Description of AWE Site Characteristics and generic hazard profile

12. AWE provides and maintains the warheads for the UK's nuclear deterrent. The work covers the entire life cycle of the nuclear warhead from design, component manufacture and assembly, in-service support (except for deployment), and decommissioning and disposal. There are many facilities at the AWE sites handling a range of radioactive, explosive and chemical materials, which pose varying degrees of risk. The radioactive materials held and used at the premises include plutonium and uranium and tritium, in sufficient quantities for REPPIR to apply (i.e. exceeding the threshold levels defined by Schedules 2 and 3 of REPPIR) and for a HIRE assessment to be required under Regulation 4.

13. Operations at AWE are undertaken on a batch production basis, almost wholly during standard daytime working hours with nuclear production materials stored securely over night within the nuclear facilities. The AWE sites do not have a Nuclear Power Plant or stored nuclear fuel requiring decay heat removal. There are no bulk quantities of highly active liquors, irradiated reactor fuel or large quantities of High Level Waste stored on either site. These considerations restrict the possibility of, and potential dose consequences arising from, a reasonably foreseeable radiation emergency at either site.

14. AWE occupies two main sites, both located inland in Berkshire, away from large bodies of water, with prevailing wind directions from the south-west. Neither site is situated over any major geological faults and historical records show a low level of seismic activity.

15. The AWE Aldermaston site is located approximately 15 km south-west of Reading and is at an elevation of ~100 m above sea-level. The licensed site extends over a significant area (260 hectares). Only a small number of the site's buildings are directly

associated with nuclear safety, or indirectly in the case of the emergency response buildings. The current DEPZ, a circle with radius 3 km with its origin at the site centre (Grid Reference SU 595 635), includes several villages and business parks with several hundred employees.

16. The AWE Burghfield site is located approximately 5 km south of Reading and is within 2 km of the M4 motorway and several local villages, at an elevation of ~45 m above sea level. The site fence encloses an area of 105 hectares, but the Nuclear Licensed Site forms a small fraction of this. The current DEPZ is a circle, centred on Grid Reference SU 684 680 with a radius of 1.5 km, and includes part of a village. Numerous small water courses run through the local flood plain area, with one passing through the eastern part of the site.

Licensee's case

AWE's interpretation of reasonably foreseeable fault sequences

17. REPPIR places requirements on operators and local authorities in response to radiation emergencies that are *reasonably foreseeable*. Paragraph 50 of the HSE guide to REPPIR [5] defines such events as *less than likely, but realistically possible*, but does not quantify what this means in terms of frequency of occurrence.

18. AWE has adopted a definition of "reasonably foreseeable" to include all fault sequences for which the associated dose has a return frequency of one in one hundred thousand per annum. AWE has also examined fault sequences with a frequency as low as one in a million to establish whether there would be any stepped increases in dose consequences with the inclusion of these less frequent events. Within its HIRE, AWE has also considered some even less frequent fault sequences with off-site consequences (which are covered within facility safety cases), but considers that these are not reasonably foreseeable for the purposes of detailed planning of the emergency response. However, such fault sequences are taken into account when considering extendibility of the emergency plans.

Methodology used for off-site dose estimates

19. AWE has assessed several possible exposure pathways and has concluded that direct inhalation of contaminants within a radiation plume is the dominant contribution. Other pathways, including ingestion and exposure by absorption through the skin, are generally considered negligible by comparison. In the case of tritium, AWE includes an additional contribution due to direct exposure by absorption through the skin via an enhancement factor to the assumed breathing rate.

20. The off-site dose consequence assessment calculations employ a standard methodology based on one developed by the National Radiation Protection Board (NRPB) first published in 1979 [6] and uses data from AWE's corporate safety procedures (cf. References [7], [8], [9] and [10]) and facility safety cases. The NRPB model assumes short-term release of airborne radioactive material from a stack via a Gaussian plume, with dispersion coefficients varying with distance depending on the elevation of release and the prevailing weather conditions. AWE uses "Pasquill Weather Stability category D" conditions, which are typical of the UK. Factors determining the source term are the inventory of the material vulnerable to release due to the fault, its physical form and means of its containment (which are codified into median values for release fractions and decontamination factors). The dose uptake, which depends on the isotope mixture inhaled, uses standard assumptions about breathing rates and committed effective dose coefficients published by the International Commission on Radiological Protection (ICRP) for individual isotopes, for standard isotopic compositions relevant to AWE. The exposed individuals are

assumed to be present during the entire passage of the released material (nominally assumed to be 30 minutes).

