

**TOWN AND COUNTRY PLANNING ACT 1990 (AS
AMENDED)**

APPEAL BY T A Fisher & Sons Ltd

Against the refusal of Full Planning Permission

by

West Berkshire Council

ON

LAND TO THE REAR OF THE HOLLIES, READING ROAD,
BURGHFIELD COMMON

For

The erection of 32 dwellings including affordable housing,
parking and landscaping. Access via Regis Manor Road.

Application Reference no. 22/00244/FULEXT
Appeal Reference no. APP/W0340/W/22/3312261

Proof of Evidence

of Dr Keith Pearce BSc PhD MBA MSc FEPS of Katmal Limited

in respect of reason for refusal 2

Reviewed by Michael C Thorne BSc PhD FInstP FSRP CRadP of Mike
Thorne and Associates Limited

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1. Introduction

1.1. My Qualifications and Experience

1. My name is Keith Ian Pearce. My qualifications include a BSc (Hons) degree in Physics, a PhD in Nuclear Physics and an MSc in Emergency Planning Management. I am a Fellow of the Emergency Planning Society, a member of the UK Society for Radiological Protection and a Chartered Physicist.
2. I taught Nuclear Physics, Radiation Protection and Emergency Planning at the Royal Naval College between 1987 and 1990.
3. Between 1990 and 2014 I worked for Nuclear Electric and successor companies in two main roles.
4. Between 1990 and 2005 I was employed as a mathematical modeller, developing and applying mathematical and computer models of the movement of radionuclides through the atmosphere, waters and food chains and the potential uptake of radiation dose by members of the public and using these to support safety cases and emergency planning preparations for a nuclear generating company.
5. I helped to develop the computer tools and processes used during an emergency to estimate where accidentally released radioactivity might migrate, the dose implications of this for the public and the strategies that could be employed to reduce the potential for harm to the public.
6. Between 2005 and 2014 I was Head of Emergency Planning, responsible for the developing, maintaining and testing of the on-site emergency plans and responsible for supporting the local authority in the preparation and testing of the off-site plans for 10 reactor sites across the UK. In this role I liaised with local authorities, regulators, emergency responders, health bodies and government departments and played an active role on several national committees.
7. Between 1992 and 2014 I held radiation monitoring, dose assessment, health physics and command roles within the company emergency scheme in addition to my “day job”.

8. Between 2001 and 2014 I wrote and maintained the REPPIR-01 Hazard Identification and Risk Evaluation (HIRE) reports for ten sites.
9. I managed and participated in several exchange visits and peer reviews with Russian emergency preparedness experts (2000 – 2003) and participated in inspections and peer reviews on nuclear power stations in the Ukraine (2011), Germany (2012) and Bulgaria (2012) for the International Atomic Energy Agency and the World Association of Nuclear Operators.
10. As an independent contractor working for my own Company (Katmal Limited) since 2014 I have helped civil operating and new build companies, fuel enrichment plant, a nuclear dockyard and a submarine building company develop their on-site emergency preparations and helped local authorities develop and audit their off-site plans.
11. I have run and reported multi-agency workshops for civil and military sites looking at the ability to extend existing nuclear plans if faced with a bigger than planned for event.
12. I have written the REPPIR-19 Hazard Evaluation and Consequence Assessment and the Consequence Report for a fuel enrichment company.
13. I have helped local authorities, including Reading and Wokingham Borough Councils, understand the Consequence Report sent to them by operators; helping them understand the risk profile of the site they host and to develop appropriate off-site plans.
14. I have also provided advice to Companies wishing to develop sites within the DEPZs of AWE Burghfield and Aldermaston. This included providing expert advice to the team promoting the Kingfisher Grove development (CD 8.3).
15. I have written books on public information, the physics of the Chernobyl accident and nuclear emergency planning for local authorities.
16. I appear at this Public Inquiry on behalf of the Appellant, T A Fisher & Sons Ltd, to present expert evidence regarding the appeal proposal in respect of the relationship between the proposed development and the Atomic Weapons Establishment AWE facility at Burghfield (AWE(B)).

1.2. Scope of Evidence

17. This appeal is against the refusal of Full Planning Permission (LPA ref. 22/00244/FULEXT) (CD 4.2) by West Berkshire District Council ('WBC') on 1 June 2022 for the erection of 32 dwellings, including affordable housing, parking and landscaping on land to the rear of The Hollies, Reading Road, Burghfield Common.

18. This is the Proof of Evidence in respect of emergency planning matters and addresses the following:

- It summarises those aspects of the objections that are relevant to emergency planning and the protection of public health and wellbeing (Section 4);
- It discusses the objections (Section 5) Including:
 - The presumption of rejection (5.1);
 - The potential impact on AWE's operations of the development (5.2);
 - The "line in the sand" (5.3);
 - The risks to the health and wellbeing of those living in the development from AWE(B) (5.4);
 - The Off-Site Emergency Plan (OSEP) and how the development might impact on its effectiveness (5.5);
 - The threat to the future operations of AWE(B) posed by the development (5.6)
- A summary and conclusions are given (Section 6).

19. It is concluded that:

It has been shown that contrary to the fears of the local authority and AWE:

- The AWE Burghfield site does not represent a significant risk to health or wellbeing for those living in or near the proposed development site;
 - The frequency of faults is very low, the probability of the wind blowing in the direction of the development (and otherwise exhibiting category F conditions) reduces the frequency of exposure further and the potential dose uptake does not represent a material threat to health and well-being.
 - An accident at AWE(B) leading to the triggering of the OSEP and urgent protective actions could inconvenience the population without being a material threat to their health and wellbeing.

- Provision of accurate information to the local population will contribute to their well-being.
- The increased number of inhabitants of the DEPZ will not put a material additional strain on the resources of the off-site plan, either for warning and informing or for providing medical and quality of life support to those in an area subject to shelter advice;
 - The activities that constitute the emergency plan do not scale with population;
 - The elevated dose rates at the proposed development site are likely to be within the ranges that emergency services can operate with Radiation Protection Advisor support;
 - The elevated dose rates would be of a short duration (during the passing of the initial plume), with resuspension doses around 1% thereof and thus immaterial;
- The increased number of people living in the area should not interfere with the emergency services' ability to provide support to the site in an emergency; and
- The development itself does not represent a threat to the future operations of AWE Burghfield.
 - There are closer receptors to AWE (B) than the proposed development site, and AWE (B) must already take these into account.
 - Despite the fears expressed by AWE no good reason has been given why the OSEP cannot cope, or be amended to cope, with the limited number of additional residential properties proposed.
 - The ONR has a number of options to consider, including improvement notices, before it would consider any prohibition on the site's functions.
 - Furthermore, even if it were to reach this point the MOD has powers to disapply REPPIR while it undertakes remedial actions.

On available evidence, while the DEPZ around AWE (B) has recently been expanded, this is as a consequence of re-drawing the emergency planning area to reflect certain weather conditions (category F) not previously reflected in the DEPZ's dimensions. The level of risk and actual impact has not changed – these are as they were at the time of the appeal site's allocation.

These conclusions echo the conclusions of the Kingfisher Grove appeal decision APP/X0360/W/22/3304042 (CD 8.3) *"I therefore conclude that the proposal would not present a barrier to the ability of blue light services to safely carry out their duties, and nor would it*

affect the Council's ability to execute and manage its obligations under the REPPIR plan".¹

While each case must be determined on its own facts, the other main parties' statements of case have not set out matters which in my view lead to different conclusions on these aspects for present purposes.

20. A Core Document list has been prepared in conjunction with the council, AWE and ONR. All references to Core Documents in this proof refer to the shared Core Document List.

1.3. Statement of Truth

21. The evidence which I have prepared and provide for this Appeal in this report is true and I confirm that the opinions expressed are my true and professional opinions.
22. This evidence has been reviewed by Dr Michael Charles Thorne considering his significant experience (as set out below) of emergency planning matters. I confirm though that, notwithstanding Dr Thorne's input, this proof remains my evidence.
23. Dr Thorne provided me with details of his personal qualifications and experience as follows:
24. "My name is Michael Charles Thorne. My qualifications include a BSc (Hons) degree and a PhD in physics. I am a Fellow of the Institute of Physics, an Honorary Fellow of the Society for Radiological Protection and a Chartered Radiation Protection Professional. I am also Editor-in-Chief of the Journal of Radiological Protection.
25. I have approximately 47 years of experience in operational and environmental radiological protection. For the last 15 years, I have advised SKB, Sweden on site characterisation activities relating to geological disposal of radioactive wastes. I also provide advice on radioactive waste disposal to organisations in the UK, Finland, France, Spain and the United States. In addition, I have extensive experience in the remediation of former uranium mining and milling sites, having led or participated in projects in Bulgaria, Slovakia, Albania and Romania. In the non-nuclear field, I have provided advice to the Channel Tunnel Safety Authority and on the safety of developments near chemically hazardous installations. I have also appeared as an expert witness in various public inquiries, hearings and civil trials in the UK and the USA and was a member of the WHO expert group that evaluated US liabilities for compensation in relation to

¹ Paragraph 22 on page 5

residents of the Rongelap Atoll in the Marshall Islands. I have published several books (comprising six volumes on radionuclides in the environment and two volumes on the pharmacodynamics of toxic metals, semi-metals, organic compounds and asbestos) and book chapters, as well as around 100 peer reviewed journal articles, mainly on the environmental transport of radioactivity.

26. I have undertaken several radiological impact assessment studies relating to proposed developments around AWE Aldermaston and AWE Burghfield and appeared as an expert witness at the Boundary Hall public inquiry (APP/H1705/V/10/2124548) (CD 5.22) and the Three Mile Cross inquiry (APP/P1425/W/22/330091) (CD 13.4).
27. Specifically, I prepared radiological impact assessments for appeals (dealt with via the written representations procedure) at Diana Close (APP/X0360/W/19/3240232), Croft Road (APP/X0360/W/21/3269790) and Hearn and Bailey Garage (APP/X0360/W/21/3271017)".
28. Dr Thorne appeared as an expert witness at the Kingfisher Grove Appeal (CD 8.3).

2. Executive Summary and Summary Proof

29. This Proof of Evidence looks at the Local Authority's reason for refusal of the proposed development of the land behind the Hollies based on concerns regarding the site's proximity to the Atomic Weapons Establishment (AWE) at Burghfield.
30. The appeal scheme comprises the erection of 32 dwellings including affordable housing, parking and landscaping on land to the rear of the Hollies, Reading Road, Burghfield Common.
31. Until 2019, the Proposed Development was outside the boundary of the DEPZ for AWE Burghfield. Part of the allocated site, 28 residential dwellings, was approved, built out and is now occupied. However, a new basis for defining the extent of the DEPZ under REPPiR [2019] (CD 16.24), has since been adopted and the site now lies inside the expanded boundary of the revised DEPZ. Therefore, because it lies within the expanded DEPZ, its implications for the off-site emergency plan must be addressed.
32. The local authority planning officer, the local authority emergency planner, the Office for Nuclear Regulation (ONR) and the AWE have all raised concerns about this matter.
33. The concerns are associated with fears that either the presence of a limited number of new homes within the DEPZ will overwhelm the ability of the responders to care for the community in the event of an accident at the site or will prevent the on-site responders from responding to the accident effectively or will, in themselves, represent a threat to the operation of AWE. In this regard, it is noted that the same OSEP covers AWE Aldermaston, and that the settlement of Tadley is located to the immediate south of AWE (A).
34. A recent appeal decision made on 31st January 2023 (Kingfisher Grove, Appeal Ref. APP/X0360/W/22/3304042) found these similar arguments when applied to another development in the area to be exaggerated (CD 11.2). While accepting (as did the Inspector in that appeal) that each case turns on its own facts, the concerns raised in this case have not to date raised any fundamentally new matters.
35. This Proof of Evidence briefly outlines the local authority's duties under the REPPiR regulations, analyses the stated objections based on the presence of AWE Burghfield, reviews

the risks posed to the local community, and those living on the proposed development, and shows that they are minimal.

