Decision Document and Authorisation Notice

Application by AWE plc under the Radioactive Substances Act 1993 for a variation to its authorisations to dispose of radioactive waste

from the Atomic Weapons Establishments at Aldermaston, Reading Berkshire RG7 4PR and Burghfield, Reading Berkshire RG3 3PR

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Decision Document

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Annexes

1 Summary

1.1 The Environment Agency has responsibility under the Radioactive Substances Act 1993 (RSA93) for regulating all disposals of radioactive waste from nuclear sites in England and Wales. Under RSA93, "disposals" of radioactive waste include discharges into the air, the sea, rivers, drains or groundwater, disposals to land, and by transfer to another site.

1.2 We regulate the disposal of radioactive waste from nuclear sites through an overall system of regulatory control that is underpinned by issuing authorisations, under RSA93, to operators of each nuclear site. These authorisations specify the limitations and conditions that we impose on the disposal of radioactive waste from that site. We can include any limitations and conditions we think fit and impose a wide range of requirements including obligations on operators to minimise waste creation at source. It is an offence under RSA93 not to comply with an authorisation's limitations and conditions.

1.3 We have prepared this Decision Document about our review of the authorisations held by AWE plc for the disposal of radioactive wastes from AWE Aldermaston and AWE Burghfield. This document summarises the responses to the consultation that we held between 15 May and 7 August 2006 on our proposals and sets out our considerations and decisions in the light of those responses and all other information available to us. We provided this Decision Document to the Secretaries of State for the Environment and Health so that they would be able to advise us in advance of this date if there was a requirement to exercise certain powers under RSA93. None of the powers available under the Act have been exercised and we issued the revised authorisations on 1st February 2007 so that they will come into effect on 1st March 2007.

1.4 We have undertaken a full review of all existing disposal authorisations, including limits and the conditions under which AWE plc must fulfil its duties under the Radioactive Substances Act 1993. This document provides the background and the basis for our decisions. Before arriving at these decisions we consulted widely on the applications from AWE with statutory consultees, the public, public bodies and other interested groups. We have carefully considered the responses and have taken these into account when arriving at our decisions.

1.5 We periodically review authorisations that permit operators to dispose of radioactive waste from their premises. In April 2005 we announced our intention to undertake a thorough review of the RSA93 Authorisations that allow AWE plc at Aldermaston and Burghfield to dispose of radioactive wastes. We did this by issuing a Process and Considerations (P&C) Document. Our P&C Document explained how we would undertake the review and required AWE plc to provide us with specific information to allow us to do so. We received this information in November 2005 in the form of three AWE Reports and we distributed copies of these to consultees.

1.6 Between December 2005 and May 2006 we prepared our consultation document (Explanatory Document (ED)) in which we presented our proposals for future disposals and the draft certificates of authorisation. The ED,

additional copies of AWE Reports and our Considerations Document (CD) were distributed to stakeholders so that we could commence our consultation on 15 May 2006. We announced details of our consultation by placing advertisements in the local press, provided copies to local libraries in the area around Aldermaston and Burghfield and by issuing press releases to local newspapers, radio and television stations. Our ED was published on our website at www.environment-agency.gov.uk

1.7 In summary the changes requested by AWE plc, and agreed by us after consultation were, for:

AWE Aldermaston

- A decrease in the annual activity limits for gaseous emissions for alpha emitting radionuclides, krypton-85 and tritium.
- The removal of the requirement to report the activity of gaseous plutonium-241 discharged into the environment.
- A clear division by activity limit between volatile and non-volatile beta/gamma emitting radionuclides but with no alteration to the overall existing annual limit of 5 MBq.
- The addition of an annual activity limit of 6 MBq for the disposal of gaseous carbon-14 for work associated with the Nuclear Non-Proliferation Test Ban Treaty.
- The inclusion of a separate Table 2b in Schedule 3 of the Authorisation Certificate that relates to the use of volatile beta/gamma emitting radionuclides and carbon-14 for work undertaken in support of the Nuclear Non-Proliferation Test Ban Treaty.
- The addition of an annual activity limit of 1GBq for the disposal of gaseous argon-41 arising from operation of the ORION Laser.
- Retention of the authorised route for the disposal of trade waste to the Silchester Sewage Works.
- Reduction in the authorised annual activity limits for the disposal of trade waste to the Silchester Sewage Works for alpha emitters from 40 MBq to 10 MBq, beta/gamma emitters from 120 MBq to 20 MBq and tritium from 50 GBq to 25 GBq.
- An activity notification limit of 30 Bq/l for the tritium concentration in water discharged from the North Ponds Water Management System into the Aldermaston Stream.
- The addition of an annual activity limit of 1 MBq for the radionuclide iodine-129 for disposal to the Low Level Waste Repository.
- The addition of an annual activity limit of 40 MBq for the radionuclide carbon-14 for transfer to the incinerator operators at Hythe, Hampshire or Knostrop, Leeds.
- Authorisation to dispose of solid and organic radioactive wastes by transfer to the Incinerator Operator at Colnbrook, Berkshire at a maximum annual activity limit of 0.24 TBq for tritium and 40 MBq for carbon-14 and a maximum annual volume limit of 510 cubic metres.

- Authorisation to transfer Warhead Waste directly to the Site Operator at Foulness, Essex or to the same receiver via the AWE Site at Burghfield, Berkshire.
- Removal and deletion of the existing annual activity limit of 2 MBq for uranium isotopes for transfer to the MOD.
- Authorisation to receive radioactive waste from the Site Operator at Foulness, Essex.

AWE Burghfield

- A decrease in the annual activity limit for gaseous emissions from the Nuclear Licensed Site for alpha emitting radionuclides from 20 kBq to 5 kBq and tritium from 50 GBq to 9 GBq.
- The addition of an annual activity limit of 1 kBq for alpha emitting radionuclides from the Non-Licensed Site in order to allow for decommissioning work to proceed.
- A decrease in the annual volume limit to 300 m^3 from 400 m^3 for aqueous wastes transferred to AWE Aldermaston from the Nuclear Licensed Site. The addition of an annual activity limit of 1 MBq for beta/gamma emitters and of 1 GBq for tritium in these wastes from the Nuclear Licensed Site.
- Authorisation to transfer solid radioactive waste directly to the Low Level Waste Repository via either the operator of Complex B4 and Facilities A50 and A51 on the Winfrith Nuclear Site or the Site Operator at Sellafield if necessary for treatment of wastes by supercompaction. In addition to the existing authorised route via AWE Aldermaston an increase in the annual disposal volume to 600 m^3 from 200 m^3 and activity limits increased for uranium from 0.15 GBq to 1.5 GBq. The annual activity limit for tritium is reduced from 2 GBq to 1.6 GBq.
- Authorisation to transfer Warhead Waste directly to the Site Operator at Foulness, Essex with a reduction in the annual volume authorised from 200 m^3 to 50 m^3.
- Reduction in annual tritium activity transferred to Foulness from 3 GBq to 6 MBq and the deletion of an authorised activity for transfer of uranium containing wastes to the MOD.
- Authorisation to receive Warhead Waste from the Site Operator at Foulness, Essex and from AWE Aldermaston.

1.8 Authorisation to dispose of tritium contaminated building demolition waste with a maximum activity limit of 10 Bq/g and an annual volume limit of 300 m^3 to Licensed Landfill **has not been granted at present.**

1.9 One of our aims during our review and during this consultation has been to reduce the number of Authorisations held by AWE Burghfield and to make overtly transparent the limits and conditions that will apply to this site. In our Explanatory Document we described how AWE Burghfield holds two distinct and separate authorisations for the disposal of radioactive wastes – one for the Nuclear Licensed Site, the other for the Non-Licensed part of the site. We have consulted on whether it would be appropriate to move forward with a single, multi-media authorisation that details disposals of radioactive wastes from the

complete AWE Burghfield Site. We will now issue a single RSA93 Authorisation for AWE Burghfield.

1.10 We have also consulted on simplifying the transfer of radioactively contaminated Warhead Waste from both AWE sites to the site currently operated by QinetiQ at Foulness, Essex. Warhead Waste requires security controlled destruction, and is currently transferred from AWE to the Ministry of Defence (MOD) at Aldermaston and Burghfield. The MOD would then consign this waste to QinetiQ at Foulness. We considered this process to be unnecessarily complex and have decided that AWE sites should be able to consign this waste directly to the site operator at Foulness. We have imposed reductions in the volume and activity for transfer to Foulness.

1.11 Radiological assessments carried out by the Food Standards Agency, AWE and the Environment Agency show that radiation doses to the most exposed members of the public at the authorised limits are much less than the legal requirements. A Habitats Assessment shows that for the radionuclides being discharged, at the revised authorised limits, doses to a range of reference groups and individual species of biota are well below the threshold at which additional conditions should be introduced to the authorisation. The risk associated with discharges from the AWE sites is therefore judged to be as low as reasonably practicable and the revised authorisations will continue to protect human health, the food chain and the environment.

1.12 We are satisfied that the requested changes reduce the hazards at the AWE sites at Aldermaston and Burghfield and are satisfied that following our consideration of AWE plc's applications and the response to our public consultation that our proposals for the future disposals of radioactive waste are warranted. We have once again issued integrated authorisations and will ensure that these remain upto date and fit for purpose by undertaking regular periodic reviews. We will continue to liaise with AWE plc to ensure that it complies with its authorisations and the Compilations of Environment Agency Requirements (CEAR) which support the authorisations and provide the detail of specific conditions in the authorisations.

1.13 Work on the AWE sites at Aldermaston and Burghfield is focused on five main activities: Research and Development; Production of the UK nuclear deterrent; Decommissioning of redundant facilities; Waste Management Operations; and Redevelopment. We regulate the disposals of radioactive wastes arising from all of these activities and our model for modern regulation is set out our *document* ***"Delivering for the environment – a 21st century approach to regulation"*.** Under Modern Regulation we intend to focus our regulatory effort specifically on environmental outcomes. Our aim is not to impose an unnecessary administrative burden on operators but to ensure, by the use of appropriate management systems, monitoring and performance reporting, that all Authorisation Conditions are properly complied with. We require AWE plc to undertake a number of programmes of work and report their findings to us periodically. These programmes are detailed in the certificates of authorisation.

2 Introduction

2.1 The Environment Agency has responsibility under the RSA93 for regulating all disposals of radioactive waste from sites in England and Wales. Under RSA93, "disposals" of radioactive waste include discharges into the air, the sea, rivers, drains or groundwater, disposals to land, and by transfer to another site.

2.2 We regulate disposals of radioactive waste from sites through an overall system of regulatory control that is underpinned by the authorisations we issue, under RSA93, to operators at each site. These authorisations specify the limitations and conditions that we impose on disposals of radioactive waste from that site. We can include any limitations and conditions we think fit and impose a wide range of requirements including obligations on operators to minimise waste creation at source. Failure to comply with these limitations and conditions is an offence under RSA93.

2.3 Our overall system of regulatory control includes:

- deciding whether or not we should grant applications for new authorisations or changes to existing authorisations, and setting appropriate limits and conditions in any authorisations that we issue, and which ensure that the public and the environment are well protected;
- periodically reviewing authorisations and operator environmental performance and changing authorisations to make sure that authorisation limits and conditions are up to date and effective and continue to ensure that the public and the environment are well protected;
- carrying out announced and unannounced inspections;
- investigating incidents;
- using our powers of enforcement, including prosecution, as necessary;
- undertaking waste, effluent and environmental monitoring and assessments of public radiation exposure.

2.4 We have prepared this document about our review of the authorisations held by AWE plc for the disposal of radioactive wastes from AWE Aldermaston and AWE Burghfield. This document summarises the responses to the consultation that we held between May and August 2006 on our proposals and sets out our considerations and decisions in the light of those responses and all other information available to us. We intend to issue the revised authorisations on 1st February 2007 so that they will come into effect on 1st March 2007. We provided this document to the Secretaries of State for the Environment and Heath so that they could advise us in advance of that date if they wish to exercise their powers under RSA93.

2.5 This Decision Document should be read in conjunction with two key documents that we prepared to assist understanding about the process and considerations that we undertook in making our decisions. The documents are our:

- Process and Considerations Document (May 2005) for our review of AWE Authorisations (P&C);

and

- Considerations for Radioactive Substances Regulation, Environment Agency, 2005, (Considerations Document (CD)).

2.6 In the Process and Considerations Document (April 2005) we described the generic processes that we have now followed when dealing with our review of the AWE plc sites at Aldermaston and Burghfield. The P&C Document identified the specific information that we needed from AWE plc in order to support our review.

2.7 Note: Since the AWE review process commenced in April 2005 with the issue of the Process and Considerations Document (P&C) the Environment Agency has reviewed the way in which it undertakes reviews and variations. The P&C Document has been replaced with a Process and Information Document (P&I) and a separate Considerations Document (CD). The P&I Document provides details of the Review Process whilst the CD aims to take into account all relevant issues including legal and policy matters and constraints. A general description of the conditions of the draft authorisation is provided in the Consideration Document and this is available on the Environment Agency web site at **www.environment-agency.gov.uk**

2.8 In carrying out this review of the authorisations held by AWE plc to dispose of radioactive waste from the sites at Aldermaston and Burghfield we have taken account of all relevant statutory, policy and regulatory matters and constraints including those in our P&C and Considerations Document. Our main concerns are to protect the environment and the health of the public.

2.9 Our Considerations Document provides information to assist understanding and helps to ensure that interested parties are aware of the issues. The document also shows how we deal with legal and policy issues and explains some of the basic concepts and principles surrounding these issues. The Considerations Document includes a glossary of terms and abbreviations that is also relevant to this document.

2.10 Together, these documents provide guidance on nuclear permitting and regulation, at a general level, to both operators and our Nuclear Regulators. They also provide reference to more detailed guidance on specific aspects of nuclear permitting. We review these documents to ensure that they are up-dated whenever there are legislative, policy or process changes or developments. The latest versions are available on our website.

2.11 Operators can apply to the Environment Agency for a new authorisation or a variation to an existing authorisation at any time. We are required, by RSA93, to periodically review the limitations and conditions of authorisations and may also carry out additional reviews at any time.

2.12 For reviews, our primary aim has been to ensure that each authorisation continues to protect the public and the environment by having limitations and conditions that remain effective and appropriate. Through the review process we have sought to secure at each site improvements in environmental performance, protection and outcomes. The limitations and conditions of the revised authorisation reflect technical developments, anticipated site developments, current legal and policy constraints, and regulatory approach, for the period until it is next reviewed. We have undertaken a comprehensive review of the three separate RSA93 Authorisations held by AWE plc for its sites at Aldermaston and Burghfield.

2.13 Our decisions on this review relate to AWE plc's sites at Aldermaston and Burghfield. AWE plc carries out the design, manufacture and in-service support of atomic weapons and their dismantling after withdrawal from service. There are a large number of processes conducted on the two AWE sites, a number of which may result in the generation of radioactive waste. The types of operations undertaken are:

- processing and handling of radioactive metals and materials in the production of components;
- assembly and disassembly of warheads;
- research into the development of radioactive components and the testing of their physical and chemical properties;
- safety related research on nuclear materials;
- measurement and analysis of a wide variety of materials including environmental samples;
- studies of the effects of radiation on materials and equipment;
- recovery and recycling of radioactive materials;
- testing of the integrity of equipment using radioactive gases as tracers;
- destructive and non-destructive testing of items, including waste assay;
- calibration and testing of radiation detection and measurement instruments;
- provision of dosimetry services;
- maintenance of equipment and plant used for radioactive operations;
- decommissioning of redundant plant and facilities;
- preparation and treatment of radioactive wastes prior to disposal;
- management of historical arisings of radioactive wastes including sorting and repackaging;
- storage of radioactive wastes pending the availability of appropriate disposal routes eg for Intermediate Level Wastes (ILW).

2.14 AWE plc is currently authorised to dispose of gaseous and aqueous radioactive wastes to the environment. Authorised transfers of wastes for disposal allow AWE to consign wastes to the Low Level Waste Repository, near Drigg in Cumbria. These transfers may be directly or via Winfrith or Sellafield where supercompaction can be applied to reduce volume. Solid and organic liquid wastes can be transferred to the operators of incinerators and Warhead Waste to the MOD at Aldermaston and/or Burghfield for transfer to the site operator at Foulness. There are several additional minor transfer routes.

2.15 AWE requested the retention of all of the above routes with the exception of the transfer of Warhead waste to MoD. AWE asked for authorisation to make transfers directly to Foulness, thus eliminating the need for a third party transfer via the MOD. In our revised authorisations we have included these along with the transfer of organic and solid wastes to one additional incinerator operator.

2.16 AWE requested a disposal route for Very Low Level Waste (VLLW) arising from the demolition of redundant buildings on site at AWE Aldermaston. This waste is contaminated with tritium to a level not exceeding 10 becquerels per gram. We included this request in our consultation but note that a policy decision by Defra on the applicability of this type of disposal for nuclear licensed sites is currently awaited. We have been in discussion with AWE plc and the NII regarding re-use of this type of material on site at Aldermaston and have decided not to authorise these disposals at this time. More information about the AWE sites and our review is set out in Sections 3 and 5 of this document.

2.17 Details of the process that we have followed in coming to our decisions on this review are set out in Section 4 of this document. Key correspondence identified in this section is included in Annex 2 of this document. Section 4 provides information about the consultation arrangements we used. We received no comments regarding our general consultation process other than those relating to Warhead Waste disposals at Foulness in Essex. Issues and comments relating to these disposals are addressed in Section 5 and include details of our extended local consultation in the vicinity of the Foulness (QinetiQ) Site.

2.18 Our consultation arrangements included the Food Standards Agency (FSA) and the Health and Safety Executive (HSE) as statutory consultees under RSA93. We consulted more widely, with Defra, the Department of Health, the Ministry of Defence, and Local Authorities in the vicinity of the AWE sites and in areas where radioactive wastes are transferred for disposal. Our list of consultees included interest groups in the vicinity of the AWE sites, the AWE Local Liaison Committee, national interest groups and members of the public. We held two drop-in sessions at Tadley and Reading during the consultation period and advertised our consultation in the local media.

2.19 In Section 5 of this document we set out considerations following consultation including a summary of comments received and our response to them. The decisions that we intend to implement are summarised in Section 6.

2.20 We keep the regulatory systems and processes that we use under review. The provision of this Decision Document contributes to our aim that our regulatory work will be:

Transparent	- by having rules and processes which are clear to those in business and local communities.
Accountable	- by explaining ourselves and our performance.
Consistent	- by applying the same approach where possible within and between sectors and over time.
Proportionate	- (or risk-based) by allocating resources according to the risks involved and the scale of outcomes which can be achieved.
Targeted	- (or outcome-focused) by having environmental outcomes central to our planning and in assessing our performance.

3 Site details and submissions

3.1 Introduction

3.1.1 This section provides a summary description of the AWE sites, their locations including nearby environmentally sensitive areas, and a brief history of operations. It provides a list of the current authorisations that will be replaced by the authorisations we now intend to issue and a brief description of how radioactive wastes are generated, processed and disposed. It summarises key requests included in the AWE plc review submission for AWE Aldermaston and AWE Burghfield. It also summarises our approach to enforcement of the authorisations we issue and recent regulatory and compliance issues at the sites.

3.2 AWE plc Atomic Weapons Establishment Sites

3.2.1 The Atomic Weapons Establishment at Aldermaston was established in 1950, and formed part of the United Kingdom Atomic Energy Authority (UKAEA) until 1973 when ownership and managerial control of the site was transferred to the Ministry of Defence (MOD). The Burghfield site was originally established as a Royal Ordnance Factory for the manufacture of munitions and became part of the AWE complex in 1987.

3.2.2 The Atomic Weapons Establishment Act 1991 made provision for the sites at Aldermaston and Burghfield to be contractorised and a Government-Owned-Contractor-Operated (GOCO) fixed term contract was let to Hunting-BRAE Limited in 1993. In July 1997 the majority of the AWE Aldermaston Site and a section of the AWE Burghfield Site were granted Nuclear Site Licences under the Nuclear Installations Act 1965 by the Health and Safety Executive.

3.2.3 The Nuclear Installations Inspectorate of the Health and Safety Executive regulate nuclear safety arrangements at AWE Aldermaston and at the Nuclear Licensed Site at AWE Burghfield. Part of the AWE Burghfield site is not governed by the Nuclear Installations Act 1965 and is colloquially termed the Non-Licensed Site.

3.2.4 Under this fixed term contract Hunting-BRAE was responsible for the management of all work activities at AWE, whilst the MOD retained ownership of the sites, radioactive substances and all plant and equipment. This contract with Hunting-BRAE expired on 31st March 2000.

3.2.5 Following publication of the Strategic Defence Review (SDR), the Secretary of State for Defence announced that he had reviewed options for the management of Aldermaston and Burghfield AWE sites after the expiry of Hunting-BRAE's contract in March 2000. The Secretary of State decided that these sites would continue to operate in the private sector under GOCO arrangements, and held a commercial tender competition. In December 1999 the Secretary of State announced that he had selected a new contractor, *AWE Management Limited,* who would operate these sites on behalf of the MOD.

3.2.6 AWE Management Limited is a consortium of SERCo, British Nuclear Fuels plc and the Lockheed Martin Corporation. Management of the Atomic Weapons Establishments from 1 April 2000 has been undertaken by AWE plc, whose shares are owned by AWE Management and the Secretary of State for Defence. The initial period of the contract was 10 years but this has

since been extended to 25 years. The site, buildings, plant and process materials continue to be owned by the Ministry of Defence.

3.3 Summary site descriptions

AWE Aldermaston

3.3.1 AWE Aldermaston is located approximately 15 km southwest of Reading, 11 km north of Basingstoke and 13 km southeast of Newbury. The A340 is routed around the western edge of the site. The village of Aldermaston lies to the northwest of the site and the built-up area of Tadley lies to the south. Pamber Heath lies to the southeast. Between the site and the communities of Burghfield Common and Mortimer coniferous woodland dominates the landscape to the northeast along with commons and agricultural land.

3.3.2 The closest residential properties are located some 100 metres south of the Falcon Gate entrance to the site. A number of isolated properties lie along the site's southern perimeter. The AWE Aldermaston site is approximately 3.5 km^2 and is located on a plateau some 100 metres above sea level. The site, originally established as a military airfield, is generally level but slopes gently away at its northern and southern edges. Below any made ground the surface geology consists of plateau gravel a few metres thick which lies above the Lower Bagshot Beds. The latter rest on a layer of London Clay some tens of metres thick which acts as a seal protecting the underlying chalk aquifer.

AWE Burghfield

3.3.3 AWE Burghfield is located approximately 6 km southwest of Reading, 15 km northeast of Basingstoke and 22 km east of Newbury. The M4 Motorway lies approximately 1.5 km to the north of the site and the A33 lies some 2 km to the east. To the south and west a number of minor roads serve local communities at Burghfield Village, Burghfield Common, Grazeley Green and Pound Green. A railway line between Reading and Mortimer lies about 0.5 km to the east of the site. Between the site and Reading to the north and northeast agricultural land dominates the landscape up to the M4 some 1.5 km to the north. Beyond the M4, to the northeast a Business Park is situated near Junction 11. Disused gravel workings, some of which provide fishing and sporting activities dominate the landscape to the north of the M4.

3.3.4 The closest residential properties are located outside the eastern perimeter of the site some tens of metres away. A number of isolated properties lie along the site's perimeter. The AWE Burghfield site is approximately 1.0 km^2 and is located some 45-50 metres above sea level. The site is generally level and was originally established as an Ordnance Factory. Below any made ground the surface geology consists of a narrow band of alluvium overlying a layer of London Clay some tens of metres thick which acts as a seal protecting the underlying chalk aquifer.

3.3.5 The AWE Burghfield site is split into two distinct areas – that of the Nuclear Licensed Site and the remainder and majority of the site known colloquially as the Non-Licensed Site. The authorisation (BX8114) for the Non-Licensed site was reviewed, as a temporary measure, in 2004. We have now developed a single RSA93 authorisation for the whole of the Burghfield site. This will

remove any complications that may result from having separate authorisations for the two parts of the Burghfield site.

3.3.6 The two authorisations that we now intend to issue – BZ1994 for AWE Aldermaston and BZ2028 for AWE Burghfield will replace three existing RSA93 Authorisations.

3.4 Conservation Sites in the vicinity of AWE Aldermaston and AWE Burghfield

3.4.1 There are no Important Conservation Sites in the vicinity of AWE Aldermaston or AWE Burghfield such as Special Area of Conservation (SAC), Special Protection Area (SPA) or Ramsar Sites. There are a number of Sites of Special Scientific Interest (SSSI).

3.5 Sources, processing and disposal of Radioactive Wastes

3.5.1 AWE plc carries out the design, manufacture and in-service support of atomic weapons and their dismantling after withdrawal from service. As a result there are a large number of processes conducted on the two AWE sites, a number of which may result in the generation of radioactive waste. The types of operations undertaken are:

- processing and handling of radioactive metals and materials in the production of components;
- assembly and disassembly of warheads;
- research into the development of radioactive components and the testing of their physical and chemical properties;
- safety related research on nuclear materials;
- measurement and analysis of a wide variety of materials including environmental samples;
- studies of the effects of radiation on materials and equipment;
- recovery and recycling of radioactive materials;
- testing of the integrity of equipment using radioactive gases as tracers;
- destructive and non-destructive testing of items, including waste assay;
- calibration and testing of radiation detection and measurement instruments;
- provision of dosimetry services;
- maintenance of equipment and plant used for radioactive operations;
- decommissioning of redundant plant and facilities;
- preparation and treatment of radioactive wastes prior to disposal;
- management of historical arisings of radioactive wastes including sorting and repackaging;
- storage of radioactive wastes pending the availability of appropriate disposal routes eg for Intermediate Level Wastes (ILW);

3.6 Gaseous Discharges

3.6.1 The principal gaseous and particulate radioactive emissions consist of tritium, plutonium and uranium. Significant use is made of High Efficiency Particulate in Air (HEPA) Filters which remove the majority of particulate matter from the air flow prior to its discharge to atmosphere via high level stacks. Tritium discharges cannot be reduced by the use of HEPA Filtration and in the main tritium facility AWE employs a Gas Clean Up System (GCUS) to remove the majority of tritium from the effluent stream prior to discharge to atmosphere via high level stacks. The tritium captured by the GCUS is stored on site.