21. Where appropriate, additional (minor) contributions to the inhalation dose due to the re-suspension of contaminated material are included.

Reference Accidents for individual facilities and for the Aldermaston site

22. The RoA for the Aldermaston site gives a summary of the radiological risk assessment based on best estimate public dose consequences of reasonably foreseeable radiation emergencies associated with the Aldermaston site.

23. AWE categorises individual facilities according to radiological hazard, with the highest, category 5, defined as "*facilities or operations which are capable of yielding a significant off-site hazard at a level which countermeasures (such as sheltering or evacuation) would be required…*". The term "*significant off-site site hazard*" is defined in the RoA as "*an off-site whole body effective dose ≥ 5 mSv at the nearest site boundary*".

24. The classified HIRE report for the Aldermaston site presents AWE's assessment of the potential off-site dose consequences from a range of fault sequences within all of the Hazard Category 5 facilities using a Reference Accident approach. The HIRE report includes nine appendices providing off-site dose estimates from individual high hazard facilities, sensitivity studies and the derivation of a bounding 5 mSv dose contour for the site as a whole, taking into account multiple facility releases. This process takes input from hazard assessments presented within facility safety cases, which consider a wide range of fault sequences initiated by a broad spectrum of internal and external hazards. Fault sequences are initially assessed to establish whether their off-site dose consequences are above the 5 mSv threshold. They are then screened by frequency to establish whether the events are reasonably foreseeable, according to AWE's frequency-based criteria. The Reference Accident for each facility corresponds to the reasonably foreseeable fault sequence that leads to the largest off-site dose consequence.

25. Four facilities at the Aldermaston site are assessed as having the potential to result in off-site doses greater than 5 mSv, and a bounding 5 mSv circular dose contour, centred on the facility concerned, is established based on the facility Reference Accident. The largest 5 mSv dose contour from an individual facility is a circle of 1035 m radius centred on the facility described in Appendix C. The next largest is a circle of radius 950 m centred on the facility described in Appendix F. The 5 mSv dose contours from the [redacted] facilities are considerably smaller.

26. In order to account for common cause effects from extreme external events, Appendix H of the HIRE presents an analysis that combines dose estimates from individual facilities. This results from reasonably foreseeable fault sequences initiated by a seismic event (based on a return frequency of less than one in ten thousand years), which leads to radiological releases from two facilities, due to the common cause. For each pair of facilities the most adverse wind direction is assumed and the dose contour is conservatively corrected (increased) to account for the distance between the facilities and the nominal centre of the site. This gives an overall bounding 5 mSv off-site circular dose contour at 2.125 km from the AWE Aldermaston centre location.

27. AWE has also considered the dose consequences from a number of severe infrequent fault sequences involving extreme external events that it does not consider to be reasonably foreseeable. These lead to a range of 5 mSv dose contours both within

and beyond the current DEPZ. Consideration of such severe infrequent events is useful in informing the extendibility of the on-site and off-site emergency plans.

Assessment

Scope

28. The main focus of this assessment has been a technical appraisal of AWE's HIRE report for the Aldermaston site. This appraisal has involved understanding the off-site dose estimate methodology and calculational route applied by AWE, and of the associated uncertainties and conservatisms. In this regard, I have benefitted from discussions with ONR Radiation Protection specialists and have researched the Gaussian Plume dispersion model developed by the NRPB, which is summarised in [11], and sampled relevant sections of AWE's corporate procedures.

29. This assessment benefits from my knowledge of the site and its facilities developed during recent assessment work. This includes my recent assessment of AWE's report on the ENSREG stress tests, initiated in response to the Reactor Accident at Fukushima Daiichi Power Plant in Japan in March 2011, and regulatory interventions concerning AWE's improvement programme to address issues identified as part of the 2010 site wide Periodic Review of Safety at the Aldermaston site.