36. It then reviews the Concept of Operations of the off-site plan and shows that a small increase in local population is unlikely adversely to affect it materially, that shelter would be an appropriate protective action at the development location and would be required only if the accident occurred while the wind was blowing in the general direction of the development site and during infrequent weather conditions that generally only occur during the night (it being understood that the AWE Burghfield site usually only operates during the daytime).
37. Evacuation would not be required at the development site for any foreseeable fault at AWE Burghfield. The off-site emergency plan (OSEP) (CD 5.42) considers the possibility of prompt evacuation to 150 m and phased evacuation to 600 m around chemical and transport incidents². The development site is over 2 km away.
38. Because of the nature of the release (plutonium dioxide powder)³ members of the public are only at risk while the plume is passing, once it has passed the dose uptake rate would be very much lower (around 1% of the plume passage dose). There will be no need for sheltering for more than a few hours in terms of dose avoidance (though residents may be asked to shelter for up to 2 days to allow full flexibility of operations in the local area for responders) and no need for eventual evacuation⁴ or relocation⁵.
39. The risk of an accident at AWE Burghfield with off-site consequences is extremely low. It can reasonably be assumed that the relevant Consequences Report has been prepared on the basis that a reference accident is no more likely than 1 in 10,000 years. Further, for the people at the development to be exposed, the wind from the AWE Burghfield site must be blowing in their direction. Even so, the doses likely to be received are comparable to those met in everyday life and these would pose no material threat to the health and wellbeing of the occupants of the development.

² Section 11AA, Page 235

³ The consequence report makes no mention of enriched uranium but it is mentioned on the OSEP. The properties outlined here for plutonium also apply to enriched uranium.

⁴ Evacuation is the rapid, temporary removal of people from an area to avoid or reduce short term radiation exposure in a nuclear or radiological emergency (a day to a few weeks). (IAEA glossary) (CD 16.49)

⁵ Relocation is the non-urgent removal or extended exclusion of people from an area to avoid long term exposure from deposited radioactive material. (IAEA glossary) (CD 16.49)

40. The Proposed Development is so distant from AWE Burghfield that urgent evacuation would not be required even for extreme accidents (as is confirmed in the off-site emergency plan), and longer-term relocation will not be necessary for those living on the site.
41. The possibility that the additional homes will reduce the effectiveness of the response on-site is discussed and it is shown that the additional traffic on the roads resulting from a development of 32 homes (we can assume that any self-evacuees will head in the opposite direction) will not materially affect the ability of emergency services travelling under blue lights and sirens to travel to or from the AWE Burghfield site.
42. The possibility that a limited number of additional homes could pose a direct threat to the operation of the AWE Burghfield site is not realistic.
43. Finally, this Proof of Evidence explains the potential consequences should the OSEP be found to be not fit for purpose. Rather than closure of the AWE Burghfield site it seems likely that the local authority would be compelled to improve the OSEP or the Secretary of State for Defence would invoke the MOD exemption and suspend REPPiR compliance while remedial action was taken rather than allow vital defence programmes to be delayed.
44. Overall, although the location of the proposed development within the DEPZ of AWE Burghfield is a material planning consideration, the arguments presented in this proof show that it is a matter that can be satisfactorily addressed without prejudice to the efficacy of the OSEP.
45. This is in accordance with the position of the Secretary of State in relation to the Boundary Hall, Tadley development (CD 5.22) where it was concluded that *“while he does not seek to minimise the potential impact of any individual dose [assumed in the decision letter to be around 20 mSv], the Secretary of State considers that this should be placed in the context of the probability of such a dose arising which, while unquantified, has been described as ‘extremely remote’... Added to this, he has taken account of the fact that there is no evidence that the Off Site Plan for dealing with such emergencies would fail; and he is satisfied that the intensification of population density is not, in itself, a reason to refuse planning permission. The Secretary of State considers that these factors temper the weight to be attached to the risk of a materially harmful radiation dose relative to the benefits of the proposed scheme. No*

activity can ever be regarded as being risk free, each case has to be considered on its own merits, and the Secretary of State concludes that the potential benefits of this scheme, coupled with the fact that is generally in accordance with the development plan, outweigh the real, but very small, risks attached.”⁶

⁶ Paragraphs 22 and 23.

3. Outline of the proposal

46. The site behind the Hollies residential home, was allocated for 60 dwellings in the Adopted Housing Site Allocation Development Plan. One part of the site is built out. An application for the remaining 32 dwellings was rejected in June 2022.
47. The refusal of the development despite its allocation was largely because of the recent expansion of the Detailed Emergency Planning Zone (DEPZ) of the Atomic Weapons Establishment at Burghfield AWE(B), which now encompasses the site. The Council, AWE/MOD and ONR have expressed concerns about the adequacy of the existing off-site emergency plan (OSEP) in relation to the development (and the expanded DEPZ in general) and about the effect the development might have on the operation of AWE(B).
48. The local authority has duties under the Radiation (Emergency Planning and Public Information) Regulations (2019) (CD 5.39) to *“make an adequate off-site emergency plan ... designed to mitigate, so far as is reasonably practicable, the consequences of a radiation emergency outside the operator’s premises”*⁷. This plan must cover the DEPZ, hence the increase in area of the DEPZ in 2020 required the local authority and the other emergency responders to undertake detailed planning over a wider area than previously. They have now had several years to manage this. As part of this exercise, local authorities took into account consented but unbuilt development located within the newly expanded DEPZ (CD16.7)⁸.
49. The OSEP is not a fixed entity. It can be updated when, for example, contact details change and must be reviewed and tested at suitable intervals not exceeding three years unless otherwise agreed by the regulator. *“Reviewing is a fundamental process, examining the adequacy and effectiveness of the components of the emergency plan and how they function together.”*⁹. The review should consider, among other things, *“any changes in the detailed emergency planning zone or outline planning zone; for example, a new school or hospital”*¹⁰ and should demonstrate *“whether any reasonable improvements can be made to the plan”*¹¹.

⁷ Regulation 11 on page 63 of the Approved Code of Practice (ACOP) (HSE 2020) (CD 5.39)

⁸ Paragraph 5.11.1 on page 3

⁹ Paragraph 378 of guidance on page 70 of ACOP

¹⁰ Paragraph 378(c) of guidance on page 70 of ACOP

¹¹ ACOP paragraph 373(g) on page 69 of ACOP

It is expected that the off-site plan will evolve as technology, best practice expectations and the population distribution and commerce in the area evolves.

50. The most recent Consequence Report for AWE Burghfield is dated November 2019 (CD 5.31). In 2022 AWE published a “Declaration of No Change” (CD 11.5) which concluded that *“The evidence gathered by the review process has concluded there has been no change in circumstances or material change which would affect the conclusions of the previous hazard evaluation or consequence assessment required by Regulations 4(1) and 5(1)”*. Thus the 2019 report remains extant.
51. While the three-year review of the Consequence Report for AWE Burghfield reported that there was no change, the Council Decision on the matter (CD 5.40) reported two relatively minor changes were made to the boundary of the DEPZ for AEW(B) resulting in a small increase in area, the inclusion of the Six Bells at Shinfield and the inclusion of two additional properties by the river Loddon¹². **The report sets an action to revise the AWE OSEP to mitigate the impact for those people and properties now included in the DEPZ¹³.**
52. REPPIR Regulation 16¹⁴ allows the local authority to charge the operator a fee for the performance of the local authority’s functions in relation to the off-site emergency. Thus, the cost of the plan and its management are borne by the operator and not the local taxpayer.

¹² Appendix A of report

¹³ Section 7.1(a)

¹⁴ Regulation 16 on page 82 of ACOP

4. Summary of objections based on AWE Burghfield

53. The key objection from the ONR, provided by email on 19 March 2022 was that the local emergency planners had not provided adequate assurance that the proposed development could be accommodated within their existing off-site emergency planning arrangements. They made no mention of the possibility of an amended version potentially being more capable (CD 5.47).
54. They also have concerns that the challenges faced when the DEPZ was expanded in 2020, the inclusion of significant population centres; the M4 motorway; and the Madjeski Stadium, have not yet been fully met (CD 12.1)¹⁵.
55. In August 2021, ONR wrote to the Chief Executive Officer at the Council (and three neighbouring local authorities) expressing concern that further development in the DEPZ would have the potential to impact upon the adequate implementation of the off-site emergency plan¹⁶. They do not report if this process led to an agreed recovery plan.
56. In their Appeal Statement of Case (CD 11.1) West Berkshire Council state four main issues three of which are on other matters but the third of which is *“Whether the public in the proposed housing development would be safe from irradiation within the Detailed Emergency Planning Zone of the Atomic Weapons Establishment Burghfield in the event of the emanation of irradiation over the application site¹⁷”*.
57. The AWE Statement of case includes 4 grounds of which the following are relevant to emergency planning:
- Ground 2: further residential development in the Detailed Emergency Planning Zone (DEPZ) poses an increased risk to public safety;
 - Ground 3: an increased local population has the potential to adversely affect AWE’s operations; and
 - Ground 4: the Appellant’s proposals do not address these issues.

¹⁵ Paragraph 36 on page 13

¹⁶ Paragraph 43

¹⁷ Section 4 on Page 15.

58. The Case Management Conference Summary Note identifies that the main issues in this appeal case are likely to relate to:

- 1) *The effect of the proposal on the safety and wellbeing of future residents of the proposed development, and the wider public, with regard to the proximity of the Atomic Weapons Establishment (AWE) site at Burghfield;*
- 2) *The effect of the proposal on the future capability and capacity of AWE Burghfield to operate effectively;*

and two other issues.

59. If I can provide reassurance that:

- (a) the people living and working in the development are not at material risk to their health and wellbeing from the AWE Burghfield site;
- (b) that the people on the development will not provide a significant burden to the emergency services in the event of a Radiological Accident at the AWE Burghfield site such that they degrade the service offered to others (ie, materially adverse safety impacts, as opposed to inconvenience); and that
- (c) the development will not hamper current and future use of the AWE Burghfield site,

then the objections of the ONR and AWE/MOD and the local council emergency planners fall away.

5. Discussion of the objections to the application

60. This section discusses the emergency planning related objection in turn.

5.1. Presumption of rejection of planning applications

61. The Council's decision to refuse is explained within the Officer's Report (CD 4.1) and decision notice to application 22/00244/FULEXT dated 1st June 2022 (CD 4.2) This notes that the site was allocated and accepted in the HSADP of 2017 but since that decision the AWE(B) DEPZ has been extended and now includes the proposed development site.

62. It claims that the whole of the newly enlarged DEPZ would now be subject to an ONR presumption against permission to develop that the ONR had declared for a smaller area as noted in paragraph 5.43 of the West Berkshire Core Strategy (2006 – 2026) (CD 04.01.01) as adopted July 2012 "as the additional resident population would compromise the safety of the public in the case of an incident at AWE."

63. The paragraph 5.43 referred to in the Local Authority's decision not to grant approval comes from a document entitled "West Berkshire Core Strategy (2006 – 2026)" (CD 5.52) of the West Berkshire Local Plan which was adopted July 2012.

64. This states that "*The ONR's decision whether to advise against a particular development is based on complex modelling. The ONR has indicated that on the basis of its current model for testing the acceptability of residential developments around the AWE sites, it would advise against nearly all new residential development within the inner land use planning zones defined on the Proposals Map*"¹⁸ (no references are given to the work nor rationale supporting this statement). However, paragraph 5.44 goes on to say that during the plan period there are likely to be changes in the inputs to the ONR's model including the 2011 Census, the PEGASUS Project, due to complete in 2021, at AWE Aldermaston and the MENSA project, due to end in 2016, at AWE Burghfield which "*may enable a less constraining population density criteria to be applied*". **I conclude that ONR did not suggest a permanent and total ban on development within the current DEPZ, rather a probable reluctance to approve most development within a smaller zone, at least until improvement projects at the sites complete (and according to the schedule presented by ONR they should now be complete).** I understand from Ms Miles that it is a matter for the Council's emerging Local Plan whether a new policy (along the lines

¹⁸ Paragraph 5.43 on page 58

of draft policy SP4) is adopted. I note that the area covered by the original inner land use planning consultation zone was 7 km² (based on radius of 1,500 m, whereas the area of the UPZ is 31.4 km² (based on a radius of 3,160 m). The new area covered is more than 4.4 times larger and the DEPZ larger still.