3.6.2 AWE requested a disposal route for gaseous argon-41 arising from the operation of the ORION Laser. Argon-41 is created by activation of natural argon in the atmosphere and has a half-life of 1.8 hours. Each time a long laser pulse is triggered assessments indicate that a maximum of 1.1 MBq of argon-41 will be produced. An assessment of the radiological impact of this radioactive noble gas release together with all other gaseous arisings from the site is provided in Section 5.

3.6.3 Monitoring of atmospheric discharges is carried out where practicable by sampling air in the ventilation system duct or stack. Sampling for airborne radioactive particulate is carried out by passing a known proportion of the discharge flow through a filter paper, which is collected for analysis after a given sampling period.

3.7 Aqueous Discharges

3.7.1 Liquid effluent, primarily aqueous waste, arises from operations carried out in facilities where radioactive material is handled. This includes liquid arisings from the decontamination of equipment and the cleaning of non-disposable personal protective equipment worn by staff. Liquid effluent also arises from hand washings and showers in these areas. Taking account of the origin and use of the liquid, it is directed as appropriate into the active effluent treatment system or as trade effluent into the sewer. Whichever treatment regime applies, measurements are made before, during and after treatment to ensure that the treatment is optimised and that the liquids eventually sentenced for transfer or disposal comply with the relevant limits for radioactivity and chemical composition.

3.7.2 Routine operations at AWE Burghfield do not currently create radioactive liquid waste and the site is not authorised to make environmental disposals of such waste. As a contingency, only to be invoked if some unforeseen event should give rise to liquid waste, AWE Burghfield is authorised to transfer liquid waste to AWE Aldermaston for treatment and disposal. If such a transfer were to be made, the waste would be added to other active effluent for treatment by the techniques approved for use at AWE Aldermaston and for subsequent disposal within the limits and conditions of the AWE Aldermaston authorisation.

3.7.3 At AWE Aldermaston radioactive liquid effluent, in batches of known volume and activity, is transferred in approved containers from the facility in which it arises to the Radioactive Waste Treatment Plant (RWTP) via on-site road transport. After receipt at the RWTP the waste is conditioned as necessary and passed into an evaporator. This removes virtually all of any insoluble or dissolved particulate, i.e. the form taken by any plutonium and/or uranium contamination. Particulate radioactivity is concentrated and retained in the

evaporator, after which it is solidified into a form suitable for disposal to the Low Level Waste Repository near Drigg in Cumbria.

3.7.4 The evaporated water is re-condensed and following radiochemical analysis discharged into the site Trade Effluent System and from there to the sewer. Now that operation of the RWTP is fully established AWE will be examining the practicability of re-using the condensate on site, as part of a long-term drive toward reduction of aqueous radioactive discharges.

3.7.5 In addition to liquid effluent treated using the RWTP there are other sources of aqueous effluent that are managed using the Trade Effluent Treatment Plant (TETP) and disposal via the sewer. These are arisings of effluent in the trade waste system from laboratories and workshops in which no radioactive materials are used and there is therefore no possibility of contamination, liquid effluent from buildings in which radioactive materials are used but only under conditions which are unlikely to introduce radioactive material into liquid waste and condensate with low levels of tritium coming from the evaporator used to treat active aqueous wastes. These latter effluents consist of:

- liquid effluent initially treated as potentially active (i.e. a candidate for evaporation treatment) but which is diverted for sewer disposal if preliminary monitoring shows the radioactivity level to be suitably low;
- small volumes of groundwater collected as samples, disposed of directly to sewer after being analysed;
- liquid effluent from the 'clean' side of change rooms serving facilities carrying out radioactive operations.

3.7.6 Most trade effluent is transferred to the TETP via on-site pipelines. Treatment of effluent in the TETP utilises acids/alkali materials to neutralise the effluent after which the treated effluent is sent to holding tanks where it is sampled and analysed. If the results show the radioactive content of the effluent to be within prescribed limits the effluent is discharged via clarifiers to the public sewer. If, however, the pre-discharge results are not satisfactory additional treatment can be applied to the effluent.

3.7.7 During the discharge to the sewer the volume of the batch is metered and samples are taken and further analysed for radioactive content. The effluent is then discharged through a pipeline to the Sewage Treatment Works at Silchester (currently operated by Thames Water Utilities Limited). Treated sewage effluent discharged from the Sewage Treatment Works enters the Silchester Brook which first joins the River Kennet and ultimately the River Thames. The sludges arising from the clarification of trade effluent are sampled and analysed to confirm that disposal of the sludge to a licensed landfill site as non-active waste is appropriate.

3.7.8 In addition to aqueous wastes treated by either the RWTP or TETP slightly tritiated ground water in the land surrounding the North Ponds Water Management System (WMS) is managed by being pumped into the duty Holding Tank. The pumped volume is measured, and samples are taken to determine the tritium concentration before it mixes with surface water draining from part of the AWE Aldermaston site. The tritium concentration in the ground water is affected somewhat by the rainfall over the previous days and weeks, but not by any factor directly within the control of AWE. When full, the Holding Tank is sampled to ascertain compliance with all regulatory requirements. One of these is to meet (i.e. to be less than) a value for tritium concentration. Only after confirmation of compliance with this requirement is

the Holding Tank discharged into the stream leading through Aldermaston Court and into the Aldermaston Stream.

3.7.9 The tritium in water discharged to the stream has three separate origins:

- regional background, as observed generally in the UK and elsewhere, some of it natural, but mostly as a consequence of human activities such as atmospheric weapons testing;
- local background, enhanced above regional background by re-deposition of traces of AWE's authorised airborne discharges;
- the tritiated groundwater pumped from around the WMS.

3.8 Solid Wastes

3.8.1 Solid wastes arise from the processes listed above. The activity level of the waste will vary, depending on the use of the item that has become waste. Examples of radioactive solid low level include:

- process wastes from operations and decommissioning;
- disposable personal protective equipment such as gloves, coveralls and overshoes worn by staff in areas in which radioactive materials are handled;
- HEPA and other filters used to remove particulate matter from airborne wastes prior to discharge to atmosphere;
- cemented sludges arising from the treatment of radioactive liquid effluent;
- wipes used for decontamination of items;
- swabs used for measuring contamination levels.

3.8.2 All solid waste generated at AWE Aldermaston is collected by Environmental Programmes (Operations), the group within AWE responsible for the management of radioactive solid wastes, from the facilities in which it arises. Solid wastes generated at the AWE Burghfield site are currently transferred to AWE Aldermaston. If the material is not re-usable then that which is designated as solid low level radioactive waste for disposal is classed either as 'compactable' (e.g. coveralls and other 'soft' wastes) or as non-compactable (e.g. soil or crushed concrete). In both cases eventual disposal is to the Low Level Waste Repository (LLWR) near Drigg in Cumbria, but compactable wastes are forwarded to the LLWR after they have been subjected to high-force compaction. AWE Aldermaston consigns compactable wastes to the operator of the compaction facility at Winfrith, or the Waste Management and Compaction facility (WAMAC) at Sellafield, for compaction before it is forwarded for final disposal at the LLWR.

3.8.3 In 2002 AWE applied for minor variations to its authorisation BB0523 for disposal of radioactive wastes from AWE Aldermaston. Most of the variations were to widen the scope for disposal of incinerable wastes to include more tritium contaminated wastes and some alpha contaminated wastes. We carried out a consultation exercise on AWE's application in late 2003 and in September 2004 issued a replacement for authorisation BB0523, referenced BR8441.

3.8.4 The wastes now authorised in Variation BR8441 for disposal by incineration include organic liquid wastes (e.g. used oils, liquid scintillant and ethylene

glycol) contaminated with tritium, organic liquid wastes (e.g. used oils) marginally contaminated with alpha activity; solid wastes (e.g. personal protective equipment, waste from weapon maintenance and refurbishment, marginally contaminated building fabric arising from decommissioning activities) contaminated with tritium and solid wastes (e.g. redundant transport containers, and personal protective equipment) that might be marginally contaminated with alpha activity.

3.8.5 AWE Aldermaston is currently authorised to transfer alpha and tritium contaminated wastes to the Incinerator Operator at Hythe, Hampshire and tritium contaminated wastes to White Rose Environmental at Knostrop near Leeds (the Incinerator Operator at Knostrop, Leeds).

3.8.6 In addition both AWE sites are authorised to transfer security classified Warhead Waste to the MOD for security controlled disposal at Foulness in Essex. AWE Aldermaston is currently authorised to transfer potentially contaminated waste mercury to AEA Technology at Winfrith, Dorset where the mercury can be decontaminated and re-cycled. Residual waste from this process is managed within that site's existing arrangements and authorisations for radioactive wastes.

3.9 Authorisations and Requirements that were included in this Review

3.9.1 The existing authorisations held by AWE plc for AWE Aldermaston and AWE Burghfield were included in our review:

3.9.1.1 AWE Aldermaston – BR8441 dated 1 October 2004 for the Disposal of Radioactive Waste

BR8441 authorises AWE Aldermaston to dispose of:

- radioactive gaseous waste to the environment via stacks and other specified outlets on site;
- radioactive aqueous waste to the environment via the Pangbourne Pipeline, Silchester Sewage Works and into the Aldermaston Stream via the North Ponds Water Management System;
- solid radioactive waste by transfer to:
- BNFL at Drigg or Sellafield;
- UKAEA at Winfrith for the purpose of final disposal at BNFL's site at Drigg (now referred to as the Low Level Waste Repository (LLWR));
- Shanks Chemical Services at Hythe (now varied by BZ6585 to the Incinerator Operator at Hythe, Hampshire taking account of a change in operator) and to White Rose Environmental at Leeds for the purpose of incineration;
- organic liquid Waste to Shanks Chemical Services at Hythe (now varied by BZ6585 to the Incinerator Operator at Hythe, Hampshire taking account of a change in operator) and to White Rose Environmental at Leeds;
- liquid mercury waste to AEA Technology at Winfrith;
- Warhead Waste by transfer to the MOD at Aldermaston for the purpose of secure and controlled disposal as approved by the Environment Agency at specified sites.

3.9.1.2 AWE Burghfield – BB0531 dated 1 April 2000 for the Disposal of Radioactive Waste (Nuclear Licensed Site)

BB0531 authorises AWE Burghfield Nuclear Licensed Site to dispose of:

- radioactive gaseous waste to the environment via stacks and other outlets on site;
- radioactive aqueous waste by transfer to AWE Aldermaston;
- radioactive solid waste by transfer to AWE Aldermaston;
- Warhead Waste by transfer to the MOD at Burghfield for the purpose of secure and controlled disposal as approved by the Environment Agency at specified sites.

3.9.1.3 AWE Burghfield – BX8114 dated 1 March 2005 for the Disposal and Accumulation of Radioactive Waste (Non-Licensed Site)

BX8114 authorises AWE Burghfield Non-Nuclear Licensed Site to:

- accumulate solid and aqueous radioactive waste;
- dispose of radioactive aqueous waste by transfer to AWE Aldermaston;
- dispose of radioactive solid waste by transfer to AWE Aldermaston;
- dispose of tritiated high explosive waste by burning on site;
- dispose of contaminated Warhead Waste by transfer to the MOD at Burghfield for the purpose of secure and controlled disposal as approved by the Environment Agency at specified sites.

Existing regulatory requirements at both AWE sites include an environmental monitoring programme. We will require this work to continue.

3.10 AWE plc Submission for the Review of AWE Aldermaston and AWE Burghfield RSA93 Authorisations – Key Points

3.10.1 AWE plc provided two submission documents and an Environmental Monitoring Programme Report to assist in our review of the RSA93 Authorisation for its sites at Aldermaston and Burghfield. The submissions were included in our consultation package. The following documents were submitted and formed the basis for applications by AWE plc to vary their authorisations:

3.10.2 AWE Report 565/05 Information to Support Proposals for Revised Radioactive Substances Act 1993 Radioactive Waste Discharge & Disposal Authorisations for AWE plc at Aldermaston.

3.10.3 AWE Report 566/05 Information to Support Proposals for Revised Radioactive Substances Act 1993 Radioactive Waste Discharge & Disposal Authorisations for AWE plc at Burghfield.

3.10.4 AWE Report 380/05 Summary of Data from and Review of the AWE RSA Environmental Monitoring Programme for Radioactivity within and around AWE Sites at Aldermaston and Burghfield.

3.10.5 AWE subsequently submitted two additional requests for disposals of radioactive wastes:

AWE EA 1050R dated 3 January 2006. RSA Authorisation for AWE Aldermaston: Request for Authorisation to Dispose of Iodine-129 to Drigg in Cumbria.

AWE EA 1061R dated 3 February 2006. RSA 1993. AWE Aldermaston Discharge Authorisation – ORION Discharges.

3.11 AWE plc advised that they did not anticipate any significant changes to operations at either AWE Aldermaston or AWE Burghfield in the period up to 2012. Construction and commissioning of a number of new facilities is however expected during the lifetime of the next radioactive waste disposal authorisation for AWE Aldermaston and AWE Burghfield whilst the programme for decommissioning redundant facilities will continue. The latter programme will, as at present, result in the generation of radioactive wastes. Consequently AWE sought authorisation to dispose of Very Low Level Solid Wastes to Licensed Landfill, particularly those arising from building demolition, and contaminated slightly above the lower threshold of regulatory control.

3.12 We support the construction of new facilities at the AWE sites as the development programme will result in the replacement of ageing facilities with those designed, built and operated to modern standards. We seek to influence this programme by continuing a close dialogue with AWE plc thus ensuring that appropriate and modern abatement standards are utilised. Furthermore we seek to ensure that the application of Best Practicable Means is considered and implemented at an early stage and includes the application of waste minimisation at source.

3.13 AWE plc has requested continued disposal of radioactive wastes via already authorised routes. A breakdown of the requested limits and the disposal routes is summarised below:

AWE Aldermaston

- A decrease in the annual activity limits for gaseous emissions for alpha emitting radionuclides, krypton-85 and tritium.
- The removal of the requirement to report the activity of gaseous plutonium-241 discharged into the environment.
- A clear division by activity limit between volatile and non-volatile beta/gamma emitting radionuclides but with no alteration to the overall existing annual limit of 5 MBq.
- The addition of an annual activity limit of 6 MBq for the disposal of gaseous carbon-14.
- The inclusion of a separate Table 2b in Schedule 3 of the Authorisation Certificate that relates to the use of volatile beta/gamma emitting radionuclides and carbon-14 for work undertaken in support of the Nuclear Non-Proliferation Test Ban Treaty.
- The addition of an annual activity limit of 1GBq for the disposal of gaseous argon-41 arising from operation of the ORION Laser.
- Retention of the authorised route for the disposal of trade waste to the Silchester Sewage Works.
- Reduction in the authorised annual activity limits for the disposal of trade waste to the Silchester Sewage Works for alpha emitters from 40 MBq to 10 MBq, beta/gamma emitters from 120 MBq to 20 MBq and tritium from 50 GBq to 25 GBq.

- An activity notification limit of 30 Bq/l for the tritium concentration in water discharged from the North Ponds Water Management System into the Aldermaston Stream.
- The addition of an annual activity limit of 1 MBq for the radionuclide iodine-129 for disposal to the Low Level Waste Repository.
- The addition of an annual activity limit of 40 MBq for the radionuclide carbon-14 for transfer to the incinerator operators at Hythe, Hampshire or Knostrop, Leeds.
- Authorisation to dispose of solid and organic radioactive wastes by transfer to the Incinerator Operator at Colnbrook, Berkshire. A maximum annual activity limit of 0.24 TBq is proposed for tritium and 40 MBq for carbon-14 and a maximum annual volume limit of 510 cubic metres.
- Authorisation to transfer Warhead Waste directly to the Site Operator at Foulness, Essex or to the same receiver via the AWE Site at Burghfield, Berkshire. Removal of the existing annual activity limit of 2 MBq for uranium isotopes.
- Authorisation to dispose of tritium contaminated building demolition waste with a maximum activity limit of 10 Bq/g and an annual volume limit of 300 m^3 to licensed landfill.
- Authorisation to receive radioactive waste from the Site Operator at Foulness, Essex.

AWE Burghfield

- A decrease in the annual activity limit for gaseous emissions from the Nuclear Licensed Site for alpha emitting radionuclides from 20 kBq to 5 kBq and tritium from 50 GBq to 9 GBq.
- The addition of an annual activity limit of 1 kBq for alpha emitting radionuclides from the Non-Licensed Site in order to allow for decommissioning work to proceed.
- A decrease in the annual volume limit to 300 m^3 from 400 m^3 for aqueous wastes transferred to AWE Aldermaston from the Nuclear Licensed Site. The addition of an annual activity limit of 1 MBq for beta/gamma emitters and of 1 GBq for tritium in these wastes from the Nuclear Licensed Site.
- Authorisation to transfer solid radioactive waste directly to the Low Level Waste Repository via either the operator of Complex B4 and Facilities A50 and A51 on the Winfrith Nuclear Site or the Site Operator at Sellafield if necessary for treatment of wastes by supercompaction. In addition to the existing authorised route via AWE Aldermaston an increase in the annual disposal volume to 600 m^3 from 200 m^3 and activity limits increased for uranium from 0.15 GBq to 1.5 GBq. For tritium the annual activity limit is proposed to decrease from 2 GBq to 1.6 GBq.

3.14 Enforcement and recent Regulatory History

3.14.1 Securing compliance with RSA93 authorisations is an important part of our regulatory system for nuclear sites. We expect full compliance with our authorisations and we will use our enforcement powers including prosecution when necessary, to ensure that relevant action is taken by the operator. We have set out our Enforcement and Prosecution Policy and identified the principles we will apply in achieving firm but fair regulation. These principles are the same as those set out above in paragraph 2.20.

3.14.2 The methods of enforcement available to us include enforcement notices (to secure compliance with authorisation conditions), prohibition notices (where there is an imminent risk of serious environmental damage), revocation of an authorisation, variation of authorisation conditions and the use of injunctions. Where we believe a criminal offence has been committed we will consider instituting a prosecution or issuing a prohibition or enforcement notice, formal caution or a warning according to the circumstances.

3.14.3 In July 2005 we served an enforcement notice requiring AWE plc to develop a programme of work that would result in improvements to management systems relating to the disposal of radioactive wastes and in particular arrangements that would result clearer lines of responsibility between Facility Managers and Operational Managers at the site. AWE completed the actions required by this notice by September 2005.

3.15 Regulatory Control

3.15.1 We carry out periodic reviews of the limitations and conditions attached to authorisations, and may carry out more comprehensive additional reviews as we see fit. Through conditions in the authorisations, we can require the operator to carry out assessments and produce reports on radioactive waste matters, for example on the application of Best Practicable Means (BPM) or review of disposals set against national and international standards of best practice. We set the timing of such reports so that they can be available when the authorisation is next likely to be reviewed. These and other documents aid us in undertaking our reviews.

3.15.2 RSA93 review work prior to April 2000 resulted in authorisations being issued to AWE plc for the sites at Aldermaston and Burghfield and in 2004 a revised authorisation was granted to AWE Aldermaston to permit the transfers of certain solid wastes for disposal. In these authorisations we required AWE to undertake a programme of work that would assist us when we came to undertake further reviews of the RSA93 Authorisations. AWE has completed the required work and provided it to us in good time along with applications for our review and a summary of environmental monitoring work around the AWE sites and the surrounding areas.

3.15.3 We set limits on discharges such that, even if discharges were made at the limits, the doses to members of the public would not exceed the relevant annual dose limit set out in The Radioactive Substances (Basic Safety Standards) (England and Wales) Direction 2000. We set limits and conditions that are consistent with European and UK law, international treaty obligations, Government policy objectives, and protection of public health, the food chain and the environment.

3.15.4 Our overall system of regulatory control at nuclear sites includes the Environment Agency:

- deciding whether or not applications for new authorisations or applications for variations to existing authorisations should be granted, and setting appropriate limits and conditions in any authorisations issued which ensure that the public and the environment are well protected;
- periodically reviewing authorisations and operators' environmental performance and varying authorisations as appropriate to ensure that the authorisation's limits and conditions are up to date and effective and continue to ensure that the public and the environment are well protected;

- carrying out announced and unannounced inspections;
- investigating incidents;
- using our powers of enforcement, including prosecution, as necessary;
- undertaking waste, effluent and environmental monitoring and radiological assessments of public radiation exposure.

4 Our Process for this Review

4.1 Introduction

4.1.1 In undertaking this review we issued our Process and Considerations Document (P&C Document). This document set out the generic process that we would follow when considering an operator's application for a new or varied authorisation or conducting a review of an existing authorisation. It has five main elements:

Information gathering: when we set out our requirements and gather information relevant to our considerations, including receipt as relevant of an application or an operator's submission to assist the review.

Initial Review: when we carefully consider the information we have available and come to a preliminary view on, for new applications, whether an authorisation might be issued and, if so, what its limitations and conditions might be. For variation applications and reviews, we will come to a preliminary view on whether the limitations and conditions of the existing authorisation might require varying and if so what the revised limitations and conditions might be.

Consultation: when we consult on our preliminary view. If we consider that a new authorisation might be issued or that an existing authorisation might need to be varied, we will set out a draft authorisation together with an Explanatory Document explaining our preliminary view, and, depending on the site concerned and where relevant the scope of application we have received, consult appropriately.

Post Consultation Review: when we will carefully consider all relevant information we have received during and after consultation together with existing information.

Decisions and Authorisations: when we will come to a view on whether a new or varied authorisation should be issued and if so what its limitations and conditions should be. We will publish a document that provides the background to and basis for, our decisions.

4.1.2 The P&C Document also notes that our decisions, including the authorisation or varied authorisation where appropriate, will be sent to the Secretary of State for the Environment, and the Secretary of State for Health, and, for sites in Wales, the National Assembly for Wales. The Secretaries of State and the National Assembly for Wales have certain powers under RSA93 and may decide that they wish to exercise them. The P&C Document states that we will also, if appropriate, advise the date on which we propose to issue an authorisation.

4.1.3 This section sets out the detailed steps that we have followed in conducting the review for the AWE plc sites at Aldermaston and Burghfield. It includes details of information requested and received, the consultation we have carried out, and our post consultation process.

4.1.4 Since the AWE review process commenced in April 2005 with the issue of our P&C Document, we have undertaken a review of the way in which we carry out reviews and variations. The P&C Document has been replaced with a Process and Information Document (P&I) and a Considerations Document (CD). The P&I Document provides details of the Review Process whilst the

CD aims to take into account all relevant issues including legal and policy matters and constraints.

4.2 Process for this Review, prior to and including consultation

4.2.1 Initiation of our Review

4.2.1.1 On 1 April 2005 we notified AWE plc that we intended to undertake a review of RSA93 Authorisations BR8441 relating to AWE Aldermaston and BB0531 and BX8114 relating to AWE Burghfield. We distributed our Process and Considerations Document widely in April 2005, to both statutory and non-statutory consultees, as well as to AWE plc. The Document provided information on how we were going to undertake this review, and required AWE plc to provide us with the necessary information. Annexes A and B of our P&C Document provided AWE plc with detailed Schedules of Information that we required in order to conduct this review. The following documents were prepared by AWE and provided to us in November 2005, so that we could formally commence our review:

4.2.1.2 AWE Report 565/05 Information to Support Proposals for Revised Radioactive Substances Act 1993 Radioactive Waste Discharge & Disposal Authorisations for AWE plc at Aldermaston.

4.2.1.3 AWE Report 566/05 Information to Support Proposals for Revised Radioactive Substances Act 1993 Radioactive Waste Discharge & Disposal Authorisations for AWE plc at Burghfield.

4.2.1.4 AWE Report 380/05 Summary of Data from and Review of the AWE RSA Environmental Monitoring Programme for Radioactivity within and around AWE Sites at Aldermaston and Burghfield.

4.2.1.5 Subsequently AWE plc submitted two letters requesting authorisation for disposal of a number of iodine-129 sources to the Low Level Waste Repository at Drigg in Cumbria, and for gaseous argon-41 into the environment from the ORION laser facility.

4.2.2 Requests for clarifications and additional information

4.2.2.1 We did not require clarification of any information supplied by AWE plc.

4.2.3 Issues for other regulators/government departments and agencies

4.2.3.1 We did not need to seek confirmation from the HSE in respect of radiation dose figures from radiation shine because no such shine dose is measurable as a result of the type of work and the radioactive materials used at either AWE site.

4.2.3.2 We sought and received FSA's views on our dose assessments and those that had been carried out by AWE plc. FSA provided their own report detailing critical group doses.

4.2.4 Initial review

4.2.4.1 Following consideration of all the information then available to us we produced draft authorisations for AWE Aldermaston and AWE Burghfield. We set out our considerations so far at that stage in an Explanatory Document so as to assist the consultation process.