30. The AWE HIRE is a substantial technical report covering more than 300 pages. Initially I noted from the Aldermaston HIRE that AWE has considered a wide range of internal and external faults for each facility, has addressed common cause failure and has conducted a sensitivity study for the facility that contributes most to the potential off-site dose. Therefore, I have focussed my detailed sampling on the main HIRE report and on Appendices C and F, H and I. Appendices C and F derive the 5 mSv dose contour from the two highest hazard facilities. Appendix H presents the derivation of the 5 mSv dose contour for the whole site and Appendix I describes a sensitivity analysis conducted for the facility in Appendix C. I have also sampled Appendices A and B, which cover the two other facilities that can lead to an off-site dose of greater than 5 mSv.

31. This targeted assessment of AWE's REPPIR submission and relevant supporting documentation is consistent with ONR's procedure for assessment [12]. In addition, I led a targeted intervention with AWE during March 2012 [13], which included support from an ONR Radiation Protection Specialist Inspector and involved discussions with AWE and sampling of supporting references.

Standards and criteria

32. This technical assessment is informed by the HSE Safety Assessment Principles [14], ONR's draft Technical Assessment Guide for the Assessment of HIRE reports [15], the HSE's Guide to REPPIR [5] and ONR's internal guidance on Assessment [12].

ONR Assessment findings

33. Following my sampling of the REPPIR submissions and relevant corporate procedures some uncertainties remained regarding the method used and the level of verification and validation applied. I had also noted that the Reports of Assessment did not contain all of the information required by Regulation 6(4) of REPPIR. In order to address these shortfalls I led a regulatory intervention at the Aldermaston site in March 2012. The outcome of this site visit is captured below.

Presentation of Reports of Assessment and REPPIR Schedule 5

34. I have compared the RoAs for the Aldermaston and Burghfield site with the particulars which operators should include under Regulation 6(4) of REPPIR, as specified in the sixteen items listed in Schedule 5.

35. I noticed that the Aldermaston RoA does not include some relatively trivial items on this list (e.g. list item "a", which requires the name and address of the operator to be included, is not provided; similarly, the general description of meteorological and hydrographical conditions, required under list item "d", has been omitted). The Burghfield RoA is better in this regard in that it is more closely aligned to the requirements of Schedule 5.

36. More significantly, both RoAs have a paucity of information on more important details (such at the diagrams and description of single plants or enclosed systems required under list item "h", or sufficient detail on the inventories of radionuclides present and their likely maximum quantities, required under list item "e"). For the Aldermaston site, some of the required information is included within the classified HIRE report, but some of it is only available from reference material, which does not form part of the formal submissions. However, taking into account my targeted sampling of supporting references during the site visit, I do not consider that these omissions affect my technical assessment of the Aldermaston HIRE and RoA.

37. During the site visit [13], I advised AWE that Regulation 16(6) requires that the RoAs be made available to the public (with the particulars of Schedule 5 included), but allows for some of the particulars to be withheld for a variety of reasons, with the agreement of the HSE. AWE took an action to revise the RoAs to include those particulars that can be included and to write to HSE to request agreement to omit those elements that it considers need to be withheld, stating the reasons. AWE also agreed that its correspondence on this issue would detail source documents in which the particulars are provided. For previous submissions under REPPIR, this was considered an acceptable means of meeting the requirements of Regulations 6(4) and 16(6) and is consistent with ONR and HSE guidance on REPPIR.

38. I will track progress of this action to ensure that it is completed in a timely fashion (and prior to making the RoAs available to the public).

Off-site dose estimate methodology

Appropriateness of the methodology

39. Reference [15] advises ONR assessors to seek evidence from REPPIR submissions that a wide range of fault sequences has been considered, including rare events and those that do not lead to off-site dose consequences.

40. Within its HIRE report for the Aldermaston site, AWE has considered a diverse range of hazards that may initiate fault sequences that could conceivably lead to off-site doses. These cover a variety of internal process faults and a broad spectrum of internal and external hazards, which span a wide range of fault sequences frequencies and possible off-site dose consequences, including rare events that AWE does not consider reasonably foreseeable.