65. Policy CS 8 (CD 13.14)¹⁹ states that *“In the interests of public safety, residential development in the inner land use planning consultation zones of AWE Aldermaston and AWE Burghfield is likely to be refused planning permission by the Council when the Office for Nuclear Regulation (ONR) has advised against that development”* so it is worthwhile to look at the ONR consultation process.
66. In a Freedom of Information Act 2000 (FOIA) response in December 2021 (CD 5.45), the ONR described themselves as a non-statutory consultee who *“consider all planning applications on a case-by-case basis.”*
67. The ONR’s consultation criteria (CD 5.46)²⁰ states that they would seek to be consulted if a proposed development could lead to an increase in residential or non-residential populations, thus impacting on the off-site emergency plan, if a development might pose an external hazard to the site, or if it could introduce vulnerable groups to the DEPZ.
68. It goes on to state that: *“ONR ... does not advise against the proposed development on planning grounds if, in its opinion, the following statements apply:*
- *the local authority emergency planners, if consulted, have provided adequate assurance that the proposed development can be accommodated within their existing off-site emergency planning arrangements (or an amended version); and*
 - *the development does not represent an external hazard to a nuclear site or the planning function for the site that may be affected by the development has demonstrated that it would not constitute a significant hazard with regard to safety on their site”²¹.*
69. Since ONR have themselves rejected bullet point 2 in relation to the proposed development (CD 12.1)²², I conclude that **if West Berkshire Council had expressed more confidence in their**

¹⁹ Section 5 on page 64.

²⁰ Table 2.

²¹ Paragraph 3 on page 5.

²² Footnote 3 on page 6.

own off-site plan, then the ONR objection as stated would be withdrawn.

70. A spreadsheet issued under FOIA (CD 5.45) shows the consultations that ONR have responded to. This shows that they have “advised against” more than 50 applications all of which are within the DEPZs of either AWE Aldermaston or AWE Burghfield. Across all the licensed sites except AWE Aldermaston and AWE Burghfield they approve many more than they reject including an application to construct 204 dwellings within the DEPZ, in fact close to the site fence, of the Devonport Royal Dockyard (CD 16.40) which is in a built-up area (ONR statement at CD 16.41).

5.2. The potential for AWE(B) to be adversely affected by the proposed development

71. The council (and AWE) objection quotes, para 97 of the NPPF of 2021 (CD 13.17) *“planning policies and decisions should promote public safety and take into account wider security and defence requirements by*

a) ...

b) recognising and supporting development required for operational defence and security purposes, and ensuring that operational sites are not affected adversely by the impact of other development in the area”

and uses this to support its rejection of planning permission but fails to provide any evidence in their Statements of Case that the proposed development might affect the operation of AWE Burghfield. AWE made comparable assertions in its written representations to the Kingfisher Grove inquiry (CD 8.3), but these were not accepted by the Inspector.

72. We might interpret *“ensuring that operational sites are not affected adversely by the impact of other development in the area”* in the same way that ONR do in Table 3 on their land use planning website (CD 5.46). That is ensuring that no new external hazards are introduced to the immediate area such as explosive or toxic chemicals, potential missiles (damaged wind turbine, for example), electromagnetic interference, seismic activity (from quarrying, mining or fracking) which could cause an interruption to operations on the site. Clearly a limited number of houses at a distance of 2 km do not constitute an external hazard to the AWE(B) site.

73. Noting again that ONR have distanced themselves from the argument that AWE(B) might be affected by an external hazard from the proposed development (CD 12.1)²³.

5.3. The line in the sand

74. In a meeting on 5th October between the Appellant, the Council's Planning Officer (Mr Butler) and the Emergency Planning Officer (Ms Richardson) (CD 5.13)²⁴ the Emergency Planning Officer referred to needing to draw a '*line in the sand*' somewhere, and she therefore took a personal view and chose to draw that line so as to exclude sites which were allocated for development in the Development Plan but which did not, at the time of the review, have permission. There is no record of this important and somewhat arbitrary decision being discussed among the local authority strategic decision makers nor was any rationale offered.

75. ONR has not to date stated whether it is aware of what was included and what was not included in this criterion.

5.4. The potential impacts of the health and wellbeing of the public

76. One of the concerns expressed about the proposed development is the effect on the safety and wellbeing of future residents of the proposed development and the wider public, with regard to the proximity of AWE(B). So, I will quantify these impacts based on a full range of publicly available information.

77. To consider the potential impacts on members of the public we need to consider the potential for a radiation emergency at the AWE(B) site looking at what could happen. We need to estimate the frequency of radiation emergencies and the potential additional radiation doses to those living at the proposed development site and the health implications of those additional radiation doses.

78. We should also consider the potential wellbeing issues that might face a community after the event although these are not within the scope of the REPIR-19 OSEP which concentrates on the ability to deliver prompt protective actions (CD 5.39).²⁵ Further, wellbeing issues fall to be addressed with accurate public information in relation to protective actions and post-event considerations.

²³ Footnote 3 on page 6.

²⁴ Paragraph 2

²⁵ Paragraph 294 of guidance on page 66.

5.4.1. The potential for the release of radioactive particles from the site

79. The operators are understandably discreet about the activities that take place on the AWE Burghfield site, but some communication is required by law to allow the local authorities to prepare suitable emergency plans.
80. The Radiation (Emergency Preparedness and Public Information) Regulations 2019 (REPPiR) (CD 5.39) require that the operator of a nuclear site make a detailed written evaluation of their operations to understand the potential for radiation accidents on their site. They then must take all reasonable steps to prevent the occurrence of a radiation emergency and to limit the consequences of any such emergency (Regulation 4)²⁶. Regulation 5 requires that they “consider and evaluate a full range of possible consequences of the identified radiation emergencies, both on the premises and outside the premises, including the geographical extent of those consequences and any variable factors which have the potential to affect the severity of those consequences”²⁷ and Regulation 7 requires that they communicate the findings of these investigations to the local authority in the form of a consequences report²⁸, the minimum contents of which are detailed in Schedule 4 of the regulations.²⁹
81. The Consequence Report (CD 5.31) for the site admits the possibility of an “explosive distribution”³⁰. This is understood to mean an accidental triggering of high explosives close to a component containing plutonium. The explosion would throw the plutonium³¹ as a cloud of dust above the explosion scene from where it would float downwind, spreading out as it goes and depositing on the ground and other surfaces.
82. We can fairly assume that in an explosive distribution almost all of the radioactive material that was going to be released would be released at the time of the explosion. There may be some released later by fires or by the actions of the responders but these would be a small fraction of the initial release. The consequence report makes no mention of a continuing release after the explosive distribution.

²⁶ Regulation 4(1) – 4(4) on page 32

²⁷ Regulation 5(1) on page 42

²⁸ Regulation 7(1) on page 49

²⁹ Schedule 4 on page 162

³⁰ Paragraph 3c on page 4

³¹ The Consequence Report only mentions plutonium and plutonium oxide but other documents also mention uranium. Like plutonium uranium is principally an alpha emitter giving little external radiation (cloud and ground shine) and is poorly absorbed in the gut so ingestion dose is also low.

83. In event of a release of radioactive material in the atmosphere, the public downwind at the time could receive radiation dose from several “pathways” comprising,
- First pass inhalation dose (breathing in the radioactive dust as it floats by on the air);
 - Cloud shine (from radiations emanating from the radioactive dust cloud as it passes by);
 - Ground shine (from radiations emanating from radioactive dusts deposited on the ground and other surfaces);
 - Resuspension dose (from inhaling activity that had been deposited on surfaces but then kicked back into the air by some process);
 - Ingestion dose from eating foods contaminated with the radioactive dust.
- First pass inhalation dose and cloud dose occur only during plume transit. Ground dose, resuspension dose and ingestion dose can continue after the event.

84. Only one of these pathways is important for a release of plutonium.
- Inhalation is important because if people breath in plutonium-bearing dust it can lodge in the lungs.
 - Cloud shine is not important because plutonium does not emit penetrating radiations.
 - Ground shine is not important for the same reason that cloud shine is not. Namely the lack of penetrating radiations³².
 - Resuspension is worth considering but it can be shown that the resuspension inhalation dose in the year following deposition would be about 1% or less of the first pass inhalation dose³³.
 - Ingestion dose will be low because of the poor uptake of plutonium into crops (other than direct contamination) and the fact that it is poorly absorbed by the gut and rapidly excreted. Further, we might reasonably expect precautionary bans on food grown in the area, at least while measurements of the activity in foods are made (but possibly in any event).

³² This is a very different situation to Chernobyl and Fukushima where the radioactivity released included a variety of fission products which emit penetrating radiation such that people near contaminated surfaces (the ground, walls, trees etc) are subject to additional radiation dose long after the plume has passed.

³³ When a plume of radioactive dust travels across an area, a fraction of the activity is deposited onto the ground. Of this fraction, a further fraction can be resuspended over time. Taking plausible values for these fractions from the literature (1×10^{-2} Bq.m⁻² per Bq s m⁻³ (CD 16.48 page 65) and 0.72 Bq s m⁻³ per Bq m⁻² over a year (CD 16.48 table 18, page 42), it follows that the dose over one year from resuspension is likely to be about 1% or less of the original plume transit dose.

85. The material that would dominate public radiation dose in the unlikely event of an explosive distribution accident at AWE(B) would be plutonium (which is an alpha emitting actinide) as an inhalable plutonium oxide.
86. The report states that *“Overall, the primary concern for early response decision-making to radiation emergencies involving possible accidents at the Burghfield Site only merits consideration of the first-pass inhalation dose and therefore sheltering is the recommended urgent protective action”*³⁴.
87. The report continues: *“It has been assessed that the first-pass inhalation dose is the most significant by far, for initial emergency response purposes, which has resulted in the recommendation to shelter as the most appropriate urgent protective action. This should be coupled with a restriction on the consumption of all locally produced food, until the direction of the plume and the extent of the contamination has been fully investigated, examined and understood. Appropriate local instructions should then be made available to the public based on the prevailing conditions”*³⁵.
88. This is important. Anybody outside and downwind of such an accident would only be incurring material dose uptake while the cloud of radioactive dust produced by the explosion was passing by. Before the dust cloud arrives and after it departs there is no material dose uptake to be averted by protective actions and no material risk. **Almost all the dose uptake occurs during plume transit.**
89. Basing the OSEP on this fault sequence was not introduced with REPIR-19. An ONR report (CD 5.44)³⁶ written in 2018 under the REPIR-01 (CD 5.38) requirements identifies the reference accident³⁷ as *“a detonation within a cell. This could result in radioactive materials being dispersed into the air in a plume carried off-site by the speed and direction of the wind”*. It agreed that *“The contributions of external irradiation from the passing plume or from deposited uranium/plutonium, and ingestion dose have been assessed as negligible due to the nature of these materials. Inhaled dose as a result of resuspension of deposited*

³⁴ Paragraph Part 2 3.g

³⁵ Paragraph Part 3 1.b

³⁶ Section 5.1 on Page 6.

³⁷ The ONR defines a reference accident as “one of a spectrum of reasonably foreseeable radiation emergencies that gives rise to the most significant off-site consequences” (CD 16.42 page 13)

uranium/plutonium material has also been assessed as negligible". That is, they agree that a person will only be at risk of additional radiation doses, predominantly inhalation doses, for the limited time in which the airborne plume is passing them.