4.2.5 Public consultation

4.2.5.1 To assist our decision making process we carried out a public consultation to enable consultees to bring to our attention any issues that they would wish us to consider. Prior to the consultation we had not made any final decisions and we would not do so until we had carefully considered all of the responses we have received.

4.2.5.2 The consultation documents included:

- our Explanatory Document (ED);
- our *Considerations for Radioactive Substances Regulation,* Environment Agency, 2005, (Considerations Document);
- AWE Report 565/05 Information to Support Proposals for Revised Radioactive Substances Act 1993 Radioactive Waste Discharge & Disposal Authorisations for AWE plc at Aldermaston;
- AWE Report 566/05 Information to Support Proposals for Revised Radioactive Substances Act 1993 Radioactive Waste Discharge & Disposal Authorisations for AWE plc at Burghfield;
- AWE Report 380/05 Summary of Data from and Review of the AWE RSA Environmental Monitoring Programme for Radioactivity within and around AWE Sites at Aldermaston and Burghfield;
- AWE EA 1050R dated 3 January 2006. RSA Authorisation for AWE Aldermaston: Request for Authorisation to Dispose of Iodine-129 to Drigg in Cumbria (Reproduced as Annex 7a in the ED);
- AWE EA 1061R dated 3 February 2006. RSA 1993. AWE Aldermaston Discharge Authorisation – ORION Discharges (Reproduced as Annex 7b in the ED);

4.2.5.3 We conducted a wide consultation on our proposals. These included local authorities in the Aldermaston and Burghfield area and local authorities in those areas where waste is currently received and where AWE plc have requested additional transfer for disposal.

4.2.5.4 Documents were made available on paper and electronically and could be requested by telephone, fax, post or e-mail.

4.2.5.5 Our consultation package was also provided to libraries local to AWE Aldermaston and AWE Burghfield.

4.2.5.6 We advertised our review and consultation process arrangements in local media by placing press releases as well as providing this document on our web site. A list of our consultees and the distribution of our consultation package is shown at Annex 3.

4.2.5.7 We held two drop-in sessions at Tadley Community Centre on 20 June 2006 and at Reading Town Hall on 22 June 2006. Our review was also covered by interviews with local radio and newspaper media.

4.2.5.8 Responses to the consultation could be made by: fax, telephone, email and by post. All of the written responses have been acknowledged and all responses have been carefully considered in this document.

4.2.6 Consultation issues

4.2.6.1 We would not normally undertake to advertise widely and directly with the public in areas where radioactive waste is transferred for treatment and/or disposal. This is because operators receiving such wastes are authorised to do so under the Radioactive Substances Act 1993.Operators may be authorised to receive waste from a number of producers eg incinerator operators, and will be subject to compliance assessment by other Environment Agency regulators.

4.2.6.2 In respect of sites receiving wastes we make information available, either electronically or in hard copy to public registers of Local Authorities and to Environment Agency public registers but will not necessarily advertise in local press/media.

4.2.6.3 As part of our consultation for the future of disposals from AWE Aldermaston and AWE Burghfield we raised a proposal to allow the AWE sites to transfer Warhead Waste directly to the QinetiQ site at Foulness in Essex. Warhead Wastes arising from the decommissioning of nuclear warheads were disposed of by security controlled destruction at Foulness over the period 1998 to 2003. The currently authorised transfer route allows the AWE sites to consign the waste to the MOD. The MOD transfers the waste to Foulness. After discussions with AWE plc and the MOD we proposed authorising AWE plc to transfer such wastes directly, eliminating the transfer to MOD and making the whole process transparent. We also proposed a reduction in volume and the amount of radioactivity (tritium) in the waste.

4.2.6.4 Between 2004 and 2006 , AWE did not transfer any Warhead Wastes to MOD and thus to Foulness. Our proposals, as presented in our Explanatory Document came as a surprise to members of the public in the area around Foulness. Many were unaware of the previous disposals whilst some believed that the disposals had ended.

4.2.6.5 The Member of Parliament for Rochford and Southend East wrote to our Chief Executive and to the MOD in June 2006 requesting information on disposals at Foulness. In late June we met with the MP and agreed to prepare a report on past disposals, the management of radioactive wastes at Foulness and on our proposals for future disposals. This report is provided at Annex 6. After receiving and reading our report we were asked to extend our consultation to allow members of the public near Foulness the opportunity to comment. Our consultation was extended until 2 October 2006 and was announced in Essex by press release to local media and advertisements in local newspapers and with interviews on local radio and television. The MP wrote to constituents and we provided additional consultation material to public libraries near the QinetiQ site (see Annex 3 for a list of local libraries).

4.2.6.6 We held a “drop-in” session at Great Wakering, Essex on 20 September 2006 in order to allow the local community an opportunity to discuss disposals at Foulness with our nuclear regulators, our local regulator for Foulness and QinetiQ and MOD representatives. The “drop-in” session was attended by the local MP along with about 60 local residents. Most had been unaware of historical disposals and we spent some time with them discussing what had been happening and our proposals for the future. Foulness disposals are addressed further in Section 5.

4.2.6.7 We did not extend the consultation to include any other item as we felt that sufficient time had been given to comment; also we would, as usual accept comments from consultees until a few days before the completion of this document.

4.2.6.8 We are reviewing our consultation guidelines as a result of the lessons identified above.

4.2.7 Process for this Review, following consultation

4.2.7.1 The purpose of the consultation was to help inform our decisions on the applications. No decision was reached until we had completed this process. All written responses to the consultation have been acknowledged and all responses have been carefully considered. This decision document is being sent to all of those to whom consultation documents were provided and to those who responded to our consultation and requested a copy.

4.2.7.2 If issues had arisen which fell outside our principal responsibilities, on which we needed the advice of other organisations having expertise in specific topics, then we would have written to the Government Department or public body concerned to seek its expert views. We have not needed to do so in the case of this review.

4.2.8 Matters for Secretary of State

4.2.8.1 As noted above, certain powers relating to this determination process fall to Secretary of State for the Environment, and the Secretary of State for Health, and, for sites in Wales, the National Assembly for Wales. We intend to issue the revised authorisations on 1 February 2007 so that they will come into effect on 1 March 2007. We provided this document to the Secretaries of State for the Environment and Heath so that they could advise us in advance of that date if they wished to exercise their powers under RSA93.

4.2.9 Consultation issues

4.2.9.1 No consultation issues relevant to the Secretaries of State were raised.

4.2.9.2 We take the view that the public consultation process has provided sufficient opportunity for members of the public and interested groups to make full and informed representations and we have carefully assessed and weighed all the points raised during the consultation. We are satisfied that the issues are sufficiently clear and that no further consultation or debate is necessary or desirable.

5 Our considerations after consultation

5.1 Introduction

5.1.1 This section sets out our considerations and views following consultation. These considerations include relevant matters identified in our Considerations Document, which includes information to assist understanding. The Considerations Document also sets out in general terms how we take account of legal and policy matters in practice and explains some of the fundamental concepts and principles that underlie these issues. We have also set out in this section our dose assessments for the discharges from AWE Aldermaston and AWE Burghfield assuming that these are made at the limits of the authorisations we now intend to issue.

5.1.2 We have undertaken a review of the three existing RSA93 Authorisations relating to the two AWE sites. We have done so despite having issued the existing authorisation for AWE Aldermaston (BR8441) in October 2004 and the RSA93 Authorisation for the Non-Licensed part of the Burghfield Site (BX8114) in March 2005.

5.1.3 Our aim has been to produce two authorisations – one for each AWE site. We have undertaken this review mindful of the significant common factors shared by AWE Aldermaston and AWE Burghfield. These include a single Company Management System, Support Services (including Waste Management and Health Physics), Quality Assurance and Emergency Support. It would not have been logical to undertake such a comprehensive review of these sites separately or at different times. We are also of the opinion that, despite comprising two distinct entities in the area of Nuclear Licensing, AWE Burghfield would benefit from being authorised to discharge and transfer radioactive wastes under a single RSA93 Authorisation. We also believe that a single authorisation for AWE Burghfield will provide the level of transparency required by the public in relation to all arisings of radioactive wastes from this site.

5.1.4 No issues have arisen during our consultation in relation to the methodology used by us to review all aspects of the AWE Aldermaston and AWE Burghfield sites in a single process.

5.2 Legal and Policy considerations

5.2.1 Policy on radioactive waste is set out in the White Paper, Review of Radioactive Waste Management Policy: Final Conclusions (July 1995), Cm 2919. Some specific statements of policy have been made subsequently. In coming to our views we have taken into account Government policy. In particular the application of the BPEO concept and BPM requirements contribute to the policy aims that radioactive wastes should not be unnecessarily created, should be safely and appropriately managed and treated, and should be safely disposed of at appropriate times and in appropriate ways. Our considerations are set out below and are included in the limits and levels we propose.

5.2.2 We have considered the draft Statutory Guidance on the Regulation of Radioactive Discharges into the Environment from Nuclear Licensed Sites issued in 2000. While we have taken account of this guidance, we are aware

that formal guidance, which may differ, is likely to be issued in the near future. Our limit setting methodology, which was developed in part in response to the draft Statutory Guidance, has been applied as appropriate in this case.

5.2.3 Section 4.3 of the Considerations Document describes the radiological protection principles of justification, optimisation and limitation. The principle of justification (as established in "The Justification of Practices Involving Ionising Radiation Regulations 2004") does not apply to the uses of nuclear energy for military purposes. We have not therefore considered justification further.

5.2.4 In respect of optimisation and limitation these have been considered as follows:

- we consider that the authorisations we intend to issue will help to ensure that radiation doses are as low as reasonably achievable, i.e. optimised, through the improved BPM conditions and the use of revised limits;
- our dose assessments confirm that doses are significantly lower than the dose limit for members of the public.

5.2.5 We have considered the principal aim of the Environment Agency, set out in section 4 of the Environment Act 1995 (EA95), which relates to sustainable development and the guidance issued by the Government in December 2002. We consider that the overall approach described in this Decision Document and the application of the BPEO concept and BPM requirements contribute towards achieving sustainable development.

5.2.6 We consider that we have properly exercised our pollution control powers contained in section 5 of EA95, for the purpose of minimising the effects of pollution of the environment, through the limits and conditions in our authorisations.

5.2.7 We have had regard to the effect the authorisations we intend to issue have on the economic and social well being of local communities in rural areas. Our assessment of the impact of discharges shows that the impacts are very low. We have not identified any effects that would require us to include additional limits or conditions.

5.2.8 We have taken into account likely costs and benefits. We are satisfied that the limits and conditions in the authorisations are appropriate.

5.2.9 We have considered the UK's OSPAR obligations and the UK Strategy for Radioactive Discharges. The Strategy applies to the Defence Sector including such sites as AWE Aldermaston and AWE Burghfield. Our regulatory system, including the application of BPM, contributes to the Strategy's principal aim of progressive and substantial reduction of radioactive discharges.

5.2.10 We consider that our regulatory process, including consultation, the authorisations we intend to issue and this Decision Document are consistent with our duties under the Human Rights Act 1998 and will not result in any actual or potential breach of a Convention right.

5.3 Best Practicable Environmental Option

5.3.1 As explained in section 5.2.2 of the Considerations Document, the Best Practicable Environmental Option (BPEO) is a concept initially developed by the Royal Commission on Environmental Pollution. BPEO is also identified in the draft Statutory Guidance on the Regulation of Radioactive Discharges into the Environment from Nuclear Licensed Sites in England (October 2000) as

one of the main principles that a regulator should follow. We define this concept in our template for nuclear site authorisations as:

> *"…The radioactive waste management option, for a given practice, that provides the most benefit or least damage to the environment as a whole in the long term as well as in the short term, taking into account operational doses and risks, and social and economic factors."*

5.3.2 Our Considerations Document requires operators to provide us with a BPEO Study of their waste management and disposal options before we issue a new authorisation under RSA93. The AWE sites consist of a large number of individual facilities in which diverse activities are undertaken. We considered, as part of our review that it would be inappropriate to require AWE plc to review each BPEO Study relating to every one of these facilities at this stage. Instead we have undertaken and will continue to require a rolling review of BPEO Studies during our programme of compliance inspections. We will sample and discuss a number of these with the operator as a matter of routine. BPEO studies for facilities undergoing redevelopment are scrutinised as a matter of course. Hold Point Schedules have been produced by AWE plc that require us to review and comment on development and refurbishment work before the next phase of any programme or project commences.

5.3.3 BPEO Studies for certain facilities have been reviewed at our request and others will be reviewed periodically, or when processes and plant change, or as required by us. AWE plc has submitted information as requested and this provides some background regarding the approach taken at both AWE sites. Examples are given in the AWE Reports of the BPEO taken with regard to management and disposal options for several waste streams. The existing RSA93 Authorisation (BR8441) required AWE plc to stop using the Pangbourne Pipeline by April 2005 and as a result AWE undertook an extensive BPEO Study to determine the most appropriate options for managing radioactive aqueous effluents. The outcome of that BPEO study is, amongst a number of other projects, the construction of the new Radioactive Waste Treatment Plant that now treats radioactive effluent, concentrating particulate and dissolved material and significantly reducing the activity of the final aqueous phase and allowing disposal as Trade Waste.

5.3.4 The gaseous, aqueous and solid wastes generated at the AWE sites are consistent with operational support and production, research and development and decommissioning work undertaken by AWE plc. AWE proposes in general to significantly reduce the activity of gaseous waste discharged into the environment but has sought authorisation to dispose of argon-41, a short half-life radionuclide that will be generated as a consequence of operating the ORION Laser Facility, and a small amount of carbon-14 arising from Non-Proliferation Treaty work. Similarly AWE proposes to reduce the activity of alpha and beta emitting radionuclides in aqueous wastes discharged to public sewer. Solid wastes are currently disposed of by transfer to a number of sites, including the LLWR and to the Winfrith and/or Sellafield Site Operators for supercompaction prior to transfer to the LLWR. There are no changes to these transfer routes. AWE plc has requested an increase in volume and activity of uranium contaminated waste and the ability to transfer solid waste directly to the LLWR from AWE

Burghfield via Winfrith or Sellafield (if supercompaction is appropriate), to minimise the number of road transport movements.

5.3.5 AWE has requested minor changes in the activities and volumes of wastes for disposal by incineration and for an additional transfer route to the S Grundon (Waste) Ltd Incinerator at Colnbrook, Berkshire. The disposal route for contaminated mercury waste remains unchanged apart from a name change of Site Operator. After discussions, AWE has now requested the ability to transfer warhead waste directly to the site currently operated by QinetiQ at Foulness, thus negating the current need to transfer this waste via an intermediary, the Ministry of Defence. This direct transfer route would increase the clarity and transparency of a transfer route process that was in use for several years (1998-2003) and for which there is a continuing need.

5.3.6 AWE has requested a new waste stream for the disposal of lightly contaminated wastes arising from building demolition and which are potentially contaminated above the limit at which regulatory control becomes necessary. AWE views this material as Very Low Level Waste (VLLW) and expects to generate several hundred cubic metres of demolition waste contaminated solely with tritium over each of the next few years. It is anticipated that the average tritium concentration will be in the range of 1-10 Bq/g. AWE has concluded that the BPEO for disposal of this type of waste is by disposal to a licensed landfill site and has requested authorisation to dispose of it as such, subject to an annual volume limit of 300 cubic metres. As explained below we have been in discussion with AWE plc and the NII regarding re-use of this material on site at AWE Aldermaston.

5.3.7 We recognise that AWE is preparing an Integrated Waste Strategy. The IWS will address the management of all forms of waste, both radioactive and non-radioactive arising now and in the foreseeable future. We very much support this approach but have not formally included the requirement for its production and submission to us as an Improvement Condition since much of the waste being generated will not be subject to regulation under RSA93.

5.3.8 We are satisfied that AWE plc is able to demonstrate the use of the BPEO for discharges and disposals of radioactive wastes from the AWE sites at Aldermaston and Burghfield. We have also considered and are content that our approach ensures that the pursuit of BPEO remains an ongoing factor with AWE plc and that by reviewing BPEO studies periodically we are not allowing the operator to become complacent in-between our RSA93 Authorisation Reviews. There were no issues raised by consultees regarding our considerations of BPEO.

5.4 Best Practicable Means

5.4.1 Section 5.3 of the Considerations Document explains the concept of Best Practicable Means (BPM). BPM is a term used by the Environment Agency in authorisations we issue under RSA93. Essentially, it requires operators to take all reasonable measures in the design and operational management of their facilities to minimise discharges and disposals of radioactive waste, so as to achieve a high standard of protection for the public and the environment. BPM is applied to such aspects as minimising waste creation, abating discharges, monitoring plant, discharges and the environment. It takes account of such factors as the availability and cost of relevant measures, operator safety and the benefits of reduced discharges and

disposals. If the operator is using BPM, radiation risks to the public and the environment will be As Low As Reasonably Achievable (ALARA).

5.4.2 The current authorisations for the AWE sites at Aldermaston and Burghfield require the use of best practicable means to minimise the creation of radioactive waste, its impact on the environment and the volume of waste transferred from the Site. The information provided by AWE plc to support our review of RSA93 authorisations at these sites summarises the measures taken to ensure compliance with the above for all waste streams. As a requirement of the Information and Improvement requirements arising from Authorisation BB0523 and BB0531, AWE plc undertook a review of national and international developments in best practice for minimising all waste disposals. In particular the review addressed methods to minimise the volume of waste being transferred and discharged directly into the environment. The use of high efficiency filtration of gases, mist and vapours and shredding, in-drum compaction, cutting and supercompaction for solid wastes are examples of AWE plc's use of best practicable means. AWE are continuing to consider additional methods.

5.4.3 As for BPEO we closely monitor the work undertaken by AWE plc to demonstrate that the BPM is being utilised for processes that will result in the generation of radioactive wastes. BPM Studies for certain facilities have been reviewed at our request and others will be reviewed either periodically, when processes and plant change or as required by us. Other than comments regarding the potential for using on-site supercompaction, which is addressed below under solid wastes, there were no issues raised by consultees regarding our considerations of BPM.

5.5 Conditions of Authorisation for AWE Aldermaston and AWE Burghfield

5.5.1 Currently there are individual, multi-medium RSA93 authorisations for AWE Aldermaston, AWE Burghfield Nuclear Licensed Site and the AWE Burghfield "Non-Licensed Site". These authorisations are based on our standard template and cover all authorised disposal routes. The authorisations that we now intend to issue continue to be based on our standard template authorisation and will cover all permitted disposal routes. The only difference will be that AWE Burghfield will have a single RSA93 Authorisation covering accumulation on the Non-Licensed Site as well as all permitted disposals.

5.5.2 We have developed the standard template over a number of years and we regularly review the template to make sure that it is up to date and effective, so that authorisations for specific sites properly protect people and the environment. Where we need to, we update existing authorisations for specific sites to the current standard template as part of our review process. The standard authorisation conditions are consistent with the principle in the draft Statutory Guidance that authorisations should include requirements on monitoring, research and development, and record-keeping. Our authorisation template and its conditions are described more fully in Section 5.6 of the Considerations Document. The standard authorisation consists, principally, of:

- a certificate granting the authorisation;
- a schedule (Schedule 1) of standard conditions applicable to all radioactive waste disposals and intended to be common at all sites;
- a schedule (Schedule 2) specifying the authorised disposal routes;

- a number of schedules (“Disposal Schedules”) containing the limitations and conditions specific to each individual disposal route; and
- a schedule of improvement and additional information requirements.

5.5.3 For AWE Aldermaston and AWE Burghfield, an additional schedule (Limitations and Conditions Relating to Receipt of Radioactive Wastes for Disposal from Other Premises) is included. This is to allow certain wastes to be transferred between AWE sites eg aqueous and solid wastes from AWE Burghfield to AWE Aldermaston for processing and for the potential return of wastes from other premises should their disposal become problematical.

5.5.4 AWE plc has not made any requests to change any of the limits and conditions in Schedule 1 of the current authorisations. The conditions in Schedule 1 of the authorisation we intend to issue have been modified from the standard conditions of our template as follows:

Modifications to RSA93 Authorisation Template

Schedule 1

General Limitations and Conditions

The Operator shall use the best practicable means to minimise the activity of radioactive waste produced **on the site** [*added for clarification*] that will require disposal under this Authorisation.”

Changes in Section 22 (1)(a) and (b) that relate to “Interpretation”. These are as follows:

AWE Aldermaston

S22(1) (a)

~~BNFL" means British Nuclear Fuels plc;~~ [*reference removed*];

"consignment" means an individual shipment of radioactive waste not greater in volume than 40 cubic metres or such ~~lesser~~ [*removed*] volume as specified in writing by the Agency;

"Low Level Waste Repository Site Operator" means the current holder of the licence issued under the Nuclear Installations Act 1965 for the Low Level Waste Repository at Drigg; [*new reference added*];

"Low Level Waste Repository Waste (LLWR Waste) [*revised reference*] " means solid radioactive waste, including any immediate package, intended by the Operator for final disposal at the Low Level Waste Repository ~~at BNFL’s site~~ [*reference removed*] at Drigg;

~~”MOD” means Ministry of Defence;~~ [*reference removed*];

S22(1) (b)

“Aldermaston Site” means those premises occupied by AWE plc at Aldermaston in Berkshire and is known as the Atomic Weapons Establishment Aldermaston which are situated on a site in respect of which a nuclear site is in force, and includes in addition the Burning Grounds at the Northeast quadrant of the site that lies outwith the Nuclear Licensed Site boundary; [*revised reference added*];

“Foulness Site Operator, Essex” means the holder of an authorisation under section 13 of the Radioactive Substances Act 1993 to dispose of radioactive waste of that description at Foulness, Essex. [*new reference added*];

“Incinerator Operator at Hythe” means the holder of an authorisation under section 13 of the Radioactive Substances Act 1993 to dispose of radioactive waste of that description by burning it at an incinerator at Hythe, Hampshire. [revised *reference added*];

“Incinerator Operator at Knostrop, Leeds” means the holder of an authorisation under section 13 of the Radioactive Substances Act 1993 to dispose of radioactive waste of that description by burning it at an incinerator at Knostrop, Leeds. [*new reference added*];

“Incinerator Operator at Colnbrook, Berkshire” means the holder of an authorisation under section 13 of the Radioactive Substances Act 1993 to dispose of radioactive waste of that description by burning it at an incinerator at Colnbrook, Berkshire. [*new reference added*];

“liquid mercury waste” means radioactive waste in the form of liquid mercury;[r*evised reference*];

"Sellafield Site Operator" means the current holder of the licence issued under the Nuclear Installations Act 1965 for the Sellafield Site; [*new reference added*];

“Winfrith Nuclear Site” means the site at Winfrith, Dorset for which a licence has been issued under the Nuclear Installations Act 1965 [*new reference added*];

AWE Burghfield

S22(1) (a)

~~"BNFL" means British Nuclear Fuels plc;~~ [*reference removed*]

"consignment" means an individual shipment of radioactive waste not greater in volume than 40 cubic metres or such ~~lesser~~ [*removed*] volume as specified in writing by the Agency;

“Foulness Site Operator, Essex” means the holder of an authorisation under section 13 of the Radioactive Substances Act 1993 to dispose of radioactive waste of that description at Foulness, Essex. [*new reference added*]

"Low Level Waste Repository Site Operator" means the current holder of the licence issued under the Nuclear Installations Act 1965 for the Low Level Waste Repository at Drigg; [*new reference added*]

"Low Level Waste Repository Waste (LLWR Waste) [*revised reference*]" means solid radioactive waste, including any immediate package, intended by the Operator for final disposal at the Low Level Waste Repository ~~at BNFL's site~~ [*reference removed*] at Drigg;

~~"MOD" means Ministry of Defence;~~ [*reference removed*]

"Sellafield Site Operator" means the current holder of the licence issued under the Nuclear Installations Act 1965 for the Sellafield Site; [*new reference added*]

S22(1) (b)

"Burghfield Site" means those entire premises occupied by AWE plc at Burghfield in Berkshire and is known as the Atomic Weapons Establishment Burghfield;

"Foulness Site Operator, Essex" means the holder of an authorisation under section 13 of the Radioactive Substances Act 1993 to dispose of radioactive waste of that description at Foulness, Essex.

"Warhead Waste" means radioactive waste in the form of a solid containing explosives, foams, plastics, rubbers, salts or metal arising from the dismantling of assembled nuclear warheads;

"Winfrith Nuclear Site" means the site at Winfrith, Dorset for which a licence has been issued under the Nuclear Installations Act 1965;

5.5.5 Many of the above changes have been implemented by us in order to take account of the changing regulatory position of sites such as the LLWR at Drigg and the Winfrith and Sellafield Sites. There have been and will be the potential for name changes to operators of sites involved in the processing or disposal of radioactive wastes. We feel that it is the interest of both ourselves, the producers and processors of these wastes and from a financial perspective to "future-proof" authorisations to allow for such changes to take place. We will always ensure that the entity operating facilities that process and dispose of radioactive wastes are properly authorised to allow them to operate.

5.5.6 Specific Disposal Schedules

5.5.6.1 The two authorisations we now intend to issue for AWE Aldermaston and AWE Burghfield contain a number of schedules covering the following:

- *disposal routes for gaseous wastes;*
- *disposal* routes for aqueous wastes;
  and
- transfer routes for solid Low Level Wastes (LLW);
- transfer routes for organic liquid wastes;
- transfer route for liquid mercury waste;
- transfer routes for Warhead Wastes;

5.5.6.2 For AWE Burghfield specific schedules cover:

- transfer of aqueous waste;
- accumulation of solid and aqueous liquid wastes on the Non-Licensed Site.