41. Therefore, I judge that within its HIRE report for Aldermaston site, AWE has considered a suitably wide range of fault sequences to inform emergency preparedness and the provision of public information.

42. The HSE guide to REPPIR notes that Pasquill stability category D weather conditions are appropriate for best estimate dose calculations (cf. Paragraph 62 of [5]) and this is guidance is reflected in ONR's draft TAG on the technical assessment of HIRE reports [15]. AWE has used these weather conditions.

43. Therefore, I consider that AWE has used appropriate weather conditions for the atmospheric dispersal of radionuclides in its off-site dose calculations.

Verification and validation

44. During the intervention in March 2012 [13], I questioned AWE concerning its methods for generating off-site dose estimates and how they had been verified and validated. AWE confirmed that it has developed an in-house spreadsheet tool to confirm dose calculations presented within facility safety cases, and to generate new dose estimates required for the HIRE. AWE provided verbal assurances that the spreadsheet results were subject to independent checking and verified by hand.

45. From my sampling of Appendices C and F of the Aldermaston HIRE, it was not possible to trace the dose estimates back to vulnerable inventories based on the information presented (which relied on scaling doses from facility safety cases). It was also somewhat unclear, which inventories are considered to be invulnerable (and why). During the intervention in March 2012, I sampled some supporting documents including a Generic Fire Risk Assessment and a Seismic Assessment Report, which provided information concerning the inventories that the dose estimates were based on, for the facilities concerned. I was able to verify an off-site dose estimate using these inventories and data on release fractions, decontamination factors, and dispersion and dose coefficients from AWE corporate procedures.

46. Based on the considerations above, I therefore judge that AWE has conducted suitable verification of its off-site dose estimates.

47. I encouraged AWE to consider the benefit in benchmarking its calculational route against dose estimate tools developed by other organisations. I noted that the SEER code, distributed by the Radiation Protection Division of the Health Protection Agency, is widely used and based on the same method. I advised AWE that I consider such benchmarking to be relevant good practice in validating dose estimates and recommended that AWE pursue this in advance of work to support its next REPPIR submission, which is due in 2014.

48. **Recommendation 1**: I recommend AWE should benchmark its calculational route and methodology for off-site dose calculations against similar methods employed by independent external organisations, prior to technical work to support its 2014 REPPIR submissions.

Uncertainties and robustness of the method

49. I questioned AWE regarding the selection of Reference Accidents for the two most onerous facilities, and how the bounding 5 mSv dose contour for the site was derived. I also discussed several fault sequences that are assessed by AWE to be not reasonably foreseeable, including those considered in the sensitivity analysis conducted for one of the facilities. Together with the other ONR inspectors, I also queried AWE's assumptions concerning the location and containment of material which AWE has assessed as being non-dispersible, when subjected to the range of hazards that may be encountered during the considered fault sequences. The ONR inspectors present judged that AWE provided a satisfactory response to this challenge.

50. In deriving the bounding off-site 5 mSv dose contour AWE has considered common cause external events and has combined the potential radiological effects from the two most onerous facilities in a conservative way (assuming the worst wind direction, which is not the prevailing wind direction for the site).

51. I consider that in combining doses from individual facilities AWE has conservatively estimated the area that may be affected by reasonably foreseeable radiation emergencies affecting two facilities simultaneously.

52. Based the ONR intervention with AWE in March 2012 [13], my sampling of AWE documents and my own independent cross checks detailed above, I am confident that AWE has used an adequate methodology for the calculation of off-site dose consequences.
53. **Conclusion 1**: Based on my technical assessment of AWE's 2011 REPPIR submissions for the Aldermaston Site I conclude that ONR's Emergency Arrangements team should advise the Local Authority to prepare a detailed emergency plan to cover a circular area of at least 2.125 km radius from the centre of the site.
54. In its HIRE report for the Aldermaston Site, AWE has used the Reference Accident approach to bound off-site dose estimates both from individual facilities and for the site as a whole. I consider this to be a suitable approach for informing requirements for emergency preparedness and provisions for public information concerning radiation emergencies. The technical analysis supporting the Report of Assessment for the Burghfield site is unchanged.
55. **Recommendation 2**: I recommend that AWE applies the Reference Accident approach developed for the Aldermaston HIRE to the Burghfield site in support of its 2014 REPPIR submissions.