90. We might suppose that the plume from the explosion has a transit time at a point downwind of a few minutes, certainly no more than half an hour and that this would start at a time determined by the distance from the site divided by the wind speed at the time.
91. More energetic faults, which produce a range of fission products, are mentioned in the Consequence Report³⁸ but not elaborated upon, giving no information against which an emergency planner can scope a response.
92. It is assumed that this refers to criticality incidents that may result in a sudden emission of gamma and neutron radiation and then the release of fission products. The radiation emitted could well be fatal to people in the immediate vicinity of the incident but would represent no real threat to people as far away as the proposed development.
93. Since AWE have not expanded on this fault so as to facilitate any consequential off-site emergency planning, it is assumed that the fission product release would cause lower off-site doses than the explosive distribution.
94. The OSEP (CD 5.42) also notes the possibility of a tritium release. Tritium is of low radiological toxicity and would rapidly disperse in the environment but can cause harm if it gets inside a human body. However, the OSEP states that "an accident involving the dispersion of plutonium would present the greatest potential hazard to the public if it were to occur"³⁹ and is thus the accident to use to scope the OSEP based on the presumption that the resulting plan can cope adequately with the different faults that have been considered.
95. The ONR [2018] (CD 5.44) noted that high consequence, low frequency external events such as aircraft impacts were considered in the AWE safety case and no faults were identified that give rise to a significant off-site release of radiation. Also, the inadvertent [nuclear] detonation of a warhead was judged to be well beyond a reasonably foreseeable occurrence⁴⁰ A security

³⁸ Paragraph Part 2, 3.d

³⁹ Section 2.8 on page 24

⁴⁰ Section 5.2 on page 7

review was also undertaken by AWE Plc and was assessed separately by the Defence Nuclear Safety Regulator, and ONR judged that it is not reasonably foreseeable for any security related event to lead to public dose consequences beyond the reference accident⁴¹.

96. The Consequence Report does not discuss the possibility of a significantly more severe fault than the explosive distribution event upon which the OSEP is prepared but, since we are told that the site works on a batch system (AWE, 2011) (CD 5.30)⁴² we can infer that the amounts of radioactive material outside the strong and secure stores at any one time are strictly limited by work protocols. Thus, we can suppose that significantly more severe accidents are even more unlikely than the one we plan against if not inconceivable.
97. By comparing estimates of the avertable radiation dose to the public resulting from the explosive distribution accident sequence with the Emergency Reference Levels of dose recommended by PHE (now the UKHSA) (CD 13.28)⁴³, the Consequence Report recommends a distance of 3,160 m *“selected as the minimum geographical extent of the Detailed Emergency Planning Zone about the Burghfield Site Centre Location⁴⁴”*.

5.4.2. Estimating the frequency of the reference accident

98. We need an estimate of the frequency of a radiation emergency at AWE(B) in order to be able to estimate the risk posed to individuals living at the proposed development from the operations at AWE(B).
99. ONR (CD 5.44)⁴⁵ reports that a Burghfield Report of Assessment (a REPPiR-01 requirement) was written claiming that there were no reasonably foreseeable faults that could lead to a radiation emergency at AWE Burghfield. If accepted, this would have removed the need for a DEPZ around AWE Burghfield and the need for a local authority off-site plan. When challenged to look harder for a potential reference accident, AWE proposed a chain of events involving earthquakes and inadvertent detonations of conventional explosives but then introduced operational restrictions such that the sequence is no longer reasonably foreseeable. They then agreed the detonation in a hot cell as the Reference Accident with ONR.

⁴¹ Section 5.2 on page 7

⁴² Paragraph 6 on Page 5

⁴³ Table 4 on page 18.

⁴⁴ To clarify, the DEPZ is centred on the centre of the nuclear licensed site at OS grid reference SU 684 680 rather than being centred on the whole site.

⁴⁵ Section 5.2 on page 6

100. The reason the above paragraph is relevant is that it provides strong circumstantial evidence that the accidents used in the current Consequence Report are at the lower end of the probabilities considered for detailed planning in REPP-01. A numerical value for “reasonably foreseeable” was never officially agreed but it was considered to be about 10^{-5} yr^{-1} (1 in 100,000 years) with pressure to look down to about 10^{-6} yr^{-1} (1 in 1,000,000 years) for potential “cliff edges”⁴⁶.
101. We can reasonably assume that, because the explosive distribution fault has been used to scale the UPAZ, it is the fault that gives the largest dose of all those faults that are more likely than 10^{-5} yr^{-1} (presented as 1 in 20,000 over 5 years in the Regulations) as this is the descriptor for the boundary between the need for detailed emergency planning and outline emergency planning⁴⁷. It may even be as low as $1 \times 10^{-6} \text{ yr}^{-1}$ as this is the limit of the sensitivity range that operators are advised to explore to prevent cliff edge effects in their work.
102. That result is consistent with AWE arguing that there were no “reasonably foreseeable” faults as the boundary of that term in REPP-01 was, as discussed above, taken to be about $1 \times 10^{-5} \text{ yr}^{-1}$ with checks down to $1 \times 10^{-6} \text{ yr}^{-1}$ to avoid cliff-edge effects.

5.4.3. Estimating the dose implication of a potential release of radioactive material

103. Having identified the fault sequence in the appropriate frequency band with the highest consequence it is necessary to estimate how far downwind urgent protective actions might be beneficial in order to define the required capabilities, scale and urgency of the OSEP. It is also required to estimate the risk to those living at the proposed development from the operations at AWE(B).
104. It can be shown that the rate at which material suspended in the air spreads out (“disperses”) as it flows downwind is sensitive to the weather conditions at the time, and in particular the turbulence of the lower atmosphere. It is possible to identify a limited number of “weather

⁴⁶ Cliff edges describes the situation where the severity of the fault identified as the reference accident is greatly increased if the target frequency threshold is slightly changed. It can be used to ensure that uncertainties in frequency estimates do not greatly affect severity of the chosen fault sequence.

⁴⁷ The value of 1 in 20 000 in a five-year period represents the lowest likelihood considered in the national risk assessment and so it is taken to be appropriate to use this as the lowest likelihood for which detailed emergency planning should be required and the point at which outline planning (or even no emergency planning in the case of low-consequence events) is sufficient. (Paragraph 172, Page 39 of REPP-19 ACOP) (CD 5.39).

categories” or conditions that adequately cover most observed weather situations and, for each of these measure dispersion in careful experiments. This provides data which then allows computer codes to be used to predict the expected dispersion in a wide range of situations.

105. A commonly used scheme for modelling atmospheric dispersion is the R91 model, named after the number of the first report describing its development (CD 16.19). This uses the Pasquill descriptions of atmospheric stability identified by the letters A to F (sometimes G). It is observed, in this scheme, that Pasquill Category D is the most frequent category recorded in UK weather and also the category that yields average dispersion. On the other hand, Pasquill Category F is relatively infrequent and produces relatively little spreading of the plume⁴⁸. It occurs only on cold clear nights with slight winds⁴⁹ which produces very little turbulence in the atmosphere so very little spreading.
106. The amount of dust that someone downwind of a short duration release will breathe in is inversely proportional to the wind speed; if you double the wind speed you half the time the airborne plume takes to pass you and therefore half the amount you breath in. The choice of a low wind speed provides a conservative estimate of likely dose.
107. The two key parameters you need for the R91 model are the Pasquill weather category (A – G) and the wind speed. You also need the wind direction to understand where the plume goes and several other parameters covering further details.
108. REPPIR-01 guidance (CD 5.38) advised that the downwind doses from a radiation accident be assessed using average weather conditions, a combination of Pasquill Category D and a wind speed of 5 m/s (commonly denoted as D(5)) (HSE, 2002)⁵⁰. This was consistent with REPPIR and ONR advice that probability and dose estimates should use best-estimate analysis and avoid unwarranted conservatism (ONR, 2018)⁵¹.

⁴⁸ The dispersion of radioactivity (a measure of how it spreads out horizontally and vertically as it moves downwind) is affected by the turbulence in the atmosphere. This is affected by barriers such as buildings, trees and hills but more so by the temperature of the ground (higher ground temperatures results in more thermal turbulence and more dilution). Thus, plumes tend to be narrow on cold, still winter nights and broader on sunny days. Therefore, higher concentrations downwind but over a smaller width tend to occur on still nights.

⁴⁹ See table 2 in Wikipedia page (CD 16.43) which shows category F only occurring at night, with low wind speeds and little cloud cover. I have used this Wikipedia page because it provides a simple and accurate explanation of relevant matters.

⁵⁰ Paragraph 62 on Page 18

⁵¹ Paragraph 5.2

109. REPIR-01 guidance (CD 5.38) required that the estimate of the distance downwind that a dose of 5 mSv would be incurred by an unprotected person be used to determine the minimum extent of the DEPZ (HSE, 2002)⁵².
110. ONR (CD 5.44)⁵³ concluded that a DEPZ of 1.252 km based on a 5 mSv avertable dose contour was appropriate. The proposed development site is outside this range.
111. REPIR-19 guidance (CD 5.39) also requires that “*Best-estimate methods and data should be used as far as possible in the hazard evaluation for determining likelihood of the initiating events*”⁵⁴.
112. Schedule 3(3) of REPIR-19 (CD 5.39) requires that:
(3) The calculations undertaken in order to reach the assessment must consider a range of weather conditions (if weather conditions are capable of affecting the extent of the radiation emergency) to account for—
(a) the likely consequences of such conditions; and
*(b) consequences which are less likely, but with greater impact*⁵⁵.
113. In fact, the AWE Burghfield Consequence Report, in common with a number of other consequence reports written by other Companies, just gives the value based on conditions that are less likely but with greater impact, namely Pasquil Category F weather with a wind speed of 2 m/s. **These F(2) conditions typically only occur on a cold winter night**⁵⁶.
114. It may be considered relevant by the Inspector that the extent of the DEPZ is based on weather that only occurs during the night since the post-Fukushima “Stress Test” report for the AWE sites (CD 5.30)⁵⁷ states that “*Operations are undertaken on a batch production basis, almost wholly during standard daytime working hours with nuclear production materials stored overnight in safes within the nuclear facilities*”.

⁵² Schedule 1 on page 91

⁵³ Section 5.1 on page 6

⁵⁴ Paragraph 121 on page 38

⁵⁵ Schedule 3(3) on page 157

⁵⁶ See table 2 in Wikipedia page (CD 16.43) which shows category F only occurring at night, with low wind speeds and little cloud cover. I have used this Wikipedia page because it provides a simple and accurate explanation of relevant matters.

⁵⁷ Paragraph 6 on page 5.

115. It seems likely that for most of the time that the area is experiencing category F weather AWE(B) is not operational and the nuclear production materials safely stored. It is also likely that fewer people are out and about in the local area, rather than in their homes. One apparent contrast would be an evening kick-off at the Majewski stadium (capacity: 24,161), Reading FC's stadium which is located within the expanded UPZ / DEPZ.
116. REPPIR-19 guidance (CD 5.39)⁵⁸ requires the consideration of "*the distances in which urgent protective action may be warranted for the different source terms when assessed against the relevant emergency reference level (ERL)*". For shelter, this means a projected dose (unprotected dose) of 7.5 mSv.⁵⁹
117. The Consequence Report gives this distance as 3,160 m and hence recommends this as the minimum radius of the DEPZ for AWE Burghfield. This distance is often termed the Urgent Protective Action Zone (UPAZ).
118. I note that the Crest Nicholson et al Judicial Review (CD 8.4)⁶⁰ concluded that the Consequence Report gave an adequate rationale for the increased size of the DEPZ. The increased DEPZ has therefore been lawfully arrived at, and does not arise in this appeal. However, it is relevant for the Inspector to note that the only difference between old and new UPZs is the inclusion of category F weather conditions in setting the latter. Levels of risk are unchanged.
119. In summary, the accident presented as the "reference accident" in the consequence report is one due to a chemical detonation of high explosives in a cell with the release of plutonium (or enriched uranium) to the atmosphere. Under average weather conditions, such an accident could result in an individual effective dose of about 5 mSv at 1,252 m downwind of the centre of the AWE Burghfield site, but under adverse weather conditions that occur less frequently (and only at night), the individual effective dose could be up to 7.5 mSv on the plume centreline at 3,160 m downwind of the centre of the site. In either case, the dose would be

⁵⁸ Paragraph 196 on page 44

⁵⁹ Shelter is assumed to reduce inhalation dose by 40% (PHE, 2019b)⁵⁹ so shelter, if implemented in time at this dose would avert $0.4 \times 7.5 \text{ mSv} = 3 \text{ mSv}$ which is the lower Emergency Reference Level (ERL) for shelter.