5.5.7 No incineration of radioactive waste is permitted at AWE Aldermaston or AWE Burghfield. This does not preclude the use of the site Burning Grounds for disposal of explosive contaminated wastes.

5.5.8 Each schedule specifies the requirements that are specific to the disposal route that it relates to. The Schedules include, as relevant, the limits that apply to specific radionuclides or groups of radionuclides for each of the approved disposal routes as well as other specific conditions. Disposal schedules for discharge of gaseous wastes and the discharge of aqueous wastes into the environment include "Quarterly Notification Levels" (QNLs) where appropriate and depending on the annual site limit for specific radionuclides and the type of work being undertaken with these radionuclides. The purpose of QNLs is described in Section 5.6 of the Considerations Document. For AWE Burghfield we have also included volume, activity and time limits relating to the accumulation of solid and aqueous wastes on the Non-Licensed Site.

5.6 Gaseous discharges to the environment

5.6.1 AWE plc has set out proposals for the future discharges of gaseous wastes in the two reports submitted to us in November 2005 and in a subsequent letter specifically relating to the ORION Laser Facility. We will address each AWE site separately and discuss issues raised by consultees at the end of this section.

5.6.2 AWE Aldermaston

5.6.2.1 In its application for AWE Aldermaston AWE plc highlighted the requirement to continue to dispose of gaseous radioactive waste (in the form of gases, vapours, mists and dusts) from a number of outlets. Existing and revised annual activity limits and quarterly notification levels (where appropriate) along with the principal outlets for these discharges are summarised in the tables below. We will continue to approve the use of minor discharge points in writing by means of our Compilation of Environment Agency Requirements (CEAR) document that we have prepared for this site.

5.6.2.2 In deciding on the approach to group activities at AWE Aldermaston we have reduced the number of tables in this section of the authorisation. The authorisation now reflects the grouping of work based activities and two tables that detail radionuclides, annual site activity limits and where appropriate, site quarterly notification levels. Table 2a reflects limits etc, for routine work whilst Table 2b reflects discharges associated with work in support of the Nuclear Non-Proliferation Treaty.

AWE Aldermaston: authorised gaseous discharge outlets
Group A: Such stacks or outlets associated with discharges from Facilities Engaged Completely or Principally in Decommissioning Operations in buildings: A, B, C, D, G2 and G3 and other minor facilities as approved in writing beforehand by the Agency.
Group B: Such stacks or outlets associated with discharges from Facilities Engaged Completely or Principally in Support of Production and Capability in buildings AB9, G1, L, N1 and P and other minor facilities as approved in writing beforehand by the Agency.
Group C: Such stacks or outlets associated with discharges from Facilities Engaged Completely or Principally in Research and Development in buildings: AB19, AB21, I, J and K and other minor facilities as approved in writing beforehand by the Agency.
Group D: Such stacks or outlets associated with discharges from Facilities Engaged Completely or Principally in Waste Management Operations in buildings: AB25, F and M and other minor facilities as approved in writing beforehand by the Agency.
Group E: Such stacks or outlets associated with discharges from Facilities expected to Commence Operation during the Lifetime of this Authorisation in the following buildings: Enriched Uranium Facility, Hydrodynamics Facility, Orion Laser Facility, Additional Tritium Facility and other new minor facilities as approved in writing beforehand by the Agency.

AWE Aldermaston: Existing and Revised Site Limits for Disposal of Waste Gases, Mists and Dusts to Atmosphere

Radionuclide	Existing Limit		Revised Limit	
	Annual Limit	Quarterly Notification Level	Annual Limit	Quarterly Notification Level
Alpha	450 kBq	90 kBq	165 kBq	NA
Plutonium-241	1.68 MBq	0.336 MBq	NA	NA
Beta emitters associated with particulate matter*	600 kBq	120 kBq	600 kBq	NA
Krypton-85	1000 GBq	200 GBq	75 GBq	15 GBq
Total Tritium	170 TBq	34 TBq	39 TBq	8 TBq
Argon-41	N/A	N/A	1 GBq	NA

* Excluding plutonium-241 and tritides

AWE Aldermaston: Existing and Revised Site Limits for Disposal of Waste Gases, Mists and Dusts to Atmosphere – Supplementary Work associated with the Nuclear Non-Proliferation Treaty

Radionuclide	Existing Limit		Revised Limit	
	Annual Limit	Quarterly Notification Level	Annual Limit	Quarterly Notification Level
Beta emitting radionuclides (volatile)	4.4 MBq	880 kBq	4.4 MBq	NA
Carbon-14	NA	NA	1 GBq	NA

5.6.2.3 We support AWE's proposals for a general reduction in the activity limits for most radionuclides. These reductions are based on a comprehensive review of recent discharges to the environment and on the requirement for continued operations at AWE Aldermaston. We also believe that the limits for carbon-14 and volatile beta/gamma emitters are appropriate and necessary as part of AWE's contribution to Non-Proliferation Treaty work.

5.6.2.4 We decided not to set gaseous discharge limits for individual Functional Groups of plant at AWE Aldermaston as these "groups" are in fact widely dispersed around the site and were originally brought together under broad functional headings rather than as physical and collective entities. Table 3 of Schedule 3 (and all references to this Table in Schedule 3 of the revised certificate for AWE Aldermaston) has therefore been removed. We accept that a site limit for specific radionuclides is appropriate and that AWE plc can and will manage discharges from individual facilities within the overall site limit.

5.6.2.5 The limits for alpha emitters and beta emitters (particulate) are notably low. It was suggested before and during our consultation that we should not propose numerical limits as such but instead rely on the application of BPM as required in Schedule 1, Conditions 1 and 2 of the authorisation. This could be appropriate as such low annual limits are technically difficult to monitor over any 12 month period. It is in fact probable that actual alpha and particulate beta monitoring results are a combination of additive limits of detection over a 12 month period and that actual discharges are negligible. AWE maintains that numerical limits are appropriate and that having these allows them demonstrate transparency and confirm the low levels of discharges for these groups of radionuclides.

5.6.2.6 We have decided that Quarterly Notification Levels (QNLs) for radionuclides or groups of radionuclides with site limits lower than 1 GBq would be inappropriate and have reflected these in Table 2a of Schedule 3 of the AWE Aldermaston authorisation as "NA". We also proposed that QNLs are inappropriate for periodic work associated with Non-Proliferation Treaty Work.

5.6.2.7 AWE plc has not requested discharge limits for beta emitting radionuclides from facilities engaged in Production and Capability and from those involved in Waste Management as beta emitters are not currently used within these

areas of the AWE Aldermaston site. They requested that we allow them to apply BPM should there be a requirement for any work to be undertaken involving beta emitters. We understand that the only time that such work would be undertaken would be in support of the Non-Proliferation Treaty when AWE would be involved in analyses of samples (and their subsequent disposal) and we generally support this proposal. In allowing AWE to use BPM for any disposals we require prior notification of their use of beta emitters within these facilities.

5.6.2.8 During our pre-review work we discussed Pu-241 discharges. Discharge of Pu-241 is controlled by the same means and to exactly the same degree as the discharge of other plutonium isotopes. We agree with AWE that it is practicably impossible to measure the activity of Pu-241 in airborne discharges and we proposed to end the requirement for AWE to calculate the amount of Pu-241 discharged from AWE Aldermaston. A ratio of 1 to 4 between Pu-alphas and Pu-241 betas is currently used for the purpose of assessing these discharges. In view of the low radiotoxicity of Pu-241, i.e. less than 1% in comparison with the alpha emitting isotopes of plutonium, and having received no comments regarding our proposal we conclude that there is no merit in requiring AWE to calculate their discharges of this radionuclide and have deleted the requirement to report such discharges.

5.6.3 AWE Burghfield

5.6.3.1 Authorised gaseous discharge outlets at AWE Burghfield are indicated in the following Table;

AWE Burghfield: Authorised gaseous discharge outlets
Group A: Such stacks or outlets as approved in writing beforehand by the Agency and associated with discharges from the minor facilities Engaged Completely or Principally in Operational work in buildings on the Nuclear Licensed Site.
Group B: Such stacks or outlets as approved in writing beforehand by the Agency and associated with discharges from the minor facilities Engaged Completely or Principally in Decommissioning work in buildings on the Non-Licensed Site.
Group C: Such stacks or outlets as approved in writing beforehand by the Agency and associated with discharges from the minor facilities Engaged Completely or Principally in Operational work in buildings or facilities on the Non-Licensed Site.

5.6.3.2 No individual buildings are identified in the above table. We have decided that identification of buildings and outlets is inappropriate in the authorisation due to the very low activity limits set for the AWE Burghfield site as a whole. We have decided to opt for “Group Limits”, unlike our approach for AWE Aldermaston, as there is clear geographical separation between the three Groups at AWE Burghfield.

5.6.3.3 "Building Groups", existing and revised gaseous discharge limits are provided in the Table below:

AWE Burghfield: Existing and Revised Site Limits for Disposal of Waste Gases, Mists and Dusts to Atmosphere.

Building or Facility Group	Radionuclide or group of radionuclides	Existing		Revised	
		Annual Limit	Quarterly Notification Level	Annual Limit	Quarterly Notification Level
Group A: Nuclear Licensed Site	Alpha	20 kBq	4 kBq	5 kBq	NA
	Tritium	50 GBq	10 GBq	9 GBq	2 GBq
Group B: Non-Licensed Site - Decommissioning	Alpha	Nil	NA	1 kBq	NA
Group C: Non-Licensed Site - Operations	Tritium	1 GBq	NA	1 GBq	NA

5.6.3.4 We support AWE's proposals for a general reduction in the activity limits for the radionuclides detailed above. These reductions are based on a comprehensive review of recent discharges to the environment and on the requirement for continued operations at AWE Burghfield.

5.6.3.5 We have decided that Quarterly Notification Levels (QNLs) for radionuclides or groups of radionuclides with site limits lower than 1 GBq would be inappropriate and have reflected these in Table 2 of Schedule 3 of the AWE Burghfield authorisation as "NA".

5.6.3.6 AWE plc has not requested discharge limits for beta emitting radionuclides for AWE Burghfield as beta emitters are not currently used there. They requested that we allow them to apply BPM should there be a requirement for any work to be undertaken involving beta emitters. We understand that the only time that such work would be undertaken would be in support of the Non-Proliferation Treaty when AWE would be involved in analyses of samples (and their subsequent disposal), and we generally support this proposal. In allowing AWE to use BPM for any disposals we require prior notification of their use of beta emitters within these facilities.

5.6.4 Comments during consultation

5.6.4.1 One consultee commented "that the regulation of alpha discharges to air needs to be transparent. An Authorised limit is needed by which to judge discharges due to a mistake or an accident". Another commented that "the limits for discharges of alpha radioactivity to atmosphere (165 kBq per year) and beta radioactivity (600 kBq) represent significant reductions and in real terms are very low. It is important that the Operator has sufficient degree of

headroom within which he can operate, especially if there is any scope for changes in operations…..".

5.6.4.2 We originally included a proposal that AWE plc use the BPM for minimising discharges of alpha and beta (particulate) emitters because of the very low limits being proposed. AWE plc have requested actual limits in the Tables relating to gaseous discharges for AWE Aldermaston and AWE Burghfield and we have included these limits in our revised certificates of authorisation. We have discussed the limits with AWE plc and are satisfied that there is sufficient but limited headroom to allow for normal operations to continue at both sites. The drive to reduce limits is supported by several consultees.

5.6.4.3 In the draft certificate for AWE Aldermaston (included in our Explanatory Document (Table 3 Page 168)) we proposed setting Building Group Limits. These limits detailed the annual "group limits" for each radionuclide in use. Whilst we maintain that this approach is valid for AWE Burghfield, due to the nature of that site, AWE plc has written requesting that we delete the Table (Table 3) from the final authorisation. AWE stated that " *The overall site limits we propose for airborne discharges are very small. We are able to propose such limits partly because we have provided very little 'headroom' for facilities and operations. ……We would therefore prefer that BZ1994 should not include a Table with enforceable limits for each functional group of outlets. To do so would place an unjustifiable constraint on AWE's management of its airborne discharges……..Instead Tables 2a and 2b, by themselves, provide a fully sufficient means for the Environment Agency to supervise our discharges and to fully protect the public and the environment".*

5.6.4.4 As part of our consideration of this application we have removed Table 3 from the draft authorisation (BZ1994) originally included in our Explanatory Document.

5.6.4.5 AWE made an application for a specific annual discharge limit for Argon-41 arising from the operation of the Orion Laser Facility. One consultee commented "We find it a matter of public concern that West Berks Planning Committee passed the plans for the Laser in the belief that there were no radioactive implications, whilst both AWE and the Environment Agency knew that this was not true".

5.6.4.6 Whilst we cannot comment on the work of the West Berks Planning Committee we are content that our approach was consistent and correct. We consider the planning process and associated applications as one aspect and the regulation of disposal (of radioactive waste in this specific case) as another. We have been aware of the activation effect associated with the use of high power lasers and the production of Argon-41 gas. We required AWE to estimate the activity that could be produced depending on the number of high-powered energy pulses. The detailed information was not available until January 2006 but would not have affected or interfered with our interaction with the planning application and subsequent processes. We consider the maximum annual generated activity of Argon-41 to be of limited consequence in respect of the already low gaseous emissions from AWE Aldermaston. By taking account of the short (1.8 hour) half-life of this noble gas and the limited number of high-energy pulses per working day we have concluded that the annual limit is appropriate and that radiological implications associated with it would be extremely low.

5.7 Aqueous discharges to the environment

5.7.1 AWE Aldermaston

5.7.1.1 AWE plc has set out proposals for future aqueous discharges to the environment in the two reports submitted to us in November 2005. These are as follows:

AWE Aldermaston: Existing and Revised Limits/Levels for Disposal of Radioactive Aqueous Waste from AWE Aldermaston

Discharge Route	Radionuclide	Existing Limit/Level		Revised Limit/Level	
		Annual Limit	Quarterly Notification Level	Annual Limit	Quarterly Notification Level
Silchester Sewage Treatment Works via Sewer	Alpha	40 MBq	8 MBq	10 MBq	2 MBq
	Tritium	50 GBq	10 GBq	25 GBq	5 GBq
	Other Beta/Gamma	120 MBq	24 MBq	20 MBq	4 MBq
Aldermaston Stream	Tritium	10 GBq	2 GBq	Nil – AWE to provide notification in the event that a tritium concentration limit of 30 Bq/litre for water discharged into the Stream is breached.	

5.7.2 Discharges to the Silchester Sewage Works

5.7.2.1 The closure of the Pangbourne Pipeline in March 2005 ended a history of aqueous waste disposals direct to the River Thames. AWE Aldermaston will however continue to produce aqueous radioactive wastes and these will be treated on-site before discharges are made to the public sewer.

5.7.2.2 In Authorisation BB0523 and repeated in BR8441 we required AWE to cease discharging radioactive aqueous waste into the public sewer. Analyses have indicated that activity concentrations of alpha and beta emitters in trade waste discharged to sewer are close to natural background. We believe that this situation will persist for these emitters since AWE now operates a new Radioactive Waste Treatment Plant. The RWTP is used to process aqueous wastes from facilities at Aldermaston and Burghfield (if required) and is designed to condition and evaporate liquid effluent, removing virtually all insoluble and dissolved particulate (plutonium and/or uranium contamination). This activity is then concentrated and retained within the evaporator before being solidified and disposed of at the LLWR.

5.7.2.3 The majority of alpha and beta activity previously disposed of to the River Thames at Pangbourne is now concentrated and transferred to the LLWR for disposal. However, tritium cannot be removed from the liquid effluent by the evaporation process nor by any other technique that is currently

available. Discharge to sewer remains the only practical means of disposal now that AWE has ceased using the Pangbourne Pipeline. Therefore it is not possible for AWE to comply with an Improvement Condition that we imposed in 2000 that required AWE to cease discharging radioactive aqueous waste into the public sewer. We have considered how best to fulfil our duty to regulate this disposal.

5.7.2.4 We accept AWE's proposal to reduce activity limits for the discharge of alpha activity to from 40 to10 MBq/year, beta activity from 120 to 20 MBq/year, and tritium discharged by this route from 50 to no more than 25 GBq/year. We also require AWE to demonstrate the best practicable means to minimise the volume of radioactive aqueous wastes generated by its operations. We do not foresee any additional means of further reducing the activity disposed of to sewer to zero since the vast majority of the alpha and beta (excepting tritium) activity in this discharge pathway now arises from natural radioactivity and not as a result of work at Aldermaston.

5.7.2.5 We will require AWE to undertake further work to minimise its aqueous discharges by this route. We will do this by imposing an Improvement Condition on AWE, We will additionally require AWE to determine whether it will be possible to ensure that the activity concentration of this waste should be equal to, or less than the World Health Organisation screening levels for Drinking Water. We have included activity limits in the above Table and in the Revised Authorisation, together with the Improvement Condition.

5.7.3 Comments during consultation

5.7.3.1 Several consultees commented in respect of tritium discharges into the public sewer and onwards to Silchester and the River Thames and are concerned about levels in drinking water being above World Health Organisation Drinking Water Guidelines. The proposed annual activity limit for tritium is 25 GBq and this should be taken in context with the massive dilution resulting from mixing before, during and after discharge from AWE Aldermaston. WHO Drinking Water Guidelines for tritium (2004) are set at 10,000 Becquerels per litre and typical local drinking water levels are between 10 and 25 Becquerels per litre, significantly lower than the guideline limits. We require AWE to undertake an environmental sampling programme, one aspect being water and sewage sampling at a number of locations around the AWE sites. We also undertake our own check monitoring programme. Typical results for tritium from liquid sewage samples indicated activity of less than 6 Becquerels per litre. We therefore conclude that WHO levels are not in danger of being breached by tritium discharges from AWE Aldermaston.

5.7.3.2 One comment was received regarding the problem of requiring AWE to reduce the volume of liquid effluent going to the Silchester Sewage Works and the resultant "concentration effect", especially in hot weather. We note that the aqueous waste containing tritium forms a minor component by volume of AWE Aldermaston's total daily non-radioactive, aqueous disposals to the public sewer. We do not believe that requiring AWE to minimise the aqueous radioactive volume component of this waste stream will result in a concentration effect further downstream. When undertaking our dose assessment work we have taken account of the mixing (with non-radioactive aqueous wastes) that occurs at various stages between AWE Aldermaston and the River Thames.

5.7.3.3 One consultee commented that the potential “concentrating effect” of using the new LETP at AWE Aldermaston should have been addressed during the LETP planning stage. We were consulted during the planning phase: we remain content that the construction and operation of the LETP represents a significant improvement to radioactive aqueous waste treatment and provides a genuine and significant reduction in the amount of activity that is now being discharged into the environment.

5.7.3.4 One consultee acknowledged that the closure of the PPL has been a step forward, but noted that other problems have been created, namely:

- Additional discharges to air;
- Additional discharges to the Thames via the Foudry Brook; and that
- The PPL remains in situ.

5.7.3.5 The closure of the PPL has not resulted in any increase in airborne discharges and monthly, quarterly and annual records do not support such a claim. We will continue to ensure that gaseous discharges remain at current low levels and our proposals for gaseous reductions for alpha emitters in particular are detailed above. The issue of additional discharges to Foudry Brook is discussed above, but there are no additional discharges overall. Total site aqueous discharges will reduce as follows:

Radionuclide/emitter	Current*	Revised
Alphas	100 MBq	10 MBq
Tritium	100 GBq	25 GBq
Beta/Gammas	180 MBq	20 MBq

* Combined PPL and Silchester STW Annual Limits

5.7.3.6 The same consultee stated that AWE should build and maintain additional storage ponds to retain more liquid and to enable the radioactive content of the effluent to be further reduced before going to the Silchester Sewage Works. In response we would point out that the accumulation of radioactive wastes on nuclear licensed sites is a matter for the Nuclear Installations Inspectorate (NII), although we would have a considerable interest in ensuing that environmental safety was not being compromised. Decay storage offers realistic benefits for certain users of radioactive materials, especially when short half-life materials can be stored prior to ultimate disposal eg Iodine-131 (half-life about 8 days). As such, and especially for liquids with longer half-life contaminants such as tritium (half-life about 12 years), this option does not present a significant benefit. For liquid wastes containing radioactive materials with half-lives measured in thousands of years or longer there is no practical benefit at all and such a programme would result ultimately in the creation of significant secondary radioactive waste arisings.

5.7.3.7 We are aware of concerns relating to the future of the closed Pangbourne Pipeline. We have not addressed the future of the PPL in our consultation other than to say that this discharge route is no longer authorised. The discharge end of the PPL (the "sparge pipes") was removed from the bed of the River Thames in October 2006. We do not address the PPL further in this document. We will be in discussion with AWE and the MOD regarding proposals for the future of this redundant pipeline and associated services, ducts, pits and buildings.

5.7.4 Discharges to the Aldermaston Stream

5.7.4.1 We issued an Improvement Condition in 2000 that required AWE to address the levels of tritium in discharges from the North Ponds Water Management System (WMS). Tritium levels have been in the range 10-25 Bq/litre over recent years and are consistent with background concentrations observed in local surface waters. In 2004 we confirmed that the Improvement Condition had been achieved but required AWE to continue to monitor discharges from the North Ponds WMS and inform us if previously agreed thresholds were breached. AWE continue to manage ground water in the vicinity of the WMS by pumping and, as this intervention by pumping causes the pumped ground water to be designated as "trade effluent" we will be regulating its disposal.

5.7.4.2 The concentration of tritium in this water is low and is decreasing, but by definition it remains a radioactive waste disposal and continues to require authorisation for regulated disposal. We will now apply controls by setting a concentration limit for tritium per litre of water discharged into the Aldermaston Stream. AWE has requested a limit of 30 Bq/litre for water discharged into the Aldermaston Stream from the North Ponds WMS. We have therefore removed the requirement for annual limits and quarterly notification levels for activity limits and have included a 30 Bq per litre activity notification level in the above Table and in the revised Authorisation, which if reached would require AWE to notify us in writing.

5.7.5 Comments during consultation

5.7.5.1 We received two comments in respect of our proposals against the setting of a notification level compared with an annual limit. Two consultees were supportive of notification levels and agreed that it was difficult to impose a limit based on the history of the tritium "leakage" from the Aldermaston site. We carefully considered our proposals in our Explanatory Document and could have set a specific annual limit for tritium. But we did not do so, and we still do not believe that limit setting in such a context would represent the Best Practicable Means for "managing" this disposal. AWE cannot influence the activity leaving site since it has not been possible to determine the exact source of this material – it could be diffuse or concentrated in a very small area of the site. Investigations have not succeeded in determining the source and further work would be more disruptive to environmentally sensitive areas of the Aldermaston Site. AWE has already spent about one million pounds on this work, and we have concluded that the expenditure of further time, trouble and money would be grossly disproportionate to any possible benefit.

5.7.5.2 We know that tritium activity in discharges has been decreasing over the last few years and believe that it will continue to do so. Levels in the Aldermaston Stream are less than 6 becquerels per litre and as such are significantly lower than WHO Drinking Water Guidelines i.e. less than 0.01%

of the relevant values. We have undertaken an assessment of radiation dose to people who may extract and drink water from this stream, and the results, reproduced in a later sub-section indicate a potential dose of 0.0001 microsieverts a year and would constitute a minute fraction of an individual's annual exposure to ionising radiations.

5.7.5.3 We cannot currently estimate how long these tritium discharges will continue. Based on knowledge of historical activity concentrations of tritium we believe that the levels will continue to decrease even further to such an extent that they will eventually be indistinguishable from background.

5.7.5.4 One consultee stated that we should not rely too much on the honesty of AWE in reporting results for analyses such as the tritium levels in the Aldermaston Stream. We impose a rigorous environmental monitoring strategy on AWE plc. As a company AWE plc undertakes environmental monitoring requirements beyond those imposed by us. In addition we have a check-monitoring programme of our own where we either sample independently or are provided with split samples by AWE plc for analysis in programme. We expect all nuclear operators to comply with the limits and conditions laid down in our certificates of authorisation and regularly inspect sites for compliance. Inspection of environmental monitoring programmes and comparison with results produced by our own monitoring programme allow us to be confident about the procedures being undertaken by such operators.

5.7.6 AWE Burghfield

5.7.6.1 AWE Burghfield does not routinely generate aqueous radioactive wastes. Should they arise AWE Burghfield has no on-site treatment facility and we have not authorised direct disposal from this site. Instead, such wastes would need to be transferred to AWE Aldermaston for treatment in the RWTP and for final sentencing along with AWE Aldermaston aqueous radioactive arisings.

5.7.6.2 Our proposals for AWE Burghfield included a single authorisation to cover the geographical site, integrating the existing authorisations for the Nuclear Licensed Site and the remainder of the site (the Non-Licensed Site). Volume and activity limits are detailed below. There are no changes to the activity limits for the Non-Licensed Site, however we have imposed an annual volume limit of 200 m^3.

AWE Burghfield: Disposal of Aqueous Wastes by Transfer to AWE Aldermaston from the Non-Licensed Site

Radionuclide	Annual Limit	Volume Limit
Alpha Emitters	1 MBq	
Beta/Gamma Emitters	1 MBq	200 m^3
Tritium	0.5 GBq	

AWE Burghfield: Disposal of Aqueous Wastes by Transfer to AWE Aldermaston from the Nuclear Licensed Site

	Existing Annual Limit	Revised Annual Limit
Volume	400 m^3	300 m^3
Radionuclide		
Uranium	5 MBq	5 MBq
Tritium	N/A	1 GBq
Beta/Gamma (excluding tritium)	N/A	1 MBq

5.7.6.3 For the Nuclear Licensed Site we have imposed a volume reduction and have added a contingency for tritium and beta/gamma emitting radionuclides. We have agreed with AWE that these additions are necessary to take account of decommissioning work at Burghfield.