Conclusions

56. **Conclusion 1**: Based on my technical assessment of AWE's 2011 REPPIR submissions for the Aldermaston Site I conclude that ONR's Emergency Arrangements team should advise the Local Authority to prepare a detailed emergency plan to cover a circular area of at least 2.125 km radius from the centre of the site.

Recommendations

57. **Recommendation 1**: I recommend AWE should benchmark its calculational route and methodology for off-site dose calculations against similar methods employed by independent external organisations, prior to technical work to support its 2014 REPPIR submissions.
58. **Recommendation 2**: I recommend that AWE applies the Reference Accident approach developed for the Aldermaston HIRE to the Burghfield site in support of its 2014 REPPIR submissions.

References

[1] "Formal Submission of Documents under the Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR), AWE letter to ONR, ONR 108-001R, dated July 1 2011.

[2] AWE Aldermaston Hazard Identification and Risk Evaluation (HIRE) 2011, Report of Assessment, AWE Reference DI02/SRG/11/PC/B/061, Issue 1, dated 28 June 2011.

[3] AWE Aldermaston Hazard Identification and Risk Evaluation (HIRE) 2011, AWE/DSDF/B/RP/AD/2627, Issue 1, dated May 2011

[4] Submission in support of Radiation (Emergency Preparedness and Public Information) Regulations 2001, Schedule 5 Risk Evaluation for the AWE Burghfield Site, AWE/DSDG/B/RP/AD/672, Issue 4, dated 28 June 2011.

[5] A Guide to the Radiation (Emergency Preparedness and Public Information) Regulations 2001, Guidance on Regulations, HSE Books L126 (1st Edition, Published 2002, ISBN 978 0 7176 2240 5).

[6] "The First Report of a Working Group on Atmospheric Dispersion – A Model for Short and Medium Range Dispersion of Radionuclides Released to the Atmosphere", R H Clarke (1979), NRPB-R91.

[7] Quantification of risk for RA Hazards, AWE Company Safety Procedure, CSP 860 Section 24, Issue 2, October 2004.

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[10] Atmospheric Dispersion Calculation for Estimating Doses from Short Term Stack release, AWE Company Safety Procedure, CSP 860 Section 12, Issue 3, October 2008.

[11] Emergency Data Handbook, NRPB-W19, published July 2002, amended June 2006.

[12] Assessment Process, ONR Internal Guidance, AST/001, Issued April 2010.

[13] ONR Intervention Report, AWE site visit 20-22 March 2012, ONR-AWE-IR-2012-020, Revision 0, Issued 28 March 2012, TRIM 2012/135422.

[14] Safety Assessment Principles for Nuclear Facilities. Health and Safety Executive. 2006 Edition, Revision 1 dated January 2008.

[15] The Technical Assessment of HIRE Reports, draft Technical Assessment Guide, TRIM 2011/544754

Quality benchmarking

ONR Inspector	[redacted]
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CRITERIA	GRADE	COMMENTS
Complete	3	A wide spectrum of hazards and associated fault sequences have been considered. It would have been helpful to include the relevant radiological inventories in each appendix of the HIRE report.
Clear	4	Overall, the methodology applied in off-site dose calculations was clear. The presentation of the necessary input data could have been better.
Rational	3	The Reference Accident approach provided a logical framework to determine the bounding 5 mSv dose contour.
Accurate	3	There was some evidence of independent checking from the intervention in March. A consistent framework was applied across the facilities that I sampled.
Objective	3	The conclusions of the report were based on a logical and evidenced-based framework.
Appropriate	4	The RoA did not contain the particulars required under Schedule 5.
Integrated	2	The main report drew together the contributions to the 5 mSv dose contour from individual facilities in an integrated way.
Current	3	The Aldermaston HIRE took into account recent changes to facility safety cases since the last submission in 2008
Forward looking	4	None of the submissions considered how the HIREs could be improved for the next REPPIR submissions.

1 Exemplar, 2 Good standard, 3 adequate, 4 Below standard, 5 Significantly below standard, 6 unacceptable