⁶⁰ Paragraph 101

almost entirely due to inhalation of radioactive material as the plume passed. It is this fault that is used to set the size of the UPZ / DEPZ and therefore the scope of the off-site plan.

5.4.4. The potential impact to human health of incidents at AWE Burghfield

120. Google Earth (see below) shows that the development site is approximately 2.4 km from the centre point of the Urgent Protection Zone at a heading of approximately 260 degrees.

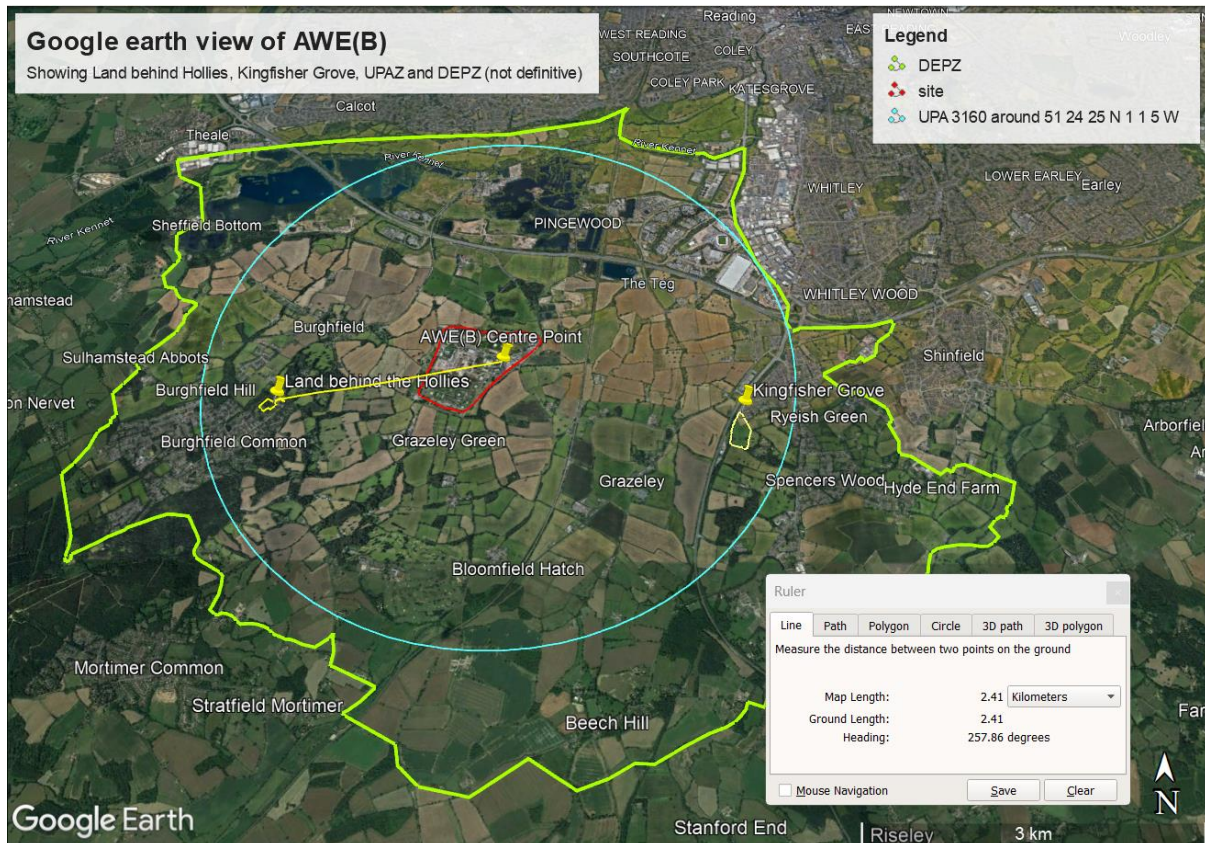


Figure 1 - Google earth view of the site

121. Given the two dose estimates and the knowledge that various studies have shown that the effective dose varies approximately as x^{-n} , where x (m) is the distance downwind from the release location and n is a numerical coefficient that typically takes a value of 1.5 (Highton and Senior, 2008)⁶¹ we can estimate the potential doses at the proposed development site thus:

$$\text{Category F(2)} \quad 7.5 \times (2400/3160)^{-1.5} = 11.3 \text{ mSv}$$

$$\text{Category D(5)} \quad 5.0 \times (2400/1252)^{-1.5} = 1.9 \text{ mSv}$$

⁶¹ Page 8

122. An alternative to this process is to use the plots of dilution factor as a function of distance given in CD 16.19 as seen below. These give consistent answers.

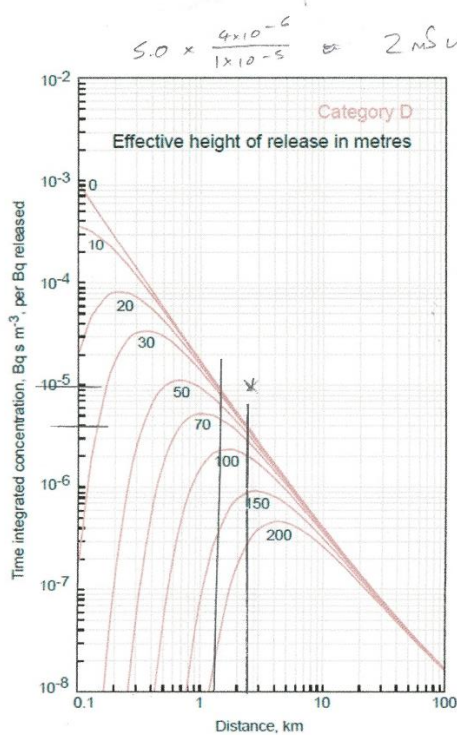


FIGURE 13(d) On-axis ground-level time-integrated concentrations as a function of effective release height for a short (30 minute) release – category D

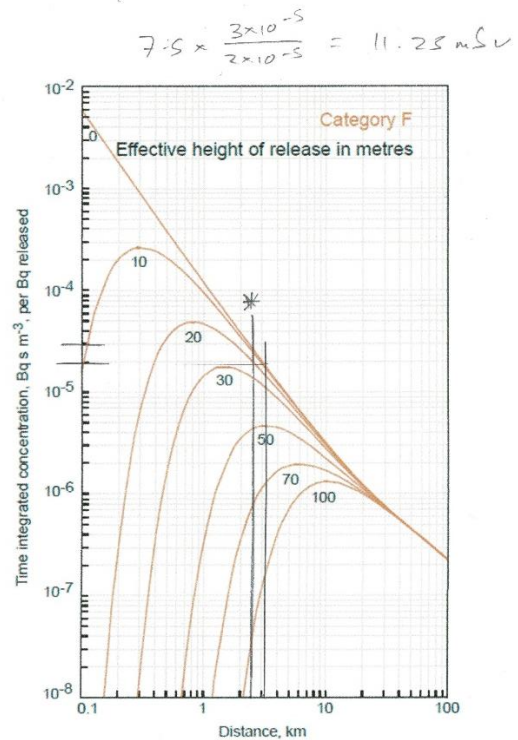


FIGURE 13(f) On-axis ground-level time-integrated concentrations as a function of effective release height for a short (30 minute) release – category F

Figure 2 - R91 dilution curves

123. Thus, if the accident occurs while the wind is blowing towards the site the projected dose⁶² at the site to a member of the public would be 11.3 mSv in Category F(2) and 1.9 mSv in Category D(5).
124. Given that the lower ERL for shelter (3 mSv) is taken to be reached for a projected outside dose of 7.5 mSv the protective action advice process would ideally⁶³ result in advice to the people at the development site to shelter in Category F(2) weather conditions but not in D(5) weather conditions.
125. The REPIR Risk Framework (CD 5.39)⁶⁴ describes doses in the range 1 – 10 mSv (the dose to an unprotected person under average weather conditions is estimated to be 1.9 mSv) as

⁶² Projected dose is the dose received over the full time of exposure without protective actions as opposed to the residual dose which is the dose received over the full duration if protective actions are taken. Averted dose is the difference between projected and residual dose.

⁶³ In this ideal world the decision makers have sufficient information and time to give the appropriate advice.

⁶⁴ Appendix 2, Figure 1 on Page 197

“Minor” with no potential for deterministic effects, minimum health and safety impacts, unlikely to have life changing consequences other than a potential for self-imposed restrictive changes in normal life activities and assumed asset value depreciation.

126. The range 10 – 100 mSv (the dose to an unprotected person under the more restrictive weather conditions is estimated to be 11.3 mSv) is described in the REPPIR Risk Framework as having no potential for deterministic effects, a “very small” (0.5%) increased risk of cancer induction, some enforced prevention of interruption of normal life activities, asset value depreciation and restricted or temporary loss of environmental growth of produce. Note that the 11.3 mSv dose estimate is at the very low end of this range – only fractionally above the “minor” category - with an actual risk factor for cancer induction that would be significantly less at 0.06%⁶⁵ and the other impacts would be more limited. Further, as noted above, the 11.3 mSv assumes a person is outside throughout the plume’s passage. Taking shelter indoors can be expected to reduce doses by at least 40%, although realistically a more substantial dose reduction would be anticipated taking into account modern house construction techniques and that windows are likely to be closed on a cold winter night.
127. The IAEA publication *EPR-Public Communication 2012 (CD 5.40)*⁶⁶ which discusses how to communicate radiation risk to the public states that *“At doses below 100 mSv there would not be any detectable cancers or other severe health effects even to the foetus. The termination of a pregnancy at foetal doses of less than 100 mSv is NOT justified based upon the radiation risk. An increase in the cancer rate has not been detected in any group of people who received a whole-body dose from external exposure below about 100 mSv”*.
128. The average annual effective dose in the UK, mainly from naturally occurring radioactivity, is around 2.7 mSv. This means that the effective dose from the reference accident, if it occurs under adverse weather conditions (and no part of it is averted through taking shelter), corresponds to just over four years⁶⁷ of average UK background exposure or 18 months of Radon dose in Cornwall⁶⁸. Useful comparisons can also be made with medical exposures. For example, a Computed Tomography (CT) scan of the chest typically delivers 6.6 mSv and a

⁶⁵ The 0.5% risk factor was estimated by applying the ICRP detriment-adjusted health risk coefficients of 5.5×10^{-5} per mSv for all fatal and non-fatal cancers ((CD 16.25 page 53) to the top of the range (100 mSv). For a dose of 11.3 mSv the risk would be less than 0.06%, significant less than “very small”.

⁶⁶ Page 36

⁶⁷ $11.3 \text{ mSv} / 2.7 \text{ mSv} = 4.2$

⁶⁸ $11.3 / 7.8 \times 12 = 17.4$

whole-body CT scan typically delivers 10 mSv⁶⁹. There are also regional variations in natural background, with the average annual radon dose to the people of Cornwall being 7.8 mSv, compared with a UK-wide average value of 1.3 mSv (radon gives rise to about half of the average annual effective dose in the UK due naturally occurring radioactivity).