5.8 Transfers to the Low Level Waste Repository (LLWR), Drigg, Cumbria

5.8.1 AWE Aldermaston

5.8.1.1 AWE requested no change to the volume and amount of activity for transfer to the LLWR other than for the inclusion of an annual limit of 1 MBq for the disposal of redundant iodine-129 sources.

5.8.1.2 The following Table summarises the existing and revised limits and radionuclides:

	Existing Limit	Revised Limit
Volume (m^3)	4000	4000
Radionuclide or group of radionuclides (GBq)		
Uranium	55	55
Ra226/Th232	0.03	0.03
Other Alpha	120	120
Carbon-14	0.03	0.03
Tritium	400	400
Cobalt-60	30	30
Others	230	230
Iodine-129	0	0.001

5.8.1.3 We are aware that decommissioning work will continue to be a significant source of radioactive waste through the lifetime of any future authorisation and we have accepted that we should not constrain such work by proposing or imposing limits which slow the pace of this work. We will continue to require that the best assay techniques are available in order that waste is assessed for the most appropriate disposal route, that BPM is used widely and effectively, and that waste minimisation, low force compaction and other factors that lend to waste volume reduction are utilised.

5.8.1.4 We have accepted the inclusion of iodine-129 for disposal at the LLWR. No other changes have been made to the Schedule authorising AWE to transfer LLW to the LLWR via the Winfrith or Sellafield Sites where supercompaction takes place.

5.8.2 AWE Burghfield

5.8.2.1 AWE Burghfield Nuclear Licensed Site is currently authorised to transfer solid Low Level Waste to AWE Aldermaston for onward transfer to the LLWR at Drigg in Cumbria. The existing volume and activity limits in the Table relate to transfers to AWE Aldermaston whilst the revised limits for solid waste transfer would apply to waste transferred to either AWE Aldermaston or to the LLWR at Drigg in Cumbria from the Nuclear Licensed Site, via the Winfrith or Sellafield Sites if treatment by supercompaction is required.

	Existing Limit	Revised Limit
Volume	200 m^3	600 m^3
Radionuclide		
Uranium	0.15 GBq	1.5 GBq
Tritium	2 GBq	1.6 GBq

5.8.2.2 The increase in disposal by transfer is linked to the planned decommissioning of some facilities and refurbishment of others at Burghfield over the next few years. Decommissioning will result in the generation of larger volumes of bulk waste ultimately destined for the LLWR at Drigg. The volume and activity limits relate to the sum of disposals made either to AWE Aldermaston (for onward transfer ultimately to the LLWR), or directly from AWE Burghfield to the LLWR for reasons of operational convenience and to reduce the number of times the waste will be shipped by road.

5.8.2.3 We have made no changes to the existing activity limits of radioactive waste that can currently be transferred to AWE Aldermaston from the Non-Licensed Site. We have imposed an annual volume limit of 200 m^3 and will authorise AWE Burghfield to transfer these wastes either to AWE Aldermaston or directly to the LLWR at Drigg whilst applying the same rationale as LLW transfers from the Nuclear Licensed Site to either AWE Aldermaston or directly to the LLWR via Winfrith or Sellafield for supercompaction. Existing and revised limits for solid waste transfers from the Non-Licensed Site are provided in the following Table:

	Existing Limit	**Revised Limit**
Volume	Not specified	200 m^3
Radionuclide		
Alpha Emitters	1 GBq	1 GBq
Beta/Gamma Emitters	1 GBq	1 GBq
Tritium	5 GBq	5 GBq

5.8.3 Comments during consultation

5.8.3.1 One consultee commented that she was unclear how the limits connected with decommissioning and demolishing buildings were derived, asking whether they were/are based on known survey data or estimates. If estimates were used, the consultee asked how reliable these were. We are content that the process used to determine the volume, activity and radionuclide content of waste arising from decommissioning is robust. We can also confirm that after initial estimates of activity have been made, it is usual for decommissioning project groups to undertake a comprehensive survey of the buildings, glove-boxes, plant and other equipment.

5.8.3.2 It can be difficult to estimate the potential arisings from buildings from decommissioning and demolishing buildings: the size of this problem may vary depending on the particular radionuclide(s) used. AWE has gained valuable decommissioning experience by starting work on the old HERALD Reactor Complex and old DU facilities at Aldermaston and Foulness using contractors with considerable experience from other parts of the nuclear industry and by following and witnessing work abroad in similar facilities. Radiological surveys (doserate and surface contamination) are used as a starting point and combined with core samples of building materials analysed by destructive assay lead to a reliable figure for volume and activity of arisings.

5.8.3.3 One consultee stated that she did not support the transportation of radioactive waste for supercompaction to other sites when it could be done

at AWE and that she would like to see supercompaction made a condition of the authorisation.

5.8.3.4 In our view it would not be appropriate for each and every nuclear site to construct, operate and maintain supercompaction facilities. Not all radioactive waste is compactable, and as these facilities are complex and expensive undertakings, which produce secondary radioactive waste, this would not favour their use on sites that produce small volumes of waste. For AWE specifically we do support the use of supercompaction at Aldermaston, since the volume of compactable waste produced on this site is relatively large. We already require the operator to utilise BPM to minimise arisings and have worked with AWE to widen use of vacuum packing and low force compaction. AWE is now assessing the use of supercompaction for minimising the volume of Intermediate Level Wastes stored on site and we will be entering into discussions to determine whether it can be used to minimise volumes of LLW before they leave the site.

5.8.3.5 The same consultee provided comments stating that "AWE should move towards a waste minimisation/zero waste approach rather than end-of-pipe abatement". We ensure through our conditions of authorisation that waste minimisation is applied and have noted considerable improvements across the site over the last five or so years. In future, we expect to see further gains in minimising waste arisings. We will continue to work with AWE to ensure that where wastes are produced they are assayed and streamed appropriately, with a commensurate reduction in both the volume and activity that will need to be consigned as radioactive waste for disposal off-site. We set process improvement targets for sites such as AWE following periodic reviews of BPM and BPEO Studies for processes and facilities with the Operator together inspection of facilities and discussion with the operator. We will continue to apply regulatory control as part of our day to day business.

5.8.3.6 We received comment from the HSE Nuclear Safety Directorate in support of our proposals for solid waste transfers of LLW to the LLWR. They stated that *"A strategic goal of the Nuclear Safety Directorate is to ensure that those we regulate bring about a reduction in the hazard potential from nuclear wastes and to ensure the safe decommissioning of redundant nuclear facilities. We therefore fully support your (the Environment Agency's) view that it is important not to constrain decommissioning activity by proposing or imposing disposal limits that slow the pace of this type of work".*

5.8.3.7 During the consultation we received comment from AWE in respect of an apparent inaccuracy in Table 3 to Schedule 6 of the draft BZ2028 Authorisation. In this table we had subdivided the alpha emitters incorrectly and were asked to amend these to reflect the actual requirement for dealing with specific radionuclides. There is no change to the total activity but we have amended Table 3 to Schedule 6 as follows:

AWE Burghfield transfer to AWE Aldermaston or the Low Level Waste Repository at Drigg:
Disposal Activity Limits from the Non-Licensed Site

Radionuclide or group of radionuclides	Annual limit
Uranium	0.9 GBq *
Radium-226 plus Thorium-232	0.1 GBq **
Other alpha emitters	0 GBq ***
Carbon-14	0 GBq
Iodine-129	0 MBq
Tritium	5 GBq
Cobalt-60	0 GBq
Other radionuclides	1 GBq

* previously 0 GBq
** previously 0 GBq
*** previously 1.0 GBq

5.8.3.8 One consultee stated that as a resident of West Cumbria he opposed the new arrangements that allow waste to be transported from Berkshire to Cumbria. This consultee was also concerned about waste being transported through his town and about the Government Policy to utilise the Low Level Waste Repository at Drigg in Cumbria for such disposals. This site (the LLWR) is authorised to receive such wastes and we work within the policy framework laid down by the Government. We would add that these arrangements have been in place for a number of years.

5.9 Other Transfers

5.9.1 Incineration

5.9.1.1 AWE Aldermaston

5.9.1.1.1 AWE Aldermaston is authorised to transfer solid and aqueous organic wastes to incinerator operators at Hythe, Hampshire and Knostrop, Leeds for disposal by incineration. We accepted that disposal of these wastes by incineration was the BPEO in our determination of the current authorisation for AWE Aldermaston (BR8441) and that it was common practice for sites to have authorised access to more than one incinerator, thus providing backup. AWE plc requested the use of an additional incinerator operated by Grundon (Waste) Ltd at Colnbrook, Berkshire and the addition of an annual activity limit of 40 MBq of the radionuclide carbon-14 for disposal by transfer to these operators.

5.9.1.1.2 The carbon-14 originates from stocks of liquid scintillation counting standards used in assay of samples. Some of this material is now surplus to requirement and as this material is of no use to any other user we required AWE to investigate the BPEO for its disposal. The standards

consist of a carbon-containing compound, some of which is carbon-14, within an organic carrier liquid. We accept AWE's conclusion that disposal by incineration represents the BPEO for this material and we included this material within the draft authorisation.

5.9.1.1.3 Existing and revised volume and activity limits for transfer for the purpose of disposal by incineration are detailed in the following Table:

Permitted Destination	**Radioactive Contaminant**	**Existing Annual Limit**		**Revised Annual Limit**	
		Activity	**Volume (m^3)**	**Activity**	**Volume (m^3)**
Incinerator Operator at Hythe, Hampshire	Alpha	60 MBq	1050	60 MBq	1050
	Tritium	0.82 TBq		0.82 TBq	
	Carbon-14	N/A		40 MBq	
Incinerator Operator at Knostrop, Leeds	Tritium	0.82 TBq	510	0.82 TBq	510
	Carbon-14	N/A		40 MBq	
Incinerator Operator at Colnbrook, Berkshire	Tritium	N/A	N/A	0.24 TBq	510
	Carbon-14	N/A		40 MBq	

5.9.1.1.4 S Grundon (Waste) Ltd at Colnbrook in Berkshire has been identified by AWE plc as a third incinerator operator capable of accepting tritium and carbon-14 contaminated wastes from AWE Aldermaston. This operator is already authorised to dispose of tritium and carbon-14 activity in wastes for incineration. In support of this additional route, AWE points out that disposals to the Colnbrook Site would involve shorter road transport journeys than to the incinerators at Hythe, Hampshire or Knostrop, Leeds, and that adding this disposal route would further widen AWE's choice of operator for at least some of the tritium and/or carbon-14 contaminated waste streams. We accept that this represents the BPM and have included the route in the revised authorisation.

5.9.1.1.5 The proposed use of this additional incinerator route does not require any changes to the authorisation for the incinerator at Colnbrook site, and the Site Operator has indicated that it is prepared in principle to accept the waste that AWE Aldermaston has applied to transfer.

5.9.1.1.6 The following Table details the total volume and activity limits that may be transferred for incineration in any one calendar year to all the incinerators taken together:

Radionuclide or Group of Radionuclides	Annual Activity Limit	Annual Volume Limit (cubic metres)
Alpha emitters	60 MBq	1050
Tritium	0.82 TBq	
Carbon-14	40 MBq	

5.9.1.2 Comments during Consultation

5.9.1.2.1 Several consultees provide comments on our proposals regarding incineration. One consultee stated that she did not view this disposal route as "good practice as it may result in the production of toxic combustion products as well as disperse radioactive materials to the area surrounding the incineration site". The same consultee indicated that "Carbon-14 is not suitable for disposal by incineration", and that, "if the Environment Agency intends to authorise disposal of radioactive waste from AWE by incineration, conditions should be included to prevent the disposal of all but short-lived isotopes by this route and to require steps to be taken to ensure that waste sent for incineration does not include chlorinated plastics or organic compounds which give rise to dioxins when incinerated".

5.9.1.2.2 We consulted on disposal by incineration in 2003 after AWE plc requested this disposal route. We consider that incineration remains the best practicable environmental option for these types of wastes especially those containing organic materials where incineration destroys the chemical properties of the compound. Many of these waste compounds arise out of requirements imposed by ourselves on nuclear operators to undertake radiochemical assay and it is the chemical nature of the material which makes it unsuitable for disposal at the LLWR.

5.9.1.2.3 Incinerators operators who are authorised to dispose of radioactive waste (and other waste) by incineration do so under a very strict regulatory regime – The Pollution and Prevention Control (England and Wales) (PPC) Regulations 2000 and we require them to make use of the Best Available Techniques (BAT). We are responsible for regulating compliance with related conditions and limits that we place on operators of incinerators. We will continue to ensure that these facilities are operated in accordance with their authorisations and that any associated risks to the public and the environment are minimised.

5.9.2 Warhead Waste

5.9.2.1 AWE Aldermaston

5.9.2.1.1 Warhead Waste is generated during surveillance and dismantling procedures. Some component parts are subject to national security restrictions because of their shape or composition. The existing transfer route for Warhead Waste involves AWE consigning these materials to the Ministry of Defence at Aldermaston. The MOD accumulates this waste on site until sufficient material is available to justify a transfer by MOD to the

QinetiQ establishment at Foulness in Essex under an RSA93 Approval held by the Site Operator.

5.9.2.1.2 We have considered for some time that this transfer route is unduly complicated and having discussed this with both AWE plc and the MOD determined that a simpler and more transparent method is warranted. As similar Warhead Waste is also produced and accumulated at AWE Burghfield there is also scope for authorising AWE Aldermaston to transfer this type of waste to Burghfield for onward transfer to QinetiQ as a single consignment thus reducing the number of road journeys to Foulness. We will now authorise AWE Aldermaston to transfer this Warhead Waste either to AWE Burghfield for onward transfer to the Site Operator at Foulness with AWE Burghfield Warhead Waste or directly to the Site Operator at Foulness, both for the purpose of security controlled disposal.

5.9.2.1.3 There is no change to the volume of waste nor to the activity limit for tritium that we propose to authorise for disposal by AWE. However there is no longer a requirement to include the ability to dispose of uranium contaminated Warhead Waste. The existing authorisation allowing transfer of uranium contaminated Warhead Waste to the MOD is therefore removed. Existing and proposed volume and activity limits are detailed in the following Table:

	Existing Annual Limit for Transfer to MoD	**Revised Annual Limit for Transfer to the Site Operator at Foulness or to AWE at Burghfield**
Volume	50 m^3	50 m^3
Radionuclide		
Tritium	300 MBq	300 MBq
Uranium	2 MBq	Nil

5.9.2.2 AWE Burghfield

5.9.2.2.1 Warhead Waste is generated at AWE Burghfield during surveillance and dismantling procedures. Some component parts are subject to national security restrictions because of their shape or composition. AWE Burghfield is authorised to dispose of these to the Ministry of Defence at Burghfield which then arranges for security controlled disposal at QinetiQ at Foulness in Essex. As stated previously, we have discussed a simpler, more transparent method of transfer, and now authorise AWE Burghfield to transfer Warhead waste directly to QinetiQ for security controlled disposal.

5.9.2.2.2 Warhead Waste arises on both the Nuclear Licensed and the Non-Licensed parts of the AWE Burghfield Site and existing and revised limits for transfer to the site currently operated by QinetiQ at Foulness are provided in the following Table:

	Existing Annual Limits for Transfers to MoD	Revised Annual Limits for Transfers to the Site Operator at Foulness, Essex
Volume	200 m^3	50 m^3
Radionuclide		
Tritium	3 GBq	6 MBq
Uranium	2 MBq	Nil

5.9.2.2.3 Quantities of actual waste transferred to the MOD for security controlled disposal in this waste stream have been small compared to the disposal limits and they have contained tritium only. Disposals have decreased further since completion of the disassembly of the WE177 and Chevaline warheads and consignment of those waste arisings. It is not expected that maintenance of Trident warheads will lead to the same degree of requirement to dispose of slightly radioactive waste components.

5.9.2.2.4 We have determined the impact of tritium on humans using an assessment tool developed by our Radiological Monitoring and Assessment Team in conjunction with the National Radiological Protection Board (now the Radiological Protection Division within the Health Protection Agency), the Food Standards Agency (FSA) and the national environment agencies in Scotland (Scottish Environmental Protection Agency) and Northern Ireland (Department of the Environment). The impact of tritium, a weakly energetic beta emitting radionuclide, has been determined making several very pessimistic assumptions. The most significant of these are that:

- the total annual activity limit is disposed of by open hearth burning at one time;
- a member of the public is standing 100 metres downwind of the burning site during the duration of open hearth burning:

5.9.2.2.5 By making these assumptions we determine the worst possible case for what is referred to as ”the critical group”, although it is virtually impossible to receive such a dose. At Foulness the closest a member of the public could get to the burning site would be about 400 metres and any impact will be dramatically reduced. We have assessed that the critical group would receive a radiation dose by inhalation of 0.0005 microsieverts.

5.9.2.2.6 The assessed radiation dose to a member of the public exposed to the maximum authorised radioactivity released at Foulness is about 2 million times less than the annual dose limit of one millisievert (1000 microsieverts). This annual dose is also equivalent to about one additional minute of exposure natural background radiation.

5.9.2.2.7 We accept that these disposals will need to continue even though no transfers have taken place since 2003 since there is an ongoing surveillance and maintenance programme for the Trident Weapon system and that ultimately these warheads will require decommissioning.

5.9.2.3 Comments during consultation

5.9.2.3.1 The transfer of Warhead Waste from AWE sites to the Foulness Site operated by QinetiQ (a defence contractor) via the Ministry of Defence (MOD) raised a considerable number of comments. Whilst we had proposed to make this transfer route more open and transparent and to significantly reduce the activity limit for transfer it soon became evident that many people in the local community were unaware of the transfers taking place. Local media interest resulted in a petition being presented to Parliament by the local Member of Parliament (Mr James Duddridge).

5.9.2.3.2 Our Anglian Region, Eastern Area Manager and the Nuclear Regulation Group (South) Manager met with the MP in order to discuss these transfers and ultimate disposals at Foulness. It was agreed that the Environment Agency would co-ordinate a report that detailed these disposals, the process by which these wastes are handled and other issues such as environmental and human impact. The MOD, AWE plc and QinetiQ provided information and comment. This report was provided to the MP in late July 2006. In mid August we agreed to a request from the MP to extend our consultation locally in order to allow local residents the opportunity to comment on our proposals.

5.9.2.3.3 We had previously sent our consultation package to Rochford District Council for comment and included information for entry onto the council public register. Having agreed to consult locally until 2 October 2006 we provided consultation packages to 5 local libraries (Annex 3). The package contained copies of the report compiled for the MP (Annex 6).

5.9.2.3.4 On the 20th of September 2006 we held a “drop-in” session at Great Wakering in Essex. The “drop-in” was attended by the local MP along with some 60 people who visited us to talk about our proposals and to gather information on what had been happening at the Foulness site. Representatives from the MOD and QinetiQ attended in order to provide site specific information. We have concluded that the general consensus is one of acceptance of our proposals. Most people had been unaware of the historical transfers, did not know why the Foulness Site was being used for the burning of the Warhead Wastes and were reassured by being able to discuss these issues directly with us. One attendee at the “drop-in” asked us “what medical studies had been done……, particularly on children”. We provided a written reply, as we did not have all the information immediately to hand during the consultation.

5.9.2.3.5 Since the consultation closed we have had acceptance of our proposals from Mr James Duddridge, Member of Parliament for Rochford and Southend East, from Rochford District Council and from Essex County Council.

5.9.2.3.6 In addition to being able to discuss the disposals of Warhead Waste directly during the “drop-in” we had four written comments from local residents.

5.9.2.3.7 One consultee asked “why should radioactive waste be transported all the way from Berkshire to the furthest reaches of Essex?” We have addressed this issue in the report we prepared for the local MP (Annex 6) and were of the opinion in 1998 when first approving these transfers and remain so now that this route provides a safe and appropriate way of dealing with these wastes. The majority of the waste has been and will continue to be lightly contaminated high explosive from the warhead. The

operator of the Foulness Site has considerable experience in safely disposing of high explosive from many military weapon systems and it is the high explosive content of the Warhead Waste that needs to be disposed of in a controlled manner. We regulate the use of the two explosive waste incinerators at Foulness and are content that these wastes are being disposed of in accordance with a permit issued by us under the Pollution, Prevention and Control (PPC) Regulations. We have also assessed the radiological impact of these disposals on humans and concluded that the impact is insignificant.

5.9.2.3.8 One consultee wrote enquiring about the dismantling of warheads at Foulness and the burial of radioactive waste on site. Issues raised by this consultee regarding flood prevention have been passed to Anglian Region, Eastern Area Environment Agency staff. Dismantling of nuclear warheads takes place at AWE Burghfield in Berkshire and during the period 1998 to 2003 AWE carried out a significant package of work to dismantle the redundant naval nuclear missile warheads and other nuclear warheads (known as WE177 bombs). This major programme of decommissioning work ended in 2003. AWE Burghfield continues to maintain the existing nuclear deterrent system (Trident) where there is a programme of assembly, disassembly and inspection of the in-service warheads.

5.9.2.3.9 The Foulness site is only authorised by us to dispose of radioactive wastes by controlled burning and the wastes that are sent there are disposed of by burning within a relatively short period of time. We have imposed limits on the amount of waste (both by volume and radioactivity) that can be sent to Foulness and on how much can be disposed of over a period of time. We are reducing the volume and amount of radioactivity that can be transferred by AWE plc to Foulness. We are not authorising burial on the site).

5.9.2.3.10 One consultee was concerned about the health effects arising from the disposals and in particular about the effect on the environment. As stated above we undertook an assessment of the radiation dose that the critical group could receive and reported a radiation dose by inhalation of 0.0005 (ie 1/2000th) of a microsievert. The Ionising Radiations Regulations 1999 (IRRs 99) limit exposure arising from artificial and occupational exposures to 1 millisievert (ie 1000 microsieverts). The pessimistic dose to a member of the public exposed to the maximum radioactivity released at Foulness would equate to about 2 million times less than the legal dose limit. The average exposure to natural background radiation in the UK is 2700 microsieverts, arising from all causes (eg solar, medical, naturally occurring radionuclides in food). Compared to this, the dose from disposals at Foulness is equivalent an additional minute per year of natural background radiation.

5.9.2.3.11 Additionally we have carried out an assessment of the impact from burning these wastes on local plant and animal life. Our results indicate that at current discharge limits to the atmosphere (ie direct to air) there would be no significant increase in radiation dose rates above background levels to any biota. We have concluded that no regulatory action is required as a result of discharges of tritium during work undertaken at Foulness and that there is no adverse effect on local biota, eg cockles and other locally harvested seafood.

5.9.2.3.12 The environmental impact of using these processes at Foulness (incineration and open hearth burning) has been assessed as being not likely to have a "significant effect" on the European Sites at Benfleet and Southend Marshes Special Protection Area (SPA), Crouch and Roach Estuaries SPA, Dengie SPA, Foulness SPA and Essex Estuaries Special Area for Conservation (SAC).

5.9.3 Disposal of Very Low Level Waste (VLLW) to Licensed Landfill

5.9.3.1 AWE Aldermaston

5.9.3.1.1 AWE has requested a disposal route for tritium contaminated waste resulting from demolition operations undertaken as part of the decommissioning programme at the Aldermaston site. This request was based on AWE's continuing programme of decommissioning redundant buildings and facilities at Aldermaston and the need to demonstrate the BPEO for a disposal route for all of the resulting wastes which would range from uncontaminated to VLLW/ LLW.

5.9.3.1.2 In respect of waste solely containing tritium VLLW is waste contaminated with radioactivity at levels between 0.4 and 40 Becquerels per gram. Apart from a limited number of "small producers" such as hospitals this waste is currently transferred to the LLWR at Drigg in Cumbria for disposal. There are reasons in favour of localised disposal of VLLW especially for bulk materials such as building demolition waste and which has been described by some as "High Volume, Low Activity Waste (HVLA)".

5.9.3.1.3 AWE is currently authorised to dispose of this type of low level waste to the LLWR at Drigg. However we required AWE to characterise these wastes and to undertake a BPEO Study for the disposal in order to determine whether it is feasible to dispose of these wastes elsewhere.

5.9.3.1.4 AWE has determined that this material is contaminated solely with tritium at an activity level of between 1 and 10 Bq/g. These levels are greater than the exemption level of 0.4 Bq/g that would allow disposal as exempted waste, but lie within the concentration range (ie a tritium concentration of up to 40 Bq per gram) for disposal as Very Low Level Waste (VLLW) with normal refuse.

5.9.3.1.5 AWE has requested an authorisation to dispose of these demolition wastes as VLLW to Licensed Landfill. The UK's policy for VLLW disposal is currently being considered by government as one part of a consultation (A Public Consultation on Policy for the Long Term Management of Solid Low Level Radioactive Waste in the United Kingdom) co-ordinated by Defra. At the time of preparation of this document we were awaiting the results of the consultation.

5.9.3.1.6 We view the disposal of high volume, low activity waste to the LLWR as inappropriate and if such disposals were to be authorised across the nuclear sector they would result in significant LLWR capacity being utilised. We have discussed the on-site re-use of building demolition material with the NII and AWE and note that there is considerable support for doing so. The Nuclear Installations Inspectorate (NII) regulates the accumulation of radioactive materials on Nuclear Licensed Sites and is broadly supportive of re-use, providing that Safety Case/Safety Statements for building/construction projects demonstrate the case for re-use and that the areas where these materials are used are accurately documented.

5.9.3.1.7 In our revised authorisation for AWE Aldermaston we have not included AWE's request for the VLLW route. We recognise that a decision on this VLLW disposal may be made in the future, subject to emerging Government Policy and may return to this issue in the future. We will **not** authorise the disposal of VLLW to Licensed Landfill at present.

5.9.3.2 Comments during Consultation

5.9.3.2.1 One consultee made several comments regarding our proposals, being concerned that VLLW would be disposed of under "less than stringent conditions" and that there is a potential for tritium to leach into groundwater. If we authorise such disposals we would ensure that they are managed and regulated in a manner fully consistent with our regulation of other disposals. One area of concern raised by us has been that we should have a stringent system in place to check consignments of VLLW leaving sites and being consigned to Licensed Landfill Sites. We already had a system in place where LLW consignments can be seized and checked for radioactive and radionuclide content at our Waste Quality Checking Laboratory (WQCL) in Dorset. We have expanded this programme to take account of high volume, low activity wastes such as building demolition rubble and contaminated soil. Whilst we do not envisage seizing tonnes of such material we would, from time to time, require operators such as AWE to provide us with samples so that we can check the activity/radionuclide content of these wastes.

5.9.3.2.2 We are aware that historic disposals (of tritium in particular) have leached into groundwater from some of the sites where these wastes were disposed. If we authorise such disposals we will ensure that by using Licensed Landfill Sites, which are able to accept these wastes, we would be minimising the potential for leaching into groundwater.

5.9.3.2.3 The same consultee commented that "suitably licensed landfills" should be used. We are supportive of this and have made such a point in our consultation. Should Government Policy allow the disposal of VLLW to landfill we would not authorise disposal to general landfill sites. Additionally this consultee made the point that "the new authorisation should specify the locations and license numbers of specific landfill sites at which such waste may be disposed of, in the same way as which the location of other disposal sites is identified in the proposed new authorisation". A similar point regarding "transparency of sites accepting landfill waste was made by a second consultee".

5.9.3.2.4 We await a decision, arising from the Defra consultation on whether there is a need to specify where these wastes are transferred for disposal. If the decision is taken that these disposals are to be to specific "named" Licensed Landfill Sites we would record these details in the Certificate of Authorisation.

5.9.3.2.5 Having made these points the same consultee then stated that they were "opposed to the use of landfill for storage of radioactive wastes, stating that this is dispersal, not disposal". We do not regard the transfer of VLLW to Licensed Landfill as storage or dispersal, but view it as permanent disposal. This approach is in keeping with the transfer of other non-radioactive wastes to Licensed Landfill and we do not regard these wastes as recoverable, now or in the future.

5.9.3.2.6 Another consultee who wrote was concerned about a particular landfill site in Oxfordshire and asked whether AWE waste would be sent there. This particular site, at Stanford-in-the-Vale had been used previously and tritium leachate was detected in groundwater surveys in the mid-1990s. This concern was also addressed, on behalf of the same consultee, by the Member of Parliament for Wantage, in a letter to the Environment Minister. In our reply we stated that Stanford-in-the-Vale closed as a Licensed Landfill in 1993 and that no radioactive waste of any category can be consigned there from any site.

5.9.4 Mercury Waste

5.9.4.1 AWE Aldermaston

5.9.4.1.1 AWE has requested that the existing route, volume and activity limits for contaminated mercury remain unchanged. Mercury is decontaminated and re-cycled. Residual waste from this process is managed within the site operator's existing arrangements and authorisations for radioactive wastes.

Person to whom the waste may be transferred	Radionuclide or group of radionuclides	Annual Activity Limit	Annual Volume Limit (cubic metres)
Transfer, for the purpose of treatment to the person operating Complex B4 and Facilities A50 and A51 on the Winfrith Nuclear Site	Alpha emitters	12 GBq	3
	Plutonium 241	48 GBq	
	Tritium	1 GBq	
	Other Radionuclides	24 GBq	

5.9.4.2 Comments during Consultation

5.9.4.2.1 No comments were received regarding this disposal route.

5.9.4.3 Accumulation on the AWE Burghfield Non-Licensed Site

5.9.4.3.1 The accumulation of radioactive waste is regulated by the NII. However as previously detailed a part of the AWE Burghfield Site is not subject to the requirements of the Nuclear Installations Act and as such we, the Environment Agency, regulate accumulations on the part of the site known as the AWE Burghfield Non-Licensed Site.

5.9.4.3.2 The current RSA93 Authorisation for the AWE Burghfield Non-Licensed Site (BX8114) allows accumulation of aqueous and solid LLW on the site. In our consultation we stated that we wished to combine the two AWE Burghfield RSA Authorisations and we proposed the following:

Accumulation of Aqueous Waste on the AWE Burghfield Non-Licensed Site

Column 1 Radionuclide or group of radionuclides	Column 2 Annual Activity Limit	Column 3 Annual Volume Limit (m^3)	Column 4 3 month Accumulated Activity Limit	Column 5 Accumulation Period	Column 6 Volume Limit (m^3)
Alpha emitters	1 MBq	200	0.25 MBq	3 months	50
Beta/gamma emitters	1 MBq		0.25 MBq		
Tritium	0.5 GBq		0.15 GBq		

Accumulation of Solid Waste on the AWE Burghfield Non-Licensed Site

Column 1 Radionuclides	Column 2 Activity Limit
Alpha Emitters	1 GBq
Beta/Gamma Emitters	1 GBq
Tritium	5 GBq

Maximum Volume of Accumulated Solid Waste on the AWE Burghfield Non-Licensed Site

200 m^3

Maximum Period of Accumulation of Solid Waste on the AWE Burghfield Non-Licensed Site

24 months

5.9.4.3.3 As previously explained the current authorisation for the Non-Licensed Site at AWE Burghfield enables aqueous radioactive wastes created on this part of the site to be transferred to AWE Aldermaston for treatment. Routine operations do not generate such wastes and it is therefore as a contingency that AWE Burghfield is currently authorised to accumulate these wastes prior to their transfer to AWE Aldermaston. We did not propose to change the annual activity limits as they have only recently (March 2005) been imposed on this site. We have imposed a volume limit of 50 m^3 for accumulation and for a maximum of 3 months before transfer is made to AWE Aldermaston.

5.9.4.3.4 Small amounts of radioactive waste accumulation in the non-Licensed area of Burghfield are currently authorised in BX8114. The wastes are awaiting the availability of a disposal route, or decommissioning action, or

are simply stored until there is sufficient to constitute a batch for transport. We have made no changes to these arrangements, and the limits in the Tables above match the limits already authorised in BX8114.

5.9.4.4 Comments during Consultation

5.9.4.4.1 No comments were received regarding the accumulation of aqueous and solid LLW on the AWE Burghfield Non-Licensed Site.

5.10 Miscellaneous Issues

5.10.1 Operation of Waste Disposal Plant

5.10.1.1 One consultee suggested that "Waste disposal operations and plant should be operated and attended by suitably qualified and experienced personnel (SQEP)". As a condition of our authorisations we require that operators shall have systems in place that ensure:

- adequate supervision of the disposal of radioactive waste by suitably qualified and experienced persons……and;

- adequate supervision by suitably qualified and experienced persons of the operation and maintenance of the systems and equipment provided to meet the requirements of …….. for the disposal of radioactive waste;

5.10.1.2 In doing so we recognise the absolute need for systems and personnel to be fit for purpose and will regulate each site to ensure that these conditions are met.

5.10.2 Storage of Radioactive Waste

5.10.2.1 The same consultee commented that "whilst AWE have strategies for dealing with radioactive waste, they do not appear to have a medium to long term plan or the equivalent, which might give the public some concept of what the future holds in terms of living near a radioactive waste store and indicate to regulators and others the quantities and types of radioactive waste which are likely to arise from activities at the site over the years ahead".

5.10.2.2 This consultee added that "AWE should therefore prepare a five year waste disposal plan which should be available to the public" and that "the new authorisation for the site should specify upper limits for waste holdings which can be retained on site".

5.10.2.3 The storage of waste on Nuclear Licensed Sites is a matter for the Nuclear Installations Inspectorate and whilst we do have an obvious interest, any concerns regarding such issues will need to be addressed to the NII. We cannot place limitations on the amount of radioactive waste that can be retained on site but we work with the NII to ensure that all arisings are managed safely. The NII require site licensees to minimise, as far as is reasonably practicable, the rate of production and the total quantities of

waste produced on such sites. We intend, together with the NII, to ensure that these issues are addressed.

5.10.2.4 We consider that there will be no change to the types of waste that will arise. We have worked with AWE plc and the MOD in preparing for this consultation and AWE has indicated to us that there will be no significant changes to the specific types of waste being generated. Similarly there will be no change in the types of radionuclide being used. We are therefore content that there is no requirement for a specific strategy outlining radioactive waste production and disposal. In our view, the strategy for decommissioning old and redundant facilities and replacing them with modern, purpose built facilities is more important. We are currently involved at a strategic level with AWE plc and the MOD in influencing the design of replacement facilities. We aim to ensure that this programme delivers facilities where all aspects of radioactive waste production are taken into account and that the generation of radioactive wastes is minimised at source.

5.10.2.5 Our review of AWE's existing RSA93 Authorisations required AWE plc to provide us with a considerable amount of information pertaining to past and future radioactive waste disposals. These reports (AWE Reports 565/05 and 566/05) provided us with an indication of radioactive waste arisings and disposals and in effect form AWE plc's assessment of future disposals for the next five to seven years. We have made these reports available during our consultation and they are also available on the AWE website, readily accessible by the public. In conducting future reviews we will ensure that this type of information will be available to the public.

5.10.2.6 In addition AWE are voluntarily preparing an Integrated Waste Strategy (IWS) that will detail the strategy for the management of all types of waste arising at Aldermaston and Burghfield. We originally proposed to impose this requirement as an Information and Improvement Condition in the revised RSA93 Authorisations. We have not done so as we believe that it may be incorrect to include work that relates to non-radioactive waste within the requirements of an RSA93 Authorisation. Instead we have been seeking voluntary action by nuclear sites and AWE is working to complete an IWS. This will be a "living" document and will therefore represent an ongoing strategy for the management of all waste types.

5.10.3 Transport of Radioactive Waste

5.10.3.1 One consultee stated that "the authorisation should specify that contractors carrying waste from the site should be licensed carriers. Appropriate safety conditions should be specified". Additionally this consultee stated that "The Environment Agency should consider whether closer internal liaison between teams responsible for the regulation of radioactive substances and teams responsible for waste disposal would be advantageous in ensuring an appropriate regulatory regime for waste arisings from AWE".

5.10.3.2 The safety of waste transportation is a matter for the Department for Transport (DfT) and the DfT has been included as a consultee during our review of AWE plc radioactive waste disposals. AWE currently uses its own personnel and vehicles to transport radioactive waste and does so in accordance with Road Transport Regulations. Where carriers are used AWE has a duty of care to ensure that they are properly licensed.

5.10.3.3 As stated previously the NII is responsible on Nuclear Licensed Sites for regulating the accumulation and storage of radioactive wastes. They apply the requirements of the Nuclear Installations Act (NIA) and associated Licence Conditions. We regulate disposals from Nuclear Licensed Sites and the accumulation, storage and disposal from Non-Licensed Sites (such as that part of AWE Burghfield that is not subject to the NIA). The DfT regulates transportation. Our working relationship with the NII is strong and healthy and we regularly undertake joint inspections of facilities and management/organisational arrangements at AWE. Of considerable importance is our combined ability to influence nuclear operators such as AWE plc and to regulate their work in a manner that results in enhanced worker, public and environmental safety. We have a Memorandum of Understanding with the NII that details our engagement on nuclear sites. In addition to the NII we liaise and engage with the Defence Nuclear Safety Regulator (DNSR), in particular with the Nuclear Weapons Regulator and with the MOD Nuclear Weapons Integrated Project Team (NWIPT) on matters that affect compliance at AWE sites. We also liaise with the DfT when issues affecting transportation of radioactive wastes arise and which may have some impact on our regulatory work.

5.10.4 Public Accountability

5.10.4.1 One consultee commented that AWE should "prepare a quantitative report on a quarterly basis on waste disposal issues and compliance with authorisations which should be available to the public and posted on the company's website". We make available, on our public register, records of all discharges and disposals from Nuclear Licensed Sites such as AWE Aldermaston and AWE Burghfield and so we feel that the first part of this comment is already adequately addressed. AWE also makes this discharge information and further documents relating to environmental performance and strategy available on its website. AWE also produces and makes available an annual Environmental Report. In developing a Modern Regulation approach at certain sites we will be trialling a system whereby operators can make an assessment of their compliance. Our Nuclear Operator Performance Risk Appraisal (NOPRA) Scoring System will allow operators to assess their environmental and regulatory performance and will then allow us to determine our involvement with such sites. We be trialling the NOPRA Scoring System at a number of sites in the near future and would anticipate that information relating to NOPRA will be made available to the public.

5.10.5 International Commitments

5.10.5.1 One consultee commented in respect of the Nuclear Non-Proliferation Test Ban Treaty and specifically that:

> *"In addition, although we recognise that the total health detriment posed by these proposed discharges is small, and so we are not suggesting that there is a significant health issue here, we feel that it is important that the following point should at least be raised.*

5.10.5.2 Under **International Commitments** on p33 (*of the May 2006 Explanatory Document*), we note the absence of any mention of the Nuclear Non-

Proliferation Test Ban Treaty, although it is mentioned elsewhere in the document that emissions of volatile radionuclides and carbon-14 are required in support of this Treaty. However, the UK Government is also committed by the Nuclear Non-Proliferation Test Ban Treaty to seek reduction in its holdings and deployment of atomic weapons. We seek assurance that the submission is compatible with the Government's obligations under the Treaty".

5.10.5.3 We would wish to indicate that the proposed limits for emissions of volatile radionuclides and carbon-14 are very small and that they would arise as a result of environmental samples being provided to AWE plc for radiochemical assay in support of the Nuclear Non-Proliferation Test Ban Treaty eg the detonation of a nuclear device.

5.10.5.4 We feel that it is inappropriate for us to comment on Government Policy or obligations under this Treaty. We are however able to take a view regarding the requirement for gaseous discharge limits that would allow work by AWE plc in support of the Nuclear Non-Proliferation Test Ban Treaty to be undertaken at AWE Aldermaston. AWE represents a national capability and we believe that these limits are appropriate and we have included limits for carbon-14 and volatile radionuclides in our revised certificate of authorisation for AWE Aldermaston.

5.10.6 Dose Assessments

5.10.6.1 Our assessment of doses uses the best available science on health and environmental effects of radiation, and realistic assumptions of the behaviour and dietary patterns of representative members of the exposed public. This is consistent with the draft Statutory Guidance on the Regulation of Radioactive Discharges into the Environment from Nuclear Licensed Sites.

5.10.6.2 Below we present the results of our assessments of the radiological impact on the public of future discharges from AWE Aldermaston and AWE Burghfield. We are required by Government to assess doses to the public from the expected discharges and compare the doses with appropriate criteria. For this review, the criteria are: the source constraint (300 microsieverts per year), the site dose constraint (500 microsieverts per year) and the EC dose limit (1000 microsieverts per year).

5.10.6.3 AWE plc carried out radiological assessments at the discharge limits that it was seeking, and we carried out assessments at the current discharge limits, the discharge limits proposed by the company and the discharge limits that we have included in the authorisation we intend to issue. The assessments do not take account of doses from direct radiation from the site as no such radiation dose exists from AWE sites as a result of the type of work undertaken and radionuclides used. The Food Standards Agency (FSA) also made an assessment of doses to people from radionuclides in the food chain from future discharges, these were included in the Explanatory Document. All dose assessments included in this Decision Document are ours, except where stated otherwise.

5.10.6.4 Radiological assessments of dose to the public from future discharges are based on assumed levels of discharge and predicting the behaviour and concentrations of radionuclides once they are in the environment. These assessments assume that discharges are at 100 % of the current and

proposed discharge limits. The assessments use EC approved modelling systems and data.

5.10.6.5 We have adopted the current International Commission on Radiological Protection (ICRP) recommendations, which uses the critical group concept for assessing exposure of the public. According to the ICRP definition of '**critical** group', there is only one group of the general public for any one site who receive the highest dose overall. The term 'critical group' is used for the group of people who receive the highest dose overall from gaseous and liquid discharges (and direct radiation from such sites where this might exist). Where doses are separately assessed for different types of discharges the term 'group most exposed to' is used. The critical group dose will not always be the total of all the doses to the 'groups most exposed', as the critical group will not be fully exposed to all the discharges and direct radiation.

5.10.6.6 Public dose assessments, as determined by AWE plc, ourselves and the Food Standards Agency (FSA) are reproduced in the table below:

Discharge Route	Discharge at 100% of current authorisation levels AWE assessment	Discharge at 100% of Revised Limits AWE assessment	Discharge at 100% of Revised Limits Environment Agency assessment	Discharge at 100% of Revised Limits FSA assessment - Probable Dose	Discharge at 100% of Revised Limits FSA assessment - Possible Dose
Annual dose to Critical Group (μSv)					
Atmospheric (Aldermaston)	6.4	1.9	1.4	< 5	< 10
Trade effluent sewage worker	0.004	0.001	0.003	< 5	< 10
Re-use of sewage sludge on land	0.06	0.02	0.03	< 5	< 10
Irrigated Food and Water Consumer	0.44	0.15	0.19	< 5	< 10
Aldermaston Stream	0.17	0.04	<0.0001	< 5	< 10
Atmospheric (Burghfield)	0.05	0.008	0.0004	< 5	< 10

5.10.6.7 In summary:

- All the assessed doses are very low, not only being less than 1% of the annual public dose limit of 1000 μSv per year, but also substantially less than the 20 μSv per year lower bound for optimisation specified in Government policy. Below that lower bound, the regulators should not seek to secure further reductions in the exposure of members of the public, provided they are

satisfied that the operator is using the best practicable means to limit discharges.

- Atmospheric discharges from Aldermaston result in larger public doses than do the liquid discharges. The dominant contributor is tritium, with the main exposure pathways being inhalation of radioactivity from the air and consumption of milk assumed to have been produced adjacent to the site perimeter. Because infants consume proportionately larger amounts of milk (compared to children or adults), the assessed doses are greater for infants than for other age groups. The contributions that would be made by argon-41 and carbon-14 are very minor.
- Doses associated with liquid discharges to the sewer are not dominated by any individual radionuclide; tritium, uranium and thorium-234 (a radioactive daughter of uranium-238) all contribute. The dose to infants is assessed to be slightly larger than the dose to adults.
- Principal exposure is attributable to drinking water consumption and milk taken from cows that consumed only water from the stream

5.10.7 Comparison of doses with the single source constraint

5.10.7.1 There is a dose constraint for the maximum dose to people, which may result from discharges from a single source, in this case, a single facility at an AWE site. The dose to be compared to this constraint should include the dose from current discharges and direct radiation, but exclude the dose from historical discharges. The constraint is 300 microsieverts per year and we are responsible for assessing doses for comparison with the constraint.

5.10.7.2 We have not undertaken an assessment at the single source constraint for single facilities as this would not be a sensible way of viewing a complex site such as AWE Aldermaston. The Table above indicates that doses from all possible pathways are very much less than the 300 microsieverts per year single source constraint.

5.10.8 Comparison of doses with the site dose constraint

5.10.8.1 There is also a dose constraint for the maximum doses to people, which may result from discharges from a site as a whole. The dose to be compared to this constraint is the dose from current discharges, including discharges made by adjacent sites. Doses arising from direct radiation and historical discharges are excluded. The constraint is 500 microsieverts per year and we are responsible for assessing doses to compare with the constraint. Taking into account all the discharges from the AWE Aldermaston Site, and including those from AWE Burghfield (and *vice versa*), dose to the Critical Group (using our revised limits) will reduce from 7 microsieverts per year to less than 2 microsieverts per year. As such this dose is very much less than the site dose constraint of 500 microsieverts per year.

5.10.9 Comparison with the dose limit for members of the public

5.10.9.1 The Government has directed us to ensure that doses to members of the public from exposure to ionising radiation do not exceed 1,000 microsieverts per year. The contribution to the total dose to members of the public (critical group) near the AWE Aldermaston and AWE Burghfield sites takes into

account doses arising from future discharges from both of these sites. The total dose of less than 2 microsieverts per year is very much less than the dose limit for members of the public of 1000 microsieverts per year.

5.10.10 Collective doses

5.10.10.1 Collective dose is the sum of all the doses received by the members of a population. It can be useful when considering the protection of the public from the effects of radiation. Collective doses are measured in man-sievert (manSv). There are no limits or constraints for collective dose. However, the International Atomic Energy Agency (IAEA) has set a level for collective doses of less than 1 man-sievert per year of discharge as part of their criteria for discharges not requiring regulatory control.

5.10.10.2 The UK Health Protection Agency, Radiation Protection Division, has provided additional guidance on assessing how important the collective doses are. They advise calculating an average dose to members of the population (per person doses). The per person doses may be very small, often in the range of a few nanosieverts to a few microsieverts. The Health Protection Agency advised that if the average per person doses for a population group are only a few nanosieverts per year, we can consider them to be less important when we make our decisions on discharges. If the per person doses increase above this level, we need start to looking more carefully at the discharge options. A nanosievert is one thousandth of a microsievert.

5.10.10.3 We have not made an assessment of collective dose when undertaking this review because when assessing the potential dose to the most likely exposed members of the population (the critical groups around AWE Aldermaston) the results produced by AWE plc, the Food Standards Agency and ourselves have been very low. Apart from the potential exposure from airborne discharges (<2 microsieverts per year) the potential doses from other exposures have been calculated at nanosievert levels. For critical groups around AWE Burghfield potential doses are even lower. If potential doses had been higher we would have undertaken a collective dose assessment. As critical group doses are low and in view of the fact that AWE Aldermaston and AWE Burghfield discharges are subject to strict regulatory control we have concluded that further detailed assessment is not required.

5.10.11 Comments during Consultation

5.10.11.1 Both the FSA and Department of Health (DoH) responded to our consultation, FSA in particular indicating that “We have no objections to the Environment Agency granting AWE plc the proposed Authorisations as detailed in the consultation package”. DoH, in their response, provided no comments regarding our consultation.

5.10.11.2 One other consultee provided us with feedback in respect of our critical group dose assessment stating that “The assessment of radiation doses follows the *Principles for the Assessment of Prospective Public Doses* jointly developed by EA, SEPA, DOENI, FSA and NRPB with one exception: collective doses do not seem to have been estimated”.

5.10.11.3 In this and previous consultations we have made assessments of the possible doses to critical groups. From a health perspective the risks to the public from airborne and aqueous radioactive discharges at the revised limits that we have proposed in our consultation are extremely small and have continued to display a downward trend. The radiation dose assessments take into account the maximum dose that could be received by a local member of the public from several discharge types at our revised limits.

5.10.11.4 The same consultee also indicated that there was "insufficient detail provided about the habits of the critical group to know if these are those observed over a long period of time" and that "From the information provided it appears that many of the assumptions regarding the critical group are cautious but this is considered acceptable given the low estimated doses (less than the 0.02 mSv y^{-1} criteria where a more detailed dose assessment is required).

5.10.11.5 The same critical groups were used in the assessments (by AWE plc, FSA and ourselves) and assessments take account of the number of distinct and often separate pathways whereby radioactive waste is discharged. The modelled doses are not necessarily additive since all groups will not be exposed to the effects of all types of discharge.

5.10.11.6 AWE has used a dedicated computer programme (INDAS – **In**dividual **D**oses for **A**WE **S**ites) developed by the National Radiological Protection Board (NRPB – now the Health Protection Agency – Radiation Protection Division) for AWE, to calculate critical group dose. We have used the *Principles for the Assessment of Prospective Public Doses* as described above. Both methodologies make pessimistic assumptions regarding the habits of persons who may form a part or the whole of a critical group and take account of the extent to which radioactive discharges are dispersed in the environment and the extent to which they become available for incorporation into the food chain. INDAS allows for the possible build-up of radionuclides in the relevant environmental medium and takes further account of discharges persisting at the proposed/revised rate for 50 years.

5.10.11.7 The uptake of radionuclides by people depends on factors such as where they live and the types of food they eat. These factors are established by studies of representative groups carried out periodically by the Food Standards Agency. The models are used to calculate doses to members of the public. The assessments are based on pessimistic assumptions that tend to overestimate the actual doses received. In view of the very low doses determined using the above assessment programmes we have not undertaken further detailed assessment to calculate the effect on the critical groups. If the estimated doses had been significant we would have undertaken further assessment work including a more detailed determination of the habits of those who may form part of a critical group.

5.10.11.8 The FSA has calculated the potential dose to members of the public arising from the consumption of food and from other exposure pathways. The FSA methodology considered combinations of pathways that the FSA regard as reasonable but not extreme. Reasonable possible future practices were also included so that dose calculations were not restricted to pathways and agricultural practices currently existing near the site.

5.10.11.9 The FSA has also made a separate estimate of 'possible dose', using a combination of maximum (cautious) assumptions, including an assumption that foods are produced at the locations where radionuclide concentrations are highest. These locations are usually very close to the sites, and are often not used for agriculture. The 'possible' doses are likely to be an overestimate and are much higher than the other assessments and much higher than retrospective assessments using monitoring results. FSA has confirmed to us that 'The proposed limits are acceptable on the grounds of food safety and the potential impact on food safety'.