129. This is not to argue that such exposures are of no importance. Indeed, substantial efforts are being made to reduce high regional exposures to radon and the use of CT scanning in medicine is subject to a requirement for justification and optimisation on a case-by-case basis. However, **it does show that the radiation doses that could arise if a major accident occurred at the AWE Burghfield site are within the range commonly experienced by members of the public during their everyday life.**
130. The estimated dose for people at the site of the proposed development are relatively small and are within the range of doses for which the “linear dose response with no threshold” (LNT) model is generally applied in radiological protection (CD 16.25)⁷⁰. The LNT model considers the risk from radiation exposure to be directly proportional to the dose received without a threshold below which effects are not seen. ICRP (CD 16.25) assigns detriment-adjusted health risk coefficients of 5.5×10^{-5} per mSv for all fatal and non-fatal cancers and 2.0×10^{-6} per mSv for heritable effects in the whole population (including infants, children and adults). The ICRP (CD 16.25) does not identify any other adverse health effects that are of significance at doses of this size and the overall risk factor (summing those for cancer in the irradiated individual and hereditary effects in their descendants) is 5.7×10^{-5} per mSv, which may be thought of as equivalent to the risk of harm arising from the irradiation. For an effective dose of 11.3 mSv (our estimated upper bound for doses at the proposed development site) the probability of an adverse health effect being induced in the exposed individual or their descendants is $11.3 \times 5.7 \times 10^{-5} = 6.4 \times 10^{-4}$ per exposure.
131. We have seen that the frequency of the explosive distribution event upon which the off-site plan is scoped is probably in the range 10^{-5} to 10^{-6} per year (once in every 100,000 – 1,000,000 years) (Paragraphs 101 – 102) but for the sake of conservatism I will assume it to be 1×10^{-4} yr⁻¹ (1 in every 10,000 years) in the following estimations.

⁶⁹ All the cited values are from HMG, 2011(CD 5.35). Further values can be found in the local public information leaflet (CD 16.51).

⁷⁰ Paragraph 36

132. But to be exposed to radiation dose at the proposed development site, the wind has to be blowing in the appropriate direction. We can look at the wind rose for nearby RAF Benson (Benson, Ewelme, Wallingford OX10 6AA) (see below) which suggests that the wind blows in the appropriate direction less than 1.5% of the time and in the relevant low windspeed range (1 – 2 m.s⁻¹) for less than 1% of the time.

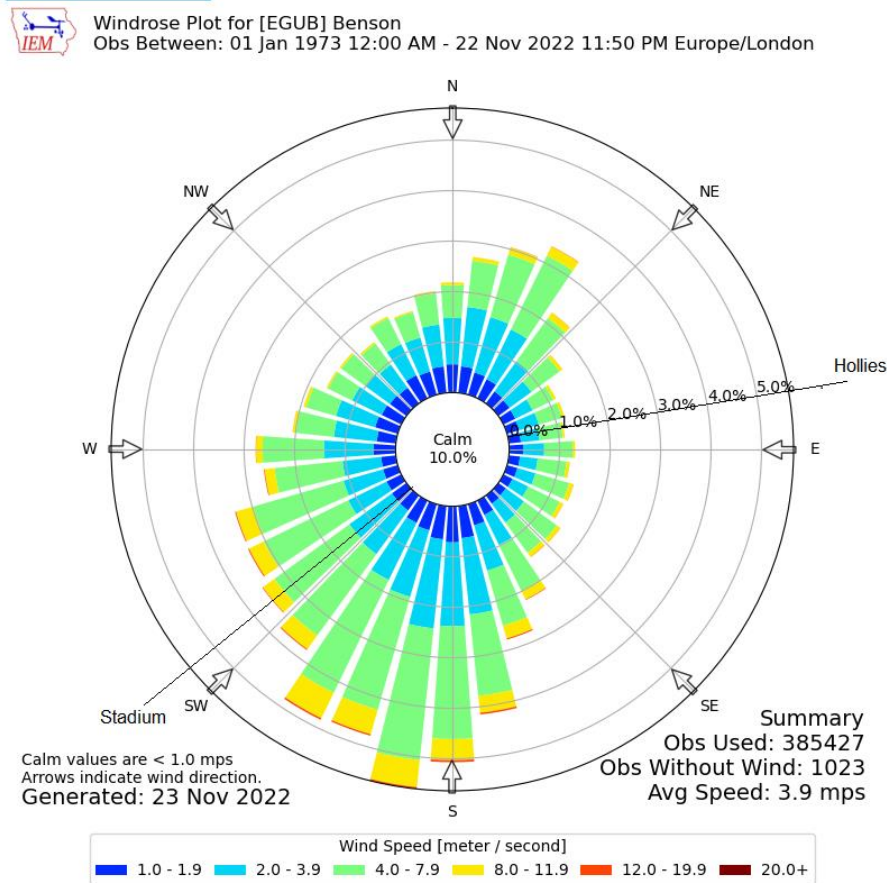


Figure 3 Windrose for RAF Benson – From the Iowa Environmental Mesonet of Iowa State University

133. Thus, the risk of harm to people living at the proposed development site from AWE Burghfield can be estimated as less than the product of the following values:

- 1 x 10⁻⁴ yr⁻¹ (the assumed upper bound probability of the accident)
- 0.015 (the probability of the wind blowing towards the development site (at any speed))
- 11.3 mSv (an upper bound dose estimate for an individual at the development site)
- 5.7 x 10⁻⁵ mSv⁻¹ (the radiation risk factor)

= 1 x 10⁻⁹ per year, about 1 in 1,000 million years.

This estimate is based on a number of assumptions as described above, but it is certainly adequate to make the point that the risk of material harm to health resulting from living on the development site given its proximity to AWE Burghfield site is miniscule.

134. To put this figure in context the HSE (CD 16.22)⁷¹ states that *“HSE believes that an individual risk of death of one in a million per annum for both workers and the public corresponds to a very low level of risk and should be used as a guideline for the boundary between the broadly acceptable and tolerable regions”*.
135. This HSE document also reports⁷² that the annual risk of death from lightning strike is 1 in 18,700,000 which is 50 times greater than my estimate above.
136. The annual probability of an effect on health for an individual on the proposed development due to an accident at AWE Burghfield, as estimated above, is roughly three orders of magnitude (a factor of 1,000) below the boundary of the tolerable region, i.e., it is well within the region where the risk would be judged broadly acceptable by the HSE.
137. None of this is intended to deny the value of proportionate emergency planning that might, in reasonably foreseeable circumstances, enable the averting of radiation doses in excess of the emergency reference levels by the application of prompt protective actions. It is intended to put any risks of harm to the safety of the residents of the proposed development into context.

5.5. The Requirements of the Off-site Plan

138. Concern has been expressed that the proposed development may degrade the response possible from the OSEP in the event of a Radiation Emergency. This section looks at the operation of the plan seeking activities that scale with population.

5.5.1. Concept of Operations

139. The Consequence Report for AWE Burghfield (AWE, 2019) (CD 5.31)⁷³ states that the minimum distance to which urgent protective actions should be taken corresponds to an area with a

⁷¹ Paragraph 130

⁷² Table 2 on Page 70

⁷³ Paragraph 2b

radial distance of 3,160 m. The only protective action it recommends is shelter, it makes no mention at all about evacuation⁷⁴.

140. It further recommends⁷⁵ that *“people are instructed, as soon as is practical, to immediately take-cover in a suitable building and to stay inside with the windows and doors all properly shut. This ‘sheltering’ action may be necessary for a period of up to two days, or at least until the initial contaminated plume has passed and monitoring of the ground contamination has been undertaken to determine the level of groundshine; and subsequent potential for further dose uptake, (e.g. from contaminated locally produced foodstuffs)”*.
141. On the subject of urgency, it states⁷⁶ *“from the event site, there will be an average of approximately 1500 seconds (25 minutes) from the initiation of the event until the leading edge of any plume travels to the minimum distance recommended for urgent action”*⁷⁷. *Assuming no early warning of the onset of any incident, and that the Site Response Group could take up to an estimated 15 minutes to set-up and formally notify the Local Authority, there remains approximately 10 minutes to inform the public, and for the public to find suitable shelter, in order to realise any substantive benefit from the sheltering action”*⁷⁸.
142. This short notice time is mitigated to some extent for the proposed development site by the fact that the assumed weather conditions are a cold night when you might expect a higher proportion of people within the DEPZ to be indoors (save those attending an evening Reading FC match). In other weather conditions the doses would generally be lower and often below the ERL for shelter.
143. The off-site plan is triggered when it is believed a site emergency might or will cause an impact off-site to the public and/or environment regardless of the incident category (CD 5.42)⁷⁹. AWE

⁷⁴ The local authority off-site plan (CD 5.42) (section 5.7.4) does mention evacuation stating, *“The closer to the site boundary the greater the risk for the need for urgent evacuation particularly out to approximately 150m with subsequent evacuation needed out to 600m”*. It seems anomalous that this potential is not mentioned in the Consequence Report. At any rate this is of little consequence for the appeal site, which is well beyond the 150m and 600m zones.

⁷⁵ Paragraph 2c

⁷⁶ Paragraph 2e

⁷⁷ This is based on a wind speed of 2 m.s⁻¹ which is below average. More often the plume will arrive at the edge of the UPAZ more quickly but with lower dose implications.

⁷⁸ The August 2022 version of the off-site plan (Section 5.3 a) suggests that AWE will initiate the automatic telephone alerting system to the public around the affected site, which is much more sensible than them telling the local authority who then initiate the alert.

⁷⁹ Section 3.1 on page 26

will notify the Thames Valley Police and, in the event of an off-site emergency⁸⁰ the full plan will be activated.

144. AWE will notify key responders (triggering a call-down chain that alerts many more responding organisations) and this includes triggering the Public Telephone Alerting System which goes to all not opted out lines in the area stating that there is an incident in progress and advising shelter and that people should listen to local media for updates⁸¹.
145. The prior information to the public leaflet (CD 16.51)⁸² explains that *“Every household and business in the area will automatically receive a pre-recorded telephone message (landline only) from the AWE Alerting System.*

Local radio and TV stations will broadcast messages, and emergency responders will use news websites and social media to issue advice to the public.

Other alerting systems may also be used such as the Governments Emergency Alerts.

Please follow the advice IMMEDIATELY.”.

146. West Berkshire Council (CD 5.53)⁸³ notes that, as a precautionary measure, the advice on sheltering may be sent to the entire DEPZ in the initial response stages of a radiation emergency. Thus, this advice could apply to about 7000 households. Monitoring (and presumably consideration of the wind direction) will then be used to confirm where sheltering needs to remain for longer and to identify those areas where it is no longer required.
147. AWE will prepare and promulgate a situation report⁸⁴. This process repeats as necessary through the response.
148. Command and Control Centres will be set up including the site Control Centre and the local authority’s Strategic Coordination Centre at which will gather the key decision makers (the

⁸⁰ A significant incident where the hazard extends beyond the site boundary and poses a potential risk and/or causes significant disruption to the public outside the site.

⁸¹ Section 3.3 on page 27

⁸² Page 5, top right.

⁸³ Page 6

⁸⁴ Section 3.5 page 31

Strategic Coordination Group (SCG)⁸⁵) and key technical and expert input (Science and Technology Advisor Cell (STAC)).

149. Monitoring of the situation, including radiation levels on and off-site, will commence and there will be a cycle of discussions in STAC and SCG about the course of the event, the on-site actions to bring it to a close and the off-site actions, notably protective action advice and other communications with the public.
150. The Command and Control system used, and regularly exercised, reaches up into government departments including the government crisis management and scientific advice processes COBR and SAGE as required⁸⁶. Help can be obtained from other local authorities and emergency services regions under mutual aid agreements as required.
151. There is a group within the SCC, the Recovery Coordination Group⁸⁷ put in place to coordinate the recovery from the radiation emergency. This group is tasked, along with many other things, with supporting the wellbeing of the affected population after the event.
152. **It is important to note that none of these activities scales directly with population numbers.**

5.5.2. Shelter as a Protective Action

153. Shelter is the recommended protective action for members of the public within the DEPZ because it is a relatively simple protective action to communicate, relatively easy to achieve (if a suitable building is available) and is reasonably effective if achieved in a timely manner.
154. The full advice given in the REPIR prior information leaflet (CD 16.51)⁸⁸ is:
“You should go indoors immediately and stay there. This is because contamination levels are likely to be higher outside buildings than inside. Staying inside is the most important advice because the fabric of the building will provide a layer of protection against any ionising radiation and will reduce exposure to any radioactive particles.”