5.10.11.10 We are satisfied that the doses to critical groups have been assessed in such a way, and using appropriate assessment tools. We conclude that the effect on critical groups is not significant and that there is a reasonable correlation between the critical group estimates determined by AWE plc, FSA and ourselves.

5.10.12 Habitats Assessment and Conservation

5.10.12.1 There were no issues raised regarding the way in which we consulted in respect of our obligations concerning Habitats.

5.10.13 Habitats

5.10.13.1 Under the Conservation (Natural Habitats &c) Regulations 1994 (the Habitats Regulations) we must be satisfied that the integrity of designated "European sites" will not be affected adversely by the authorisations that we issue. We have considered the potential impact of discharges of radioactive waste from AWE Aldermaston and AWE Burghfield sites on plant and animal life at the relevant designated European sites.

5.10.14 Methodology

5.10.14.1 We assessed the potential impact of discharges of radioactive wastes from AWE Aldermaston and AWE Burghfield on plant and animal life by using our Habitats Stage 3 spreadsheets for terrestrial and marine environments. These spreadsheets use the methods and data published in our Research & Development Report 128. We developed these methods jointly with English Nature. We developed them mainly to meet our responsibilities under the Habitats Regulations. We can also use them to show that proposed discharges will not have a significant impact on designated areas and ecosystems in general. The spreadsheets calculate dose rates to a wide variety of species which would be of conservation interest near the AWE sites at Aldermaston and Burghfield. We considered the AWE sites along with all other authorised discharges into or around a number of sites. In addition we calculated the combined impact to these conservation sites from AWE Aldermaston and AWE Burghfield alone.

The following Tables provide the results of our assessments:

Dose rates (μGy/h) to the most affected species of plant and animal life – as a result of discharges from premises authorised under RSA93 to make discharges into the Thames Basin and surrounding areas

Site	Coastal	Freshwater	Terrestrial	Total	> 40 μGy/h	Note
Burnham Beeches	NA	NA	0.00	0.00	No	1
South West London Water Bodies	The combined impact assessment has not been completed yet for this low priority Natura 2000 Site					2
Thames Basin Heaths	NA	5.5	7.4	12.9	No	2
Benfleet and Southend Marshes SPA	3.5	3.3	4.2	3.5	No	2, 3
Thames Estuary and Marshes	7.6	0.00	5.7	7.7	No	3

Notes:
1. No authorised releases impact on this site.
2. AWE(A) liquid discharges will ultimately flow past this site or through the water bodies.
3. AWE(A) liquid discharges will ultimately flow into the Thames Estuary.

Dose rates to the most affected species of plant and animal life – as a result of discharges from AWE Aldermaston and AWE Burghfield alone

Discharge route	Assessed dose rates from discharges at our revised limits AWE Aldermaston (μGy/h)	Assessed dose rates from discharges at our revised limits AWE Burghfield (μGy/h)
Gaseous discharges	0.0023	7.4E-07
Liquid discharges	0.35	There are no aqueous discharges from AWE Burghfield
Sum of assessed dose rates from gaseous and liquid discharges	0.35	Effectively Zero

5.10.15 Criteria for comparison with assessment

5.10.15.1 In its recent work, the EU's Framework for Assessment of Environmental Impact (FASSET) Project concluded that, in general and from the available data, there appear to be no significant adverse effects in biota exposed at levels of up to 100 micrograys per hour (µGy/hr). Allowing for the dose rate from natural background, which is at most about 60 µGy/h in European ecosystems, we have adopted a value of 40 µGy/hr as an assessment threshold above which we should take regulatory aaction.

5.10.16 Data input to the assessment spreadsheets

5.10.16.1 The assessments of potential dose rates to plant and animal life have been made at the annual limits we have included in the authorisations we intend to issue. The inputs to the terrestrial environment spreadsheet were the limits for discharges to the air. The inputs to the marine environment spreadsheet were the limits for discharges to the riverine/estuarine environment.

5.10.16.2 The potential dose rates to plant and animal life at the revised annual limits included in the authorisation we intend to issue are shown in the tables above for discharges from all authorised discharges and from the AWE sites (combined effect of AWE Aldermaston and AWE Burghfield). The spreadsheets calculate dose rates to a range of species of plant and animal life. The dose rates shown are for the species most affected by discharges into the air and to water, both separately and together.

5.10.16.3 The predicted dose rates from the discharges from the AWE Aldermaston and AWE Burghfield sites combined are very much less than the assessment threshold of 40 µGy/hr. We consider that the discharges of radioactive wastes into the environment at our revised limits will not have a significant impact on plant and animal life around AWE Aldermaston and AWE Burghfield sites including sites that are of conservation interest.

5.10.17 Conservation

5.10.17.1 We have considered the conservation objectives set out in section 6 and 7 of EA95. Our view is that the limits and conditions of the authorisation we intend to issue are sufficient to meet these objectives and that no other requirements are necessary.

5.10.17.2 We have considered our duties under the National Parks and Access to the Countryside Act 1949 and the AWE sites at Aldermaston and Burghfield are not likely to adversely affect any National Parks. We consider that the limits and conditions of the authorisation we intend to issue are sufficient to meet our duties and that no other requirements are necessary.

5.10.17.3 We have considered our duties under section 28G of the Wildlife and Countryside Act 1981. These duties relate to Sites of Special Scientific Interest. There are Sites of Special Scientific Interest near both AWE Aldermaston and AWE Burghfield. We consider that the limits and conditions of the authorisation we intend to issue are sufficient to meet our duties and that no other requirements are necessary.

5.10.17.4 We have considered our duties under section 28I of the Wildlife and Countryside Act 1981. We consider that there are no changes that are likely to damage any of the flora, fauna or geological or physiographical features by reason of which a Site of Special Scientific Interest is of special interest.

5.10.17.5 We have considered our duties under section 85 of the Countryside and Rights of Way Act 2000. Neither AWE Aldermaston nor AWE Burghfield is situated in an Area of Outstanding Natural Beauty. We consider that the limits and conditions of the authorisation we intend to issue are sufficient to meet our duties and that no other requirements are necessary.

5.10.18 Comments during Consultation

5.10.18.1 We received only one comment relating to conservation and habitats during the consultation. One consultee stated that we had made no mention of Wokefield Common as an area with many species of flora and fauna and which "must be within 5 km of this area *(AWE Aldermaston and AWE Burghfield)*". We mentioned those SSSIs that are sited within 5 km of the AWE sites in our consultation document. By ensuring that we have taken account of these we consider that we have also addressed similar, but undesignated areas of environmental concern close to the AWE sites, including Wokefield Common .

5.10.19 Information and Improvement Requirements

5.10.19.1 We have included three standard Information Requirements in our revised certificates of authorisation. These will apply to both AWE Aldermaston and AWE Burghfield and relate to our requirement that operators continue to monitor and review developments that may affect the generation of radioactive wastes. The standard Information Requirements are shown below:

1. The Operator shall provide the Agency with a full report of a comprehensive review of whether the current disposal routes continue to represent the best practicable environmental option for waste disposal from the site, together with a programme for carrying out any necessary changes identified by the review.

2. The Operator shall provide the Agency with a full report of a comprehensive review of national and international developments in best practice for minimising all waste disposals, together with a strategy for achieving reductions in discharges.

3. The Operator shall provide the Agency with a full report of a comprehensive review of the means used to assess the activity of radionuclides in disposals and to determine compliance with this Authorisation including consideration of national and international developments in best practice.

5.10.19.2 AWE plc will have up to three years from the effective date of the revised authorisations in which to provide us with the above information.

5.10.19.3 In addition, and as explained in the section above on aqueous discharges we have required AWE to undertake the following work and provide us with a report within three years of the effective date of the revised authorisations:

> *4. The Operator will investigate the practicality of continued reductions in the generation of aqueous radioactive wastes on site and the on-site re-use of the condensate arising from the operation of the Radioactive Waste Treatment Plant as part of a continued drive towards reduction of aqueous discharges into the environment and provide a full report to the Agency.*
>
> *5. The Operator shall undertake a programme of work to identify the means to minimise radioactive aqueous effluent discharged into the environment by use of the route to the Silchester Sewage Works with the end point of determining whether it will be possible to ensure that the activity concentration of the discharge should be equal to, or less than the World Health Organisation screening levels for Drinking Water.*

5.10.19.4 In order to clarify the Improvement Condition 5 above we have deleted the words “the volume of” from line 2, the word “concentration” after “activity” in line 6 and replaced the words “this waste” in line 6 with “the discharge”. The IC therefore requires AWE Aldermaston to undertake a programme of work to ensure that the activity of trade effluent discharge leaving the AWE Aldermaston Site is equal to or less than WHO screening levels for drinking water.

5.10.19.5 We have included these two Information requirements in order to ensure that AWE continues with the very positive work that has already been carried out to reduce aqueous discharges into the environment.

5.11 Other Matters

5.11.1 Flood Prevention

5.11.1.1.1 One consultee responding to our proposals relating to Warhead Waste being consigned to QinetiQ at Foulness for security controlled disposal and was very concerned about flood defence and the low lying nature of land in that part of Essex. One aspect of concern related to burial of waste on site. This is not authorised and all disposals are by incineration or open-hearth burning.

5.11.1.1.2 We have passed this letter to colleagues in the Environment Agency’s Anglian Region so that they can address matters relating to Flood Prevention.

6 Our decisions

6.1 We have considered the information supplied to us by AWE plc in order for us to undertake this review of discharges and disposals of radioactive wastes from AWE Aldermaston and AWE Burghfield.

6.2 Our initial proposals, as published in our Explanatory Document, have attracted a number of comments. After considering these we have made 12 amendments to the draft certificates provided in our Explanatory Document (ED). These are:

6.2.1 AWE Aldermaston (BZ1994)

Schedule 1
Section 22(1)(b) – deletion of definition for "Licensed Landfill".

Schedule 2
Table - deletion from the Table of the reference for the proposed route for "Very Low Level Waste" and "Transfer to Licensed Landfill for disposal".

Schedule 3
Paragraph 1(a) – removal of "and Table 3".
Paragraph 1(b) – removal of "and Table 3".
Paragraph 2(c) – removal of "Table 3 for Building Group Limits".
Table 2a – the addition of "*" against "Beta emitting radionuclides associated with particulate matter"
Table 2a – the addition of "* excluding Pu-241 and tritides" as a footer and thus denoting the requirement to exclude these from the annual site limit.
Table 3 – deletion of this complete table

Schedule 7
The deletion of Table 5 relating to the disposal of VLLW to Licensed Landfill.

Schedule 9
The words "concentration" and "volume of" have been removed from Improvement Condition 5 and replaced by "this waste" and "the discharge" respectively.

6.2.2 AWE Burghfield (BZ2028)

Schedule 6
Table 3 – Revised Annual Limits as follows:
Uranium – delete "0 GBq", insert "0.9 GBq"
Radium-226 plus Thorium-232 – delete "0 GBq", insert "0.1 GBq"
Other alpha emitters[1] – delete "1 GBq", insert "0 GBq"

After careful consideration we have now issued the revised authorisations, as detailed at Annexes 5a and 5b.

6.3 A summary of our proposed decisions is provided below:

AWE Aldermaston

- A decrease in the annual activity limits for gaseous emissions for alpha emitting radionuclides from 450 kBq to 165 kBq.
- A decrease in the annual activity limits for gaseous emissions for krypton-85 from 1000 GBq to 75 GBq.
- A decrease in the annual activity limits for gaseous emissions for tritium from 170 TBq to 39 TBq.
- The removal of the requirement to report the activity of gaseous plutonium-241 discharged into the environment.
- A clear division by activity limit between volatile and non-volatile beta/gamma emitting radionuclides but with no alteration to the overall existing annual limit of 5 MBq.
- The addition of an annual activity limit of 6 MBq for the disposal of gaseous carbon-14.
- The inclusion of a separate Table 2b in Schedule 3 of the Authorisation Certificate that relates to the use of volatile beta/gamma emitting radionuclides and carbon-14 for work undertaken in support of the Nuclear Non-Proliferation Test Ban Treaty.
- The addition of an annual activity limit of 1GBq for the disposal of gaseous argon-41 arising from operation of the ORION Laser.
- Retention of the authorised route for the disposal of trade waste to the Silchester Sewage Works.
- Reduction in the authorised annual activity limits for the disposal of trade waste to the Silchester Sewage Works for alpha emitters from 40 MBq to 10 MBq, beta/gamma emitters from 120 MBq to 20 MBq and tritium from 50 GBq to 25 GBq.
- An activity notification limit of 30 Bq/l for the tritium concentration in water discharged from the North Ponds Water Management System into the Aldermaston Stream.
- The addition of an annual activity limit of 1 MBq for the radionuclide iodine-129 for disposal to the Low Level Waste Repository.
- The addition of an annual activity limit of 40 MBq (in total) for the radionuclide carbon-14 for transfer to the incinerator operators at Hythe, Hampshire or Knostrop, Leeds.
- Authorisation to dispose of solid and organic radioactive wastes by transfer to the Incinerator Operator at Colnbrook, Berkshire with a maximum annual activity limit of 0.24 TBq for tritium and 40 MBq for carbon-14 and a maximum annual volume limit of 510 cubic metres.
- Authorisation to transfer Warhead Waste directly to the Site Operator at Foulness, Essex or to the same receiver via the AWE Site at Burghfield, Berkshire. Removal of the annual activity limit of 2 MBq for uranium isotopes for transfer to the MOD.
- Authorisation to receive radioactive waste from the Site Operator at Foulness, Essex.

AWE Burghfield

- A decrease in the annual activity limit for gaseous emissions from the Nuclear Licensed Site for alpha emitting radionuclides from 20 kBq to 5 kBq.
- A decrease in the annual activity limit for gaseous emissions from the Nuclear Licensed Site for tritium from 50 GBq to 9 GBq.
- The addition of an annual activity limit of 1 kBq for alpha emitting radionuclides from the Non-Licensed Site in order to allow for decommissioning work to proceed.
- A decrease in the annual volume limit to 300 m^3 from 400 m^3 for aqueous wastes transferred to AWE Aldermaston from the Nuclear Licensed Site. The addition of an annual activity limit of 1 MBq for beta/gamma emitters and of 1 GBq for tritium in these wastes from the Nuclear Licensed Site.
- Authorisation to transfer solid radioactive waste directly to the Low Level Waste Repository via either the operator of Complex B4 and Facilities A50 and A51 on the Winfrith Nuclear Site or the Site Operator at Sellafield if necessary for treatment of wastes by supercompaction. In addition to the existing authorised route via AWE Aldermaston an increase in the annual disposal volume to 600 m^3 from 200 m^3 and activity limits increased for uranium from 0.15 GBq to 1.5 GBq. The annual activity limit for tritium is reduced from 2 GBq to 1.6 GBq.
- Authorisation to transfer Warhead Waste directly to the Site Operator at Foulness, Essex with a reduction in the annual volume authorised from 200 m^3 to 50 m^3. Reduction in annual tritium activity transferred from 3 GBq to 6 MBq and the deletion of an authorised activity for transfer of uranium containing wastes to the MOD.
- Authorisation to receive Warhead Waste from the Site Operator at Foulness, Essex and from AWE Aldermaston.

7 Next steps

7.1 We have carefully considered the responses to our consultation and have prepared this Decision Document setting out our responses to the issues raised by consultees.

7.2 We have prepared certificates of authorisation for the AWE sites at Aldermaston (BZ1994) and Burghfield (BZ2028) and incorporated these into this Decision Document.

7.3 The Secretary of State for Environment, Food and Rural Affairs and the Secretary of State for Health have certain powers under the Radioactive Substances Act 1993 to intervene in our proposed decisions. We have submitted this document to them to assist in their considerations of whether or not to exercise their powers in respect of the applications from AWE plc for the AWE sites at Aldermaston and Burghfield. They have not intervened in the case of our decisions relating to our review of the authorisations to discharge radioactive wastes from the Atomic Weapons establishments at Aldermaston and Burghfield.

7.4 We issued our varied authorisations on 1st February 2007. These authorisations will then become effective on 1st March 2007.

7.5 These Authorisation Certificates enable us to set further detailed requirements, etc, in addition to those specifically laid down in the certificates. To assist the Site Operator these requirements are drawn together in a single document for each AWE site (termed as a "CEAR" - Compilation of Environment Agency Requirements). The CEAR is issued at the time the authorisations come into effect and placed on public registers. We have prepared a CEAR Document for each AWE site.

Annex 1 – Considerations and Process & Information Document key changes

As noted above (Section 2) we commenced our initial review of the AWE RSA93 Authorisations in April 2005 when we publicised our intentions and issued a Process & Considerations Document (P&C Document).

We have revisited the way in which we undertake reviews (and variations). The P&C Document has been replaced with a Process & Information Document (P&I) and a Considerations Document (CD). The P&I Document provides details of the Review Process whilst the CD aims to take into account all relevant issues including legal and policy matters and constraints.

A general description of the conditions of the draft authorisations is provided in the Consideration Document and this is available on the Environment Agency web site at www.environment-agency.gov.uk

No changes to Process & Information documentation have taken place since we started our public consultation on 15 May 2006.

Annex 2 – Relevant correspondence

The following correspondence and documentation is relevant to our Review of the RSA93 Authorisations held by AWE plc for its sites at Aldermaston and Burghfield:

1. Environment Agency - AWE/NRGS/DG/5/4/1/00217/Y dated 1 April 2005. Radioactive Substances Act 1993 - Nuclear Site Authorisation Number: BR8441 (AWE(A)) and BB0531 (AWE(B)) Notification of Review Operator: Atomic Weapons Establishments at Aldermaston and Burghfield.

2. AWE EA 1041N dated 28 November 2005. RSA Applications for AWE at Aldermaston and Burghfield.

3. AWE Report 565/05. Information to Support Proposals for Revised Radioactive Substances Act 1993 Radioactive Waste Discharge & Disposal Authorisations for AWE plc at Aldermaston.

4. AWE Report 566/05. Information to Support Proposals for Revised Radioactive Substances Act 1993 Radioactive Waste Discharge & Disposal Authorisations for AWE plc at Burghfield.

5. AWE Report 380/05. Summary of Data from and Review of the AWE RSA Environmental Monitoring Programme for Radioactivity within and around AWE Sites at Aldermaston and Burghfield.

6. AWE EA 1050R dated 3 January 2006. RSA Authorisation for AWE Aldermaston: Request for Authorisation to Dispose of Iodine-129 to Drigg in Cumbria.

7. AWE EA 1061R dated 3 February 2006. RSA 1993. AWE Aldermaston Discharge Authorisation – ORION Discharges.

8. Explanatory Document and Draft Authorisations to Assist Public Consultation on the Application by AWE plc. Issue 01. May 2006.

9. Food Standards Agency, dated 1 June 2006

10. Health and Safety Executive, NUC 700/50/60/1 P3E28 dated 28 July 2006

11. Department of Health, dated 8 August 2006

12. Department of Health, dated 18 December 2006

13. HSE-NII, dated 4 January 2007

14. Food Standards Agency, dated 2 January 2007

Annex 3 – Places where the Consultation Documents can be viewed, including relevant public registers and list of consultees

Our Consultation Package on the applications made by AWE plc for authorisations to dispose of radioactive wastes from AWE Aldermaston and AWE Burghfield was available for viewing at the following Environment Agency and Local Authority offices:

Public registers where our documents may be found	
West Berkshire District Council	Dorset County Council
Leeds City Council	Purbeck District Council
Slough Borough Council	Hampshire County Council
Copeland District Council	New Forest District Council
Cumbria County Council	Rochford District Council
Essex County Council	Environment Agency offices in Wallingford
Environment Agency offices in Reading	

The following libraries were provided with our Consultation Pack. They have now been provided with a copy of this Decision Document:

Libraries	
Burghfield	Caversham
Hungerford	Reading Central
Lambourn	Palmer Park, Reading
Mortimer	Southcote
Newbury	Tilehurst
Pangbourne	Whitley
Thatcham	Marlborough
Theale	Basingstoke
Battle, Reading	Tadley
Rochford, Essex	Rayleigh, Essex
Hullbridge, Essex	Hockley, Essex
Great Wakering, Essex	

The following organisations and individuals were consulted during our review of AWE plc RSA93 Authorisations:

Statutory consultees	
Heath and Safety Executive, Nuclear Installations Inspectorate	Food Standards Agency
Other organisations being consulted	
English Nature (National)	Food and Drink Federation
Dorset County Council	Health Protection Agency – RPD
Department of Environment, Food and Rural Affairs (Defra)	UKAEA, Winfrith
Department of Health	AEAT plc Winfrith
Department for Transport	British Nuclear Group Sellafield plc
Leeds City Council	Veolia-ES Onyx, Hythe, Southampton
Slough Borough Council	S Grundon (Waste) Ltd, Reading
Copeland District Council	White Rose Environmental, Knostrop, Leeds
Cumbria County Council	QinetiQ, Foulness, Essex
New Forest District Council	Ministry of Defence
Hampshire County Council	Thames Water Utilities Ltd
Purbeck District Council	Nuclear Advisory Group
Rochford District Council	Greenpeace
West Berkshire District Council	Nuclear Free Future
CEFAS	Friends of the Earth (National)
COMARE	Campaign for Nuclear Disarmament
AWE Local Liaison Committee	Nuclear Information Service
Essex County Council	

Annex 4 – List of respondents to the consultation

The following organisations and individuals responded to our consultation:

Consultee	**Consultee**
Food Standards Agency	Nuclear Awareness Group
Nuclear Safety Directorate – Health and Safety Executive	M D Money, Cumbria
Department of Health	The Reverend Hazel Barkham
Health Protection Agency	Ms McClure, Battle Library
UKAEA Harwell	Ms D Botley
Essex County Council	Mr D Money
COMARE	Mr R W Browning
Rochford District Council	Mr C Hunt
Mr James Duddridge, MP	Ms E Elton
AWE plc	Mr P Burt
Nuclear Information Service	Mr JD Wilkins
Mr P Arnold	Mr and Mrs K D Rustman
Mr P and Mrs J Chesterton	

Annex 5 – Certificates of Authorisation to be issued

Annex 5a: AWE Aldermaston BZ1994

ENVIRONMENT AGENCY

RADIOACTIVE SUBSTANCES ACT 1993

CERTIFICATE OF AUTHORISATION
AND
INTRODUCTORY NOTE

DISPOSAL OF RADIOACTIVE WASTE
FROM NUCLEAR SITE

AWE plc

ATOMIC WEAPONS ESTABLISHMENT
ALDERMASTON
READING
BERKSHIRE
RG7 4PR

AUTHORISATION NUMBER BZ1994

INTRODUCTORY NOTE

IN 1. The following Certificate of Authorisation is issued by the Environment Agency under the provisions of Section 13 of the Radioactive Substances Act 1993 ("the Act"). The Authorisation permits the disposal of the specified radioactive wastes from the specified site, subject to limitations and conditions.

IN 2. The Act is concerned with the control of radioactive material and accumulation and disposal of radioactive waste. The requirements of the Act relating to control of radioactive material and accumulation of radioactive waste do not apply to sites Licensed under the Nuclear Installations Act 1965 because these matters are regulated under the terms of the site licence. The conditions attached to this Authorisation are, therefore, concerned only with matters that relate to the disposal of radioactive waste from the Operator at Aldermaston.

IN 3. The certificate authorises the disposal of solid, liquid and gaseous radioactive wastes by AWE plc from the premises of the Atomic Weapons Establishment (AWE) at Aldermaston. The wastes are produced during the production, servicing and disassembly of nuclear warheads, research and development of warhead technology and decommissioning of redundant nuclear process plant. The radioactive wastes principally contain tritium, krypton-85, plutonium-239, plutonium-240, uranium-234, uranium-235, uranium-238, caesium-137, carbon-14, iodine-129 and cobalt-60.

IN 4. The Certificate of Authorisation comprises a signed certificate together with 9 schedules. Schedule 1 contains general conditions that are applicable to all authorised waste types. Schedule 2 specifies the categories of radioactive waste and the disposal routes that are authorised. Schedules 3 to 7 include limitations and conditions on the radionuclides in the waste and the physical nature of the waste streams. Schedule 8 includes limitations and conditions relating to receipt of radioactive waste for disposal from other premises. Schedule 9 specifies information to be supplied and improvements to be carried out.

IN 5. Where limits are specified for “alpha emitters” these are principally plutonium-239 and uranium-234 with smaller contributions from uranium-238, uranium-235, plutonium-238, plutonium-240, plutonium-242, americium-241 and neptunium-237. Where limits are specified for “Beta emitting radionuclides associated with particulate matter” these are principally daughter products and activation products, mainly caesium-137 and cobalt-60. Where limits are specified for “Beta emitting radionuclides (volatile)” these are principally mixed fission products.

IN 6. Solid radioactive wastes arising from the dismantling of assembled nuclear weapons may be categorised as both “solid waste” for disposal to either the Low Level Waste Repository (LLWR) at Drigg or to the Operator of the Incinerators at Hythe, Hampshire; Knostrop, Leeds; and Colnbrook, Berkshire or “Warhead Waste” for disposal to the Site Operator at Foulness, Essex. Limits and conditions relating to “Warhead Waste” in the authorisation are primarily intended to prevent the disposal of other classes of “solid waste” to the Site Operator at Foulness, Essex, the LLWR Site Operator at Drigg or the

Operators of the Incinerators at Hythe, Hampshire; Knostrop, Leeds; and Colnbrook, Berkshire.