⁸⁵ Section 4.3 on page 58

⁸⁶ See figure on page 57

⁸⁷ Section 9.4 on Page 170.

⁸⁸ Page 6

If you are not at home, go into the nearest permanent building. If you are outside and in the downwind area, as advised by the emergency services, at the time of the incident you may benefit from decontaminating yourself.

Taking off your outer layer of clothing can remove up to 90% of radioactive material. If you can, shower using mild soap and shampoo; do not use conditioner, as this may bind contamination to the hair. If you cannot, wash your hands, face, and other exposed body parts at a sink or tap.

As a precautionary measure, all within the DEPZ area will be advised to shelter in the initial response stages of a radiation emergency. Sheltering may be necessary for up to 48hrs.

Keep your pets inside if they were not outside at the time of the emergency; those that have been outside should be kept in a separate room or building.

Close all windows and doors to stop radioactive particles from entering the building.

Turn off boilers and air conditioning units and put out fires or woodburners. Fans, heating systems, boilers, gas fires and air conditioning all draw in air from outside so these should be shut down to minimise radioactive particles entering the building.

Listen to local TV and radio for instructions and updates. During a radiation emergency, advice will be broadcast regularly. This will include the care of children at school, food and water supplies and care of farm animals and pets”.

155. The AWE Burghfield Consequence Report (CD 5.31)⁸⁹ states that “*This ‘sheltering’ action may be necessary for a period of up to two days, or at least until the initial contaminated plume has passed and monitoring of ground contamination has been undertaken to determine the level of groundshine and subsequent potential for further dose uptake, (e.g. from contaminated locally produced foodstuffs)*”.

156. The two-day duration claim is notable. For the explosive distribution fault, I have established both that the release is of a short duration and that the deposition that might occur will not

⁸⁹ Part 2 2(c) on page 3

lead to a significant ground dose, resuspension dose or ingestion dose. The OSEP has (CD 5.42)⁹⁰ *“The nature and extent of protective actions will be continuously reviewed by STAC. Advice on amending protective actions will be provided by STAC to SCG, based on the scientific and technical information available at the time”*. STAC will therefore have access to expert scientific assessments. It is likely to be possible to advise people that they can break shelter and return to near normal life (with exceptions of not harvesting and eating food that was outside during plume transit) within an hour or two of the alarm⁹¹. This would certainly be true for all those sectors that were not downwind during the release. For the downwind sectors some measurement and dispersion modelling may be required to determine if shelter should be continued near to the site but, at the distance of the proposed development, a quite quick decision to drop the shelter advice might be possible.

157. Environmental radiation monitoring, which would largely be for reassurance except near to scene (ie, much nearer to AWE than the appeal site), could continue after the event has moved into the recovery phase. The OSEP (CD 5.42)⁹² states that *“the monitoring plan should include the monitoring of:*
- i. The environment around the sites to establish the spread and level of radiation contamination*
 - ii. Food – any crops and foodstuffs grown in the area – for direct consumption or to be put into manufactured human or animal food products (fruit, vegetables, grain, grass, milk etc.)*
 - iii. Water- Contamination of the water supply is less likely - the water authorities would have to take a decision regarding the use of water based on STAC advise*
 - iv. People – setting up a radiation monitoring unit in order to reassure people who think they may have been contaminated and allow decontamination of those who have”*.

This should be sufficient to support decision making and, when combined with a suitable communications strategy, to reassure the public.

158. It is worth noting that the recommendation is not for strict sheltering where it is forbidden to enter or leave the building under any circumstances. The government advice on the use of

⁹⁰ The end of section 6.6 on page 80.

⁹¹ It has to be recognised that the decision-making process will probably take longer to signal the end of shelter as there are issues of public perception and the natural caution of the decision makers.

⁹² Section (f) Page 39.

sheltering states that *‘The health and wellbeing of sheltered populations may be affected by restricted access to medical care or assistance. In such situations, consideration should be given to supervised entry into the sheltered area by medical professionals and carers, or planned evacuation of these vulnerable groups’* (CD 13.28)⁹³ and earlier advice included *“To a large extent, these adverse effects of the countermeasure are small particularly if the sheltering period is kept to a few hours. Significant problems can be reduced by advising individuals that short periods out of doors, for necessary activities, will not, in many situations, result in very high exposures. External exposures to people inside a building will not be significantly affected by opening and closing of outside doors, nor will occasional opening and closing of outside doors have a major impact on the radionuclide concentrations in air in the building, and hence on doses by inhalation.”* (NRPB, 1990) (CD 16.33)⁹⁴.

159. The general advice is that people should thoroughly ventilate their house as soon as the release has stopped and contamination levels in the outside air have fallen (NRPB, 1990) (CD 5.43)⁹⁵. This will occur in less than an hour for the whole Urgent Protection Action Zone in any non-calm weather conditions.
160. Based on this, it would in reality probably be unnecessary to ask people to shelter for more than an hour or so after the explosion. After the plume has passed them, they should ventilate their buildings to disperse any radioactive material that has infiltrated their building.

5.5.3. Evacuation as a Protective Action

161. Evacuation is unlikely to be recommended for the proposed development site because the predicted levels of radiation dose off-site are well below the lower Emergency Reference Level (ERL) for evacuation which is set at 30 mSv (CD 13.28)⁹⁶.
162. The Consequence Report written by AWE and upon which the local authority scales the off-site plan (CD 5.31) makes no mention of evacuation. However, the off-site plan (CD 5.42) does include the provision for evacuation.

⁹³ Section 5.2.1.1. page 7.

⁹⁴ Paragraph 8 on page 8

⁹⁵ Paragraph 56 on page 23

⁹⁶ Table 4 on page 18

163. Section 6.5.1 of the off-site plan (CD 5.42)⁹⁷ states that *“Urgent Evacuation (at the direction of emergency services at the scene) may be required:*
- *For non-radiological scenarios - e.g. areas within cordons in incidents involving explosives or other materials posing an immediate risk to life (e.g. asphyxiate gases, conventional smoke).*
 - *For radiation emergencies properties and persons in close proximity to the site boundary (e.g. incidents involving the transport of radioactive materials on the site, or severe accidents) but such evacuation would normally be subject to careful consideration by STAC taking into account the potential dose saving (or increase in public dose) that would result, but could perhaps be usefully classified as “Early Evacuation”.*
164. Section 11AA of the off-site plan (CD 5.42)⁹⁸ states that *“The closer to the site boundary the greater the risk for the need for urgent evacuation particularly out to approximately 150 m with subsequent evacuation needed out to 600 m”* and *“Vulnerable sites are more likely to need evacuation”*. The risk analysis behind this statement includes accidents involving chemicals.
165. Such evacuations are described as *“at the direction of the emergency services at the scene”*⁹⁹ and use standard and trained procedures as used for a wide range of conventional events and within the normal operational capabilities of the emergency services.
166. I conclude that it is not credible that the proposed development site, 2.4 km from AWE Burghfield compared to a potential urgent evacuation to 150 m and subsequent evacuation to 600 m, will need to be evacuated because of an event on the AWE Burghfield site.

5.5.4. Post-accident monitoring and decontamination

167. During the release phase and afterwards there will be a great deal of interest in the path taken by any plume of radioactive material and any contamination left behind. The OSEP (CD (CD 5.42)¹⁰⁰ states that AWE has the capability to undertake initial monitoring and will share their results in the SCC.

⁹⁷ Page 74

⁹⁸ Page 235

⁹⁹ Page 75

¹⁰⁰ Section 6.4 on page 72

168. Initial interest will be in tracking the plume and discussing the needs for urgent protective actions such as shelter but interest will turn towards environmental monitoring to inform any decontamination strategy.
169. The 2023 revision of the public information leaflet provided to residents (CD 16.51) states that people outside at the time of the incident may benefit from self-decontamination and gives some advice on how it may be undertaken. On the day, advice may be given for people who were outside and downwind during the accident to carefully undress, bag clothing and shower (CD 5.42)¹⁰¹. In my view this would primarily be for reassurance rather than making a material improvement in likely outcome, particularly for those some distance from the site.
170. The Fire and Rescue Services have mass decontamination capabilities (CD 5.42)¹⁰².
171. It is not at all likely that there will be a real need for any significant decontamination of the area around the proposed development in the aftermath of an emergency at AWE Burghfield. We have already seen that the radiation doses received on the site during plume transit are likely to be less than 11.3 mSv and that the additional dose after plume transit would be a small fraction of this value (and well below natural background levels). PHE advice (CD 5.49) is that *“During the recovery phase, the responsible authority (or local response body) will select a RL in the range of 20 mSv y⁻¹ or below, with a long-term objective of 1 mSv y⁻¹”*¹⁰³. In this context, a Reference Level is defined as *“constraints on overall dose (that is, a level of ambition to keep below)”*. **Thus, the radiation levels predicted at the development site in the aftermath of an accident at AWE Burghfield are likely to be below those at which remedial decontamination action is likely to be required.**
172. That is not to claim that there will not be a public clamour for decontamination activity but it is likely to be limited to closer to the site.
173. Some self-help decontamination, such as hosing of cars, pathways and garden furniture might be advised by the government. This would largely be for reassurance rather than making a real difference to dose uptake. External dose rates will be low as will doses due to resuspension and contamination of foodstuffs.

¹⁰¹ Section 7.3.1 on page 92.

¹⁰² Section 7.3.2. on page 93

¹⁰³ Section 6.4.4 on page 24

174. The authorities might consider the merits of decontamination of public spaces, probably with some focus on school and other play grounds, other public spaces and roads. Monitoring of local residents themselves is not time critical.
175. In the early phase, with a duration of a few days, decontamination efforts might involve prompt tie-down of contamination and the recovery of items. The intermediate phase might then involve treatment of the heaviest or most significant contamination over a few weeks, whereas the late phase would last at least several months and might involve reduction of environmental contamination to acceptable levels. The above relates to land nearer to AWE (B) than the appeal site.
176. In the longer-term, the presence of ground contamination might lead to a desire of some residents of the Proposed Development to relocate. However, any such desire does not affect the plan (and therefore does not require WBC to obtain or provide accommodation). In essence, that is because the levels of ground contamination would be too low to justify relocation on a health basis – although a personal choice that some might make. This can be confirmed by considering that the first pass dose could be of the order of 11.3 mSv and it has been shown that this would comprise most of the dose with resuspension and ingestion over the following year each being about 1% or less of the first pass dose. Thus, the dose over the year following plume transit is likely to be less than 0.23 mSv which is below any levels suggested as clean-up targets.
177. The AWE notes that the burden of compensating people should it be required post-accident, would fall entirely upon the public purse¹⁰⁴ and suggests that this remote threat should be minimised by controlling developments more than 2 km from the site¹⁰⁵. It would, of course, be possible for AWE to insure themselves against this eventuality¹⁰⁶.

5.5.5. Wellbeing

¹⁰⁴ This is only true to the limit of tier two payments, thereafter the parties of the 1963 Brussels supplementary convention (CD 16.44) cover payments between SDR 175 million and SDR 300 million. Where an SDR is a unit of account defined by the International Monetary Fund, approximately equal to 1.4 US dollars in March 2021

¹⁰⁵ Para 26.

¹⁰⁶ See (CD 16.45) for a discussion of liability for nuclear damage.

178. The wellbeing of the population within their area is of legitimate concern of AWE/MOD and the local authorities.
179. The World Health Organisation defines wellbeing as *“Well-being is a positive state experienced by individuals and societies. Similar to health, it is a resource for daily life and is determined by social, economic and environmental conditions. Well-being encompasses quality of life and the ability of people and societies to contribute to the world with a sense of meaning and purpose. Focusing on well-being supports the tracking of the equitable distribution of resources, overall thriving and sustainability. A society’s well-being can be determined by the extent to which it is resilient, builds capacity for action, and is prepared to transcend challenges”* (CD 16.46)¹⁰⁷.
180. The OSEP does not explicitly state what steps will be taken to support community wellbeing during and after an accident at AWE(B) but it does have “Public Health and Wellbeing” as within the remit of the Recovery Coordinating Group. (CD 5.42)¹⁰⁸.
181. There could be a number of strands to this process including:
- The continuous provision of good quality information and reassurance to those that are in areas subject to protective action advice including managing urgent needs and the reassurance of those separated from family members¹⁰⁹,
 - A dialogue with the public to explain the implications of residual contamination, the decontamination options available and the choice of those to deploy,
 - Support facilities for those affected by the accident either directly or indirectly,
 - Supporting the economy of the area in the weeks and months following the accident to ensure that shops, schools and leisure facilities stay open as near to normal as possible.
182. A small increment in the area’s population, particularly one at 2 km from the site, would not add materially to the resources required for these steps to be taken.

5.5.6. Strain on the emergency services resulting from the proposed development

¹⁰⁷ Page 1

¹⁰⁸ Section 9.4 on page 170.

¹⁰⁹ The IAEA suggest that the questions that the public will be asking centre on safety, health effects, contamination, evacuation and stigmatization. The recovery coordinating group might expect to field questions on these matters (CD 16.47)

183. The proposed development of 32 dwellings is a small increment compared to the estimated 6,651 residential and 2,887 “other” properties in the DEPZ (CD 5.51)¹¹⁰. I note the local authority accepting an action to review the off-site plan when the DEPZ was slightly enlarged (CD 11.7) the same process seems reasonable when developments increase the population of the area.
184. It is certainly true that the people asked to shelter may suffer the normal run of emergencies such as medical emergencies, fire alarms or reports of gas etc. and may require in-home support for medical or personal reasons, but these should not be significantly higher than usual.
185. The emergency services and social services, aided by the expertise in STAC and their own Radiation Protection Advisor, should be able to judge each call to the affected area on its merits and go in to provide urgent assistance or delay entry until the plume will have passed. The radioactive plume will only be overhead for a short period.
186. In a recent Appeal Decision in the adjacent administrative area of Wokingham Borough Council (CD 14.4)¹¹¹ but within the same DEPZ as this appeal site, the Inspector stated that “*Although fear of contamination may prevent workers from entering the DEPZ, this could be disproportionate to the actual risk.*”¹¹² He concluded that “*the proposal (for 49 affordable dwellings within the DEPZ) would not present a barrier to the ability of blue light services to safely carry out their duties, and nor would it affect the Council’s ability to execute and manage its obligations under the REPPIR plan*”¹¹³.
187. The Approved Code of Practice for REPPIR-19 (CD 5.39) includes (Paragraph 293):
- The local authority should prepare the plan in accordance with the requirements of regulation 11 and the associated Schedules and should ensure the plan:*
- (a) *is a written document, or set of documents; and*

¹¹⁰ Table in Section 5.10.2 ii

¹¹¹ APP/X0360/W/22/3304042 (CD 14.4)

¹¹² Paragraph 19

¹¹³ Paragraph 22

- (b) *can be put into effect without delay when required by ensuring that prior information has been supplied in accordance with regulation 21 and by seeking confirmation, so far as reasonably practicable, from responding organisations that:*
- (i) *the necessary information, instruction and training have been provided and the necessary equipment for restricting exposure has been made available, in accordance with regulation 11(6); and*
 - (ii) *any other underpinning capabilities required to implement the plan are in place and readily available*

Paragraph 299 (Guidance)¹¹⁴ suggests that the confirmation that the underpinning capabilities should ideally be obtained in writing. This would include getting assurances from the emergency services and social services that they have the training, equipment and decision-making processes to provide reasonable support for those sheltered in the DEPZ.

188. **The same off-site plan serves both the AWE Aldermaston and AWE Burghfield sites.** A quick examination of a map of the area shows that the town of Tadley is immediately to the south of the AWE Aldermaston site and that if an accident were to occur on this site while the wind was blowing from the North or the North-East then a significantly greater and closer population would be affected than by an accident at AWE Burghfield with the wind blowing towards the development site. If the plan is adequate for Tadley it is surely adequate for the proposed development site.

189. **Note that a plan can be reviewed and amended at any time.** Paragraph 378(c) of the REPPiR-19 guidance (HSE, 2022)¹¹⁵ (CD 5.39) states “*reviewing is a fundamental process, examining the adequacy and effectiveness of the components of the emergency plan and how they function together*” ...and that a review should take into account “*any changes in the detailed emergency planning zone or outline planning zone; for example, a new school or hospital*”.

5.5.7. The development as a threat to emergency assess and egress to AWE(B)

190. Another possible objection is that the addition of more housing increases the number of vehicles on the road and that these may hamper the emergency services either heading towards the site or away from the site in pursuit of emergency response objectives.

¹¹⁴ Page 67

¹¹⁵ Page 70

191. The addition of 32 homes in this area would present a small incremental increase in traffic.
192. Self-evacuation is strongly discouraged in the prior information (CD 5.53)¹¹⁶ for very good reasons. However, if people do self-evacuate by car, we might expect them to travel south and west, away from the site. In the meantime, the emergency services, which will try to approach the scene from up-wind, will mainly be using roads to the east of the site if the wind is blowing towards the proposed development site.
193. The Inspector in the Kingfisher Grove inquiry (CD 8.3) concluded that *“Should the REPIR shelter-in-place advice be followed by those in the DEPZ, road traffic levels are unlikely to be greater than normal and the ability of services to access the zone would not be adversely affected. The possibility of self-evacuation by those within the zone was also raised as a potential safety issue, but this is addressed within the REPIR plan and discouraged through the dissemination of public information”*¹¹⁷.
194. It seems unlikely that the addition of these 32 homes will make a noticeable difference to the time it takes for emergency services travelling under blue lights and sirens to travel to or from the AWE Burghfield site.

5.6. The development as a threat to the current and future operation of AWE Burghfield

5.6.1. The development as an external hazard to AWE(B)

195. The second string of concern from the ONR process and referred to in the objectors’ Statements of Case, is the possibility that the development site may represent an external hazard to the nuclear site or hamper any emergency response. External hazards are those natural or human-induced hazards to a nuclear site and facilities that originate externally to both the site and its processes, such that the site operator may have very little or no control over the initiating event. They include for example fire, toxic release, missiles, electromagnetic interference and flooding.
196. It is clear that an incremental increase in the local housing stock 2 km away does not represent such an external hazard. This fact is recognised in the ONR Statement of Case (CD

¹¹⁶ Stay where you are

¹¹⁷ Paragraph 20

12.1)¹¹⁸. Further, as noted above, there are numerous residential and other properties located nearer to AWE (B) than the appeal site.

5.6.2. The threat of OSEP being deemed inadequate by the ONR

197. In their letter objecting to the proposed development (CD 5.33) AWE state that *“AWE will be unable under REPPIR 2019 to work with ionising radiation if, amongst other matters, the Council is unable to comply with its duties in connection with the off-site emergency plan”*¹¹⁹. For which they cite REPPIR-19 Regulation 10(4)b.
198. This regulation states that *“10(4) The operator must not require any person to carry out work with ionising radiation, and no person shall carry out such work unless—*
(a) the operator has complied with the requirements of paragraph (1); and
(b) the local authority has complied with its duties in connection with the off-site emergency plan as set out in regulation 11, and has confirmed this to the operator in writing”
199. It does not seem realistic that the ONR will order a site shutdown because of perceived deficiencies in the OSEP. Long before that stage is reached the ONR would be noting its dissatisfaction with the plan (either to the local authority or to AWE or both)¹²⁰, allowing the local authority the opportunity to amend the plan to accommodate relevant additional development and to address any inadequacies identified.
200. The cost of updating or amending the OSEP should not be an issue to the local authority because REPPIR-19 regulation 16 allows *“(1) A local authority may charge the operator a fee for the performance of the local authority’s functions in relation to the off-site emergency plan relating to the operator’s premises under regulations 8, 11, 12 and 21”*¹²¹.
201. If the ONR warnings of dissatisfaction did not work, then they may give a formal improvement notice or a prohibition notice. Only when their patience is exhausted would ONR consider curtailing activity on the site with a prohibition notice.

¹¹⁸ Footnote 3 on page 6.

¹¹⁹ Paragraph 22

¹²⁰ This process has already started. See ONR Statement of Case (CD 12.1) paragraph 43.

¹²¹ These regulations are (8) setting the Detailed emergency planning zone, (11) the local authorities (off-site) emergency plan, (12) Review and testing of emergency plan and (21) prior information to the public.

202. We can then imagine the Secretary of State invoking REPPIR regulation 25(2) (CD 5.39)¹²²:

252) The Secretary of State for Defence may, in the interests of national security, by a certificate in writing, exempt—

(a) Her Majesty's Forces;

(b) visiting forces;

(c) any member of a visiting force working in or attached to any headquarters or organisation; or

(d) any person engaged in work with ionising radiation for, or on behalf of, the Secretary of State for Defence,

from all or any of the requirements or prohibitions imposed by these Regulations and any such exemption may be granted subject to conditions and a limit of time and may be revoked at any time by a certificate in writing.

203. It therefore seems farfetched to believe that inadequate emergency preparedness from the local authority would be allowed to result in any threat to the operations of an AWE site. The site and local authority would be given ample opportunity to remedy any deficiency and even if they failed in that and ONR wished to curtail activity on the site the Secretary of State could trigger exemptions for a short time citing national security while the plan is improved.

¹²² Page 119

6. Summary and conclusion

It has been shown that contrary to the fears of the local authority and AWE:

- The AWE Burghfield site does not represent a significant risk to health or wellbeing for those living in or near the proposed development site;
 - The frequency of faults is very low, the probability of the wind blowing in the direction of the development (and otherwise exhibiting category F conditions) reduces the frequency of exposure further and the potential dose uptake does not represent a material threat to health and well-being.
 - An accident at AWE(B) leading to the triggering of the OSEP and urgent protective actions could inconvenience the population without being a material threat to their health and wellbeing.
 - Provision of accurate information to the local population will contribute to their well-being.
- The increased number of inhabitants of the DEPZ will not put a material additional strain on the resources of the off-site plan, either for warning and informing or for providing medical and quality of life support to those in an area subject to shelter advice;
 - The activities that constitute the emergency plan do not scale with population;
 - The elevated dose rates at the proposed development site are within the ranges that emergency services can operate with Radiation Protection Advisor support;
 - The elevated dose rates would be of a short duration (during the passing of the initial plume), with resuspension doses around 1% thereof and thus immaterial;
- The increased number of people living in the area should not interfere with the emergency services' ability to provide support to the site in an emergency; and
- The development itself does not represent a threat to the future operations of AWE Burghfield.
 - There are closer receptors to AWE (B) than the proposed development site, and AWE (B) must already take these into account.
 - Despite the fears expressed by AWE no good reason has been given why the OSEP cannot cope, or be amended to cope, with the limited number of additional residential properties.

- The ONR has a number of options to consider, including improvement notices, before it would consider any prohibition on the site's functions.
- Furthermore, even if it were to reach this point the MOD has powers to disapply REPPIR while it undertakes remedial actions.

On available evidence, while the DEPZ around AWE (B) has recently been expanded, this is as a consequence of re-drawing the emergency planning area to reflect certain weather conditions (category F) not previously reflected in the DEPZ's dimensions. The level of risk and actual impact has not changed – these are as they were at the time of the appeal site's allocation.

These conclusions echo the conclusions of the Kingfisher Grove appeal decision APP/X0360/W/22/3304042 (CD 8.3) *"I therefore conclude that the proposal would not present a barrier to the ability of blue light services to safely carry out their duties, and nor would it affect the Council's ability to execute and manage its obligations under the REPPIR plan"*.

While each case must be determined on its own facts, the other main parties' statements of case have not set out matters which in my view lead to different conclusions on these aspects for present purposes.