IN 7. The Authorisation allows the Agency to place requirements on the Operator to carry out various actions. Details of current requirements, associated specifications and approvals are placed on relevant public registers. Certain information provided by the Operator in response to Certificate requirements will also be placed on the registers.

IN 8. This note does not form part of the Certificate of Authorisation.

RADIOACTIVE SUBSTANCES ACT 1993

Authorisation to Dispose of Radioactive Waste from the Premises of AWE plc on the Nuclear Site at Aldermaston

AWE plc

Certificate Reference Number BZ1994

This certifies that the Environment Agency in exercise of its powers under Sections 16(2), 16(8) and 17(2) of the Radioactive Substances Act 1993 ("the Act") has authorised

AWE plc
(Company Registration No 2763902)
("the Operator")

whose Registered Office is

The Atomic Weapons Establishment
Aldermaston, Reading
Berkshire, RG7 4PR

under Sections 13(1) and 13(3) of the Act to dispose of radioactive waste from its premises which are on the AWE plc site at

Aldermaston in Berkshire

subject to the limitations and conditions in the Schedules to this Certificate of Authorisation.

This Authorisation shall come into effect on

Signed .....

S D Chandler
Authorised to sign on behalf of the Environment Agency

Dated the .....

Schedule 1

GENERAL LIMITATIONS AND CONDITIONS

DISPOSAL

1. The Operator shall use the best practicable means to minimise the activity of radioactive waste produced on the site that will require disposal under this Authorisation.

2. The Operator shall use the best practicable means to:

   (a) minimise the activity of gaseous and aqueous radioactive waste disposed of by discharge to the environment;

   (b) minimise the volume of radioactive waste disposed of by transfer to other premises;

   (c) subject to paragraph 5 in this Schedule, dispose of radioactive waste at times, in a form, and in a manner so as to minimise the radiological effects on the environment and members of the public;

   where the relevant waste types and disposal routes are specified in the Table in Schedule 2.

3. The Operator shall maintain in good repair the systems and equipment provided:

   (a) to meet the requirements of paragraphs 1 and 2 in this Schedule;

   (b) for the disposal of radioactive waste.

4. The Operator shall check, at an appropriate frequency, the effectiveness of systems, equipment and procedures provided:

(a) to meet the requirements of paragraphs 1 and 2 in this Schedule;

(b) for the disposal of radioactive waste.

5. If required by the Agency, the Operator shall only dispose of radioactive waste at such times, in such a form and in such a manner as the Agency specifies.

MANAGEMENT

6. The Operator shall:

   (a) have a management system, organisational structure and resources which are sufficient to achieve compliance with the limitations and conditions of this Authorisation and which include:

      (i) written arrangements specifying how the Operator will achieve compliance with each limitation and condition of this authorisation, to include arrangements for control of

modifications to the design and operation of systems and equipment;

(ii) provision for consultation with such suitable RPAs, or other such qualified experts approved by the Agency in writing, as are necessary for the purpose of advising the Operator as to compliance with the limitations and conditions of this Authorisation and, in particular, on the matters addressed in paragraphs 1, 2, 4, 12 and 13 in this Schedule;

(iii) written Environmental Operating Rules and operating instructions;

(iv) a written maintenance schedule and instructions;

(v) adequate supervision of the disposal of radioactive waste by suitably qualified and experienced persons, whose names shall be clearly displayed with each copy of the Certificate of Authorisation that is posted on the premises as required by Section 19 of the Act;

(vi) adequate supervision by suitably qualified and experienced persons of the operation and maintenance of the systems and equipment provided to meet the requirements of paragraphs 1 and 2 in this Schedule and for the disposal of radioactive waste;

(vii) internal audit and review of the Operator's management system;

(b) inform the Agency in writing, at least 28 days or such shorter period agreed by the Agency before the first disposal of radioactive waste is made under the terms of this Authorisation, of the organisational structure and resources, together with such parts of the management system as the Agency specifies, provided to achieve compliance with the limitations and conditions of the Authorisation;

(c) inform the Agency, at least 28 days in advance or, where this is not possible, without delay, of any change in the management system, organisational structure or resources, which might have, or might reasonably be seen to have, a significant impact on how compliance with the limitations and conditions of this Authorisation is achieved.

SAMPLING, MEASUREMENTS, TESTS, SURVEYS AND CALCULATIONS

7. The Operator shall take samples and conduct measurements, tests, surveys, analyses and calculations to determine compliance with the limitations and conditions of this Authorisation.

8. The Operator shall use the best practicable means when taking samples and conducting measurements, tests, surveys, analyses and calculations to determine compliance with the limitations and conditions of this Authorisation, unless particular means are specified in this Authorisation.

9. If required by the Agency, the Operator shall take such samples and conduct such measurements, tests, surveys, analyses and calculations, including environmental measurements and assessments, at such times and using such methods and equipment as the Agency specifies.

10. If required by the Agency, the Operator shall, as the Agency specifies:

(a) keep samples;

(b) provide samples;

(c) dispatch samples for tests at a laboratory and ensure that the samples or residues thereof are collected from the laboratory within three months of receiving written notification that testing and repackaging in accordance with the appropriate transport regulations are complete.

11. The Operator shall maintain, in good repair, systems and equipment provided for:

(a) carrying out any monitoring and measurements necessary to determine compliance with the limitations and conditions of this Authorisation;

(b) measuring and assessing exposure of members of the public and radioactive contamination of the environment.

12. The Operator shall have and comply with appropriate criteria for the acceptance into service of systems, equipment and procedures for:

(a) carrying out any monitoring and measurements necessary to determine compliance with the limitations and conditions of this Authorisation;

(b) measuring and assessing exposure of members of the public and radioactive contamination of the environment.

13. The Operator shall carry out:

(a) regular calibration, at an appropriate frequency, of systems and equipment provided for:

(i) carrying out any monitoring and measurements necessary to determine compliance with the limitations and conditions of this Authorisation;

(ii) measuring and assessing exposure of members of the public and radioactive contamination of the environment;

(b) regular checking, at an appropriate frequency, that such systems and equipment are serviceable and correctly used.

RECORDS

14. The Operator shall, subject to paragraph 18 in this Schedule:

(a) make and retain records sufficient to demonstrate whether the limitations and conditions of this Authorisation are complied with;

(b) retain records made in accordance with any previous Authorisation issued to the Operator and related to the premises covered by this Authorisation;

(c) retain records transferred to the Operator by any predecessor operator which were made in accordance with any previous Authorisation related to the premises covered by this Authorisation.

15. The Operator, not later than 14 days after the end of each month or within such longer period as the Agency may approve in writing, shall in respect of all disposals of radioactive waste made during that month:

(a) make a record of each measurement, analysis, test and survey conducted for the purpose of this Authorisation in relation to those disposals;

(b) make a record which shows clearly and legibly:

(i) the type of waste and the disposal route;

(ii) the name of each radionuclide or group of radionuclides, specified in the relevant Table in the relevant Schedule, which is present;

(iii) the activity of each such radionuclide or group of radionuclides per cubic metre of the waste, unless otherwise agreed in writing by the Agency;

(iv) for LLWR waste, the activity of each such radionuclide or group of radionuclides per tonne of the waste, unless otherwise agreed in writing by the Agency;

(v) the total activity of each such radionuclide or group of radionuclides;

(vi) the total volume in cubic metres, unless otherwise agreed in writing by the Agency;

(vii) for LLWR waste, the total mass in tonnes;

(viii) the date and time on which, or period during which, the disposal took place;

(ix) any other information the Agency may specify.

16. If the Operator amends any record made in accordance with this Authorisation it shall ensure that the original entry remains clear and legible.

17. The Operator shall keep the records referred to in paragraph 15 in this Schedule in a manner and place approved by the Agency.

18. The Operator shall retain the records referred to in paragraphs 14 and 15 in this Schedule until notified in writing by the Agency that the records no longer need to be retained.

PROVISION OF INFORMATION

19. The Operator shall supply such information in such format and within such time as the Agency may specify.

20. The Operator shall inform the Agency in writing, at least 14 days before the first disposal of radioactive waste is made under the terms of this Authorisation, of the techniques being employed to determine the activity of radioactive waste disposals and shall inform the Agency in writing in advance of any modifications to those techniques.

21. The Operator shall inform the Agency without delay if the Operator has reason to believe that disposal of radioactive waste is occurring, has occurred or might occur which does not comply with the limitations and conditions of this Authorisation, and shall report the circumstances in writing to the Agency as soon as practicable thereafter.

INTERPRETATION

22. (1) In this Certificate of Authorisation:

(a) except where otherwise specified, words and expressions defined in the Radioactive Substances Act 1993 shall have the same meanings when used in this Certificate of Authorisation as they have in that Act;

"activity", expressed in becquerels, means the number of spontaneous nuclear transformations occurring in a period of one second;

"the Agency" means the Environment Agency;

"aqueous waste" means radioactive waste in the form of a continuous aqueous phase together with any entrained solids, gases and non-aqueous liquids;

"Authorisation" means an authorisation issued under the Radioactive Substances Act 1993 or the Radioactive Substances Act 1960;

"best practicable environmental option" means the radioactive waste management option, for a given practice, that provides the most benefit or least damage to the environment as a whole in the long term as well as in the short term, taking into account operational doses and risks, and social and economic factors;

"Bq, kBq, MBq, GBq, TBq and PBq" are used as abbreviations meaning becquerels, kilobecquerels, megabecquerels, gigabecquerels, terabecquerels and petabecquerels respectively;

"calendar year" means a period of 12 consecutive months beginning on 1 January;

"consignment" means an individual shipment of radioactive waste not greater in volume than 40 cubic metres or such volume as specified in writing by the Agency;

"environment" means all, or any, of the media of air, water (to include sewers and drains) and land;

"Environmental Operating Rule" means a mandatory restriction on operation, established by the Operator, which is necessary to ensure compliance with this Authorisation;

"gaseous waste" means radioactive waste in the form of gases and associated mists and particulate matter;

“Low Level Waste Repository Operator” means the current holder of the licence issued under the Nuclear Installations Act 1965 for the Low Level Waste Repository at Drigg;

" Low Level Waste Repository Waste (LLWR Waste)" means solid radioactive waste, including any immediate package, intended by the Operator for final disposal at the Low Level Waste Repository at Drigg;

"maintenance instructions" means instructions for carrying out any maintenance that may have an effect on compliance with this Authorisation;

"maintenance schedule" means a programme for maintenance of all systems and equipment that contribute to achieving compliance with this Authorisation;

"month" means calendar month (ie 1-31 January, 1-28/29 February, 1-31 March, etc.);

"operating instructions" means instructions for carrying out any operation that may have an effect on compliance with this Authorisation;

"organic liquid waste" means radioactive waste in the form of liquid, not being aqueous waste, containing one or more organic chemical compounds;

"package" includes any sack, drum, container or wrapping;

"quarter" means any period of three consecutive months;

“RPA” means a Radiation Protection Adviser appointed under Regulation 13 of the Ionising Radiations Regulations 1999;

"samples" includes samples that have been prepared or treated to enable measurements of activity to be made;

"Schedule" means a Schedule forming part of this Certificate of Authorisation;

“Sellafield Site Operator” means the current holder of the licence issued under the Nuclear Installations Act 1965 for the Sellafield Site;

"week" means a period of 7 consecutive days commencing at a day and time to be notified in writing to the Agency by the Operator at least 14 days before any disposal of radioactive waste is made under

the terms of this Authorisation, any subsequent change being notified in writing to the Agency at least 7 days in advance;

"year" means any period of 12 consecutive months;

(b) Other Site Specific Definitions:

"Aldermaston Site" means those premises occupied by AWE plc at Aldermaston in Berkshire and is known as the Atomic Weapons Establishment Aldermaston which are situated on a site in respect of which a nuclear site licence is in force, and includes in addition the Burning Grounds at the Northeast quadrant of the site that lies outwith the Nuclear Licensed Site boundary;

"Foulness Site Operator, Essex" means the holder of an authorisation under section 13 of the Radioactive Substances Act 1993 to dispose of radioactive waste of that description at Foulness, Essex;

"Incinerator Operator at Hythe" means the holder of an authorisation under section 13 of the Radioactive Substances Act 1993 to dispose of radioactive waste of that description by burning it at an incinerator at Hythe, Hampshire;

"Incinerator Operator at Knostrop, Leeds" means the holder of an authorisation under section 13 of the Radioactive Substances Act 1993 to dispose of radioactive waste of that description by burning it at an incinerator at Knostrop, Leeds;

"Incinerator Operator at Colnbrook, Berkshire" means the holder of an authorisation under section 13 of the Radioactive Substances Act 1993 to dispose of radioactive waste of that description by burning it at an incinerator at Colnbrook, Berkshire;

"liquid mercury waste" means radioactive waste in the form of liquid mercury;

"warhead waste" means radioactive waste in the form of a solid containing explosives, foams, plastics, rubbers, salts or metal arising from the dismantling of assembled nuclear warheads;

"Winfrith Nuclear Site" means the site at Winfrith, Dorset for which a licence has been issued under the Nuclear Installations Act 1965;

(2) In this Certificate of Authorisation the Interpretation Act 1978 shall apply as it does to an Act of Parliament and in particular words in the singular include the plural and words in the plural include the singular.

(3) (a) In determining whether particular means are the "best practicable" for the purposes of this Authorisation, the Operator shall not be required to incur expenditure whether in money, time or trouble which is, or is likely to be, grossly disproportionate to the benefits to be derived from, or likely to be derived from, or the efficacy of, or likely efficacy of,

employing them, the benefits or results produced being, or likely to be, insignificant in relation to the expenditure.

(b) Where reference is made to the use of "best practicable means" in this Certificate of Authorisation, the means to be employed shall include:

(i) the provision, maintenance and manner of operation of any relevant plant, machinery or equipment;

(ii) the supervision of any relevant operation.

Schedule 2

AUTHORISED RADIOACTIVE WASTE TYPES AND DISPOSAL ROUTES

1. Subject to paragraph 2 in this Schedule, the Operator is authorised to dispose only of the radioactive waste types identified in the Table in this Schedule and only by the relevant disposal routes specified in the Table.

2. The Operator may dispose of radioactive waste, not being waste otherwise authorised to be disposed of, which is collected as a result of the user's participation in the National Arrangements for Incidents involving Radioactivity provided that the Operator:

   (a) transfers the waste to a person whom the Environment Agency has agreed in writing may receive that waste;

   (b) as soon as practicable provides available details in writing of the nature of the radioactive waste, the radionuclides present, their activities and the manner and date of disposal.

Table – Authorised Waste Types and Disposal Routes

Radioactive waste type	Disposal Route
Gaseous Waste	Discharge to the environment
Aqueous Waste	Discharge to the Public Sewer at AWE Aldermaston
	Discharge to the Aldermaston Stream at AWE Aldermaston
Organic Liquid Waste	Transfer to the Incinerator Site Operator at Hythe in Southampton for the purpose of disposal by incineration at that site
	Transfer to the Incinerator Site Operator at Knostrop, Leeds for the purpose of disposal by incineration at that site
	Transfer to the Incinerator Site Operator at Colnbrook, Berkshire for the purpose of disposal by incineration at that site
Solid Waste	Transfer to the Incinerator Site Operator at Hythe, Hampshire for the purpose of disposal by incineration at that site
	Transfer to the Incinerator Site Operator at Knostrop, Leeds for the purpose of disposal by incineration at that site
	Transfer to the Incinerator Site Operator at Colnbrook, Berkshire for the purpose of disposal by incineration at that site
	Transfer, for the purpose of treatment prior to final disposal at the LLWR at Drigg, to the person operating Complex B4 and Facilities A50 and A51 on the Winfrith Nuclear Site.
	Transfer to the Sellafield Site Operator at Sellafield for the purpose of final disposal at the LLWR at Drigg
	Transfer to the LLWR Site Operator at Drigg for the purpose of final disposal at the site.
Liquid Mercury Waste	Transfer, for the purpose of treatment, to the person operating Complex B4 and Facilities A50 and A51 on the Winfrith Nuclear Site.
Warhead Waste	Transfer to the Site Operator at Foulness, Essex for the purpose of security controlled disposal at that site
	Transfer to AWE Burghfield

Schedule 3

LIMITATIONS AND CONDITIONS RELATING TO DISPOSAL OF RADIOACTIVE GASEOUS WASTE BY DISCHARGE TO THE ENVIRONMENT

1. The Operator shall:

   (a) only discharge radioactive gaseous waste to the environment by means of the outlets identified in Table 1 in this Schedule and such other outlets as the Agency may approve in writing.

   (b) not discharge radioactive gaseous waste through any outlet identified in Table 1 in this Schedule that the Agency has notified in writing is not to be used.

2. The Operator shall not in any year discharge gaseous waste in which the activity of any radionuclide or group of radionuclides specified in the Tables in this Schedule exceeds the relevant Annual Limit:

   (a) Table 2a for discharges associated with the operation of the site;
   (b) Table 2b for supplementary discharges associated with Nuclear Non-Proliferation Treaty work.

3. If, in any quarter, the activity in gaseous waste discharged of any radionuclide or group of radionuclides specified in Table 2a in this Schedule exceeds, or is likely to exceed, the relevant Quarterly Notification Level (where specified), the Operator shall provide the Agency with a written submission which includes:

   (a) details of the occurrence;

   (b) a description of the means used to minimise the activity of gaseous waste discharged;

   (c) a review of those means having regard to paragraphs 1 and 2 in Schedule 1;

   not later than 14 days from making the record which demonstrates such excess.

4. For the purposes of demonstrating compliance with the limitations and conditions of this Authorisation relating to " beta/gamma emitting radionuclides associated with particulate matter" and "alpha emitting radionuclides associated with particulate matter" in gaseous waste the Operator shall measure the gross beta and alpha activity of all particulate samples collected for these purposes, after an appropriate period for decay of radon daughters, by using suitable sample preparation methods and suitable counting systems which have been agreed in writing by the Agency.

Table 1 – AWE Aldermaston - Authorised Gaseous Discharge Outlets

Authorised gaseous discharge outlets
Group A: Such stacks or outlets associated with discharges from Facilities Engaged Completely or Principally in Decommissioning Operations in buildings: A, B, C, D, G2 and G3 and other minor facilities as approved in writing beforehand by the Agency.
Group B: Such stacks or outlets associated with discharges from Facilities Engaged Completely or Principally in Support of Production and Capability in buildings AB9, G1, L, N1 and P and other minor facilities as approved in writing beforehand by the Agency.
Group C: Such stacks or outlets associated with discharges from Facilities Engaged Completely or Principally in Research and Development in buildings: AB19, AB21, I, J and K and other minor facilities as approved in writing beforehand by the Agency.
Group D: Such stacks or outlets associated with discharges from Facilities Engaged Completely or Principally in Waste Management Operations in buildings: AB25, F1, and M and other minor facilities as approved in writing beforehand by the Agency.
Group E: Such stacks or outlets associated with discharges from Facilities expected to Commence Operation during the Lifetime of this Authorisation in the following buildings: Enriched Uranium Facility, Hydrodynamics Facility, Orion Laser Facility, Additional Tritium Facility and other new minor facilities as approved in writing beforehand by the Agency.

Table 2a – AWE Aldermaston Site Gaseous Annual Activity and Quarterly Notification Levels

Radionuclide	Annual Site Activity Limit	Site Quarterly Notification Level
Alpha emitters	165 kBq	NA
Beta emitting radionuclides associated with particulate matter*	600 kBq	NA
Krypton-85	75 GBq	15 GBq
Total Tritium	39 TBq	8 TBq
Argon-41	1 GBq	NA

* excluding Pu-241 and tritides

Table 2b – AWE Aldermaston Site Gaseous Annual Activity Limits – Supplementary Work associated with the Nuclear Non-Proliferation Treaty

Radionuclide	Annual Site Activity Limit
Beta emitting radionuclides (volatile)	4.4 MBq
Carbon-14	6 MBq

Schedule 4

LIMITATIONS AND CONDITIONS RELATING TO DISPOSAL OF RADIOACTIVE AQUEOUS WASTE BY DISCHARGE TO THE ENVIRONMENT

1. The Operator shall:

   (a) only discharge radioactive aqueous waste to the environment through the systems specified in Table 1 in this Schedule and such other systems as the Agency may approve in writing.

   (b) not discharge radioactive aqueous waste through any system identified in Table 1 to this Schedule that the Agency has notified in writing is not to be used.

2. The Operator shall use the best practicable means to exclude all entrained solids, gases and non-aqueous liquids from radioactive aqueous waste prior to discharge to the environment.

3. The Operator shall not in any year discharge aqueous waste through any system or group of systems specified in Table 1 in this Schedule in which the activity of any radionuclide or group of radionuclides specified in Table 2 exceeds the relevant Annual Limit.

4. If, in any quarter, the activity in aqueous waste discharged through any system or group of systems specified in Table 2 in this Schedule of any radionuclide or group of radionuclides specified exceeds the relevant Quarterly Notification Level, the operator shall provide the Agency with a written submission which includes:

   (a) details of the occurrence;

   (b) a description of the means used to minimise the activity of aqueous waste discharged;

   (c) a review of those means having regard to paragraphs 1 and 2 in Schedule 1;

   not later than 14 days from making the record which demonstrates such excess.

5. If the activity of any radionuclide or group of radionuclides specified in Table 3 in this Schedule exceeds the relevant Activity Notification Level for aqueous waste discharged through any system or group of systems specified, the operator shall provide the Agency with a written submission which includes details of the occurrence not later than 14 days from making the record which demonstrates such excess.

6. For the purposes of demonstrating compliance with the limitations and conditions of this Authorisation relating to " beta/gamma emitting radionuclides" and "alpha emitting radionuclides" in aqueous waste the Operator shall measure the gross beta and alpha activity of all samples collected for these purposes by using suitable sample preparation methods and suitable counting systems which have been agreed in writing by the Agency.

Table 1 – Authorised Aqueous Discharge Systems

Authorised aqueous discharge systems
From the Aldermaston site into the public sewer. ("System 1")
System provided by the Operator for the discharge of aqueous radioactive waste from the North Ponds Water Management System situated on the Aldermaston site into the Aldermaston Stream at AWE Aldermaston. ("System 2")

Table 2 – System 1 - AWE Aldermaston Discharge to the Public Sewer

Radionuclide or Group of radionuclides	Annual limit	Quarterly notification level
Alpha emitters	10 MBq	2 MBq
Tritium	25 GBq	5 GBq
Other beta emitters	20 MBq	4 MBq

Table 3 – System 2 - AWE Aldermaston Discharge to the Aldermaston Stream

Radionuclide or Group of radionuclides	Activity notification level Bq l^{-1}
Tritium	30 Bq/litre

Schedule 5

LIMITATIONS AND CONDITIONS RELATING TO DISPOSAL OF RADIOACTIVE WASTE BY INCINERATION ON THE PREMISES

1. Disposal of radioactive waste by incineration on the premises is not authorised.

Schedule 6

LIMITATIONS AND CONDITIONS RELATING TO THE DISPOSAL OF RADIOACTIVE WASTE BY TRANSFER FOR THE PURPOSE OF FINAL DISPOSAL AT THE LLWR AT DRIGG

1. The Operator shall not:

   (a) transfer any consignment of LLWR Waste in which the activity of alpha emitting radionuclides exceeds 4 gigabecquerels per tonne or the activity of all other radionuclides exceeds 12 gigabecquerels per tonne;

   (b) in any calendar year transfer LLWR Waste in which, in total, the activity of any radionuclide or group of radionuclides listed in Table 1 in this Schedule exceeds the relevant Annual Limit;

   (c) in any calendar year transfer LLWR Waste in which, in total, the volume of the waste exceeds the Annual Limit specified in Table 2 in this Schedule.

2. The Operator shall not transfer LLWR Waste:

   (a) unless it has been treated or packaged in such a way as to render it, so far as is reasonably practicable, insoluble in water and not readily flammable;

   (b) which contains any of the following materials, unless otherwise agreed in writing by the Agency:

      (i) metals and other materials which readily react either with water or air with the evolution of heat or flammable gases;

      (ii) explosive materials;

      (iii) liquids with flashpoint less than 21 °C absorbed on solid materials;

      (iv) strong oxidising agents;

      (v) pressurised gas cylinders or pressurised aerosol containers;

      (vi) materials which generate or are capable of generating toxic gases, vapours or fumes harmful to persons handling the waste;

      (vii) chemical complexing or chelating agents.

3. The Operator shall ensure that the transfer of LLWR Waste is in accordance with the directions of the person to whom the waste is transferred.

4. The Operator shall:

   (a) ensure that the person to whom LLWR Waste is transferred receives, at the time of transfer of each consignment, a clear and legible note signed on the Operator's behalf stating:

(i) that the activity of alpha emitting radionuclides in the consignment does not exceed 4 gigabecquerels per tonne and that the activity of all other radionuclides does not exceed 12 gigabecquerels per tonne;

(ii) the total activity in the consignment of each radionuclide or group of radionuclides listed in Table 1 in this Schedule;

(b) obtain a record signed on behalf of the person to whom LLWR Waste is transferred, at the time of transfer, stating that the transfer has taken place.

5. If required by the Agency, the Operator shall ensure that any consignment or part of any consignment of LLWR Waste found, following transfer, not to be in accordance with the limitations and conditions of this Authorisation:

(a) is packaged in accordance with the appropriate transport regulations;

(b) is returned as soon as is reasonably practicable to the Aldermaston site.

Table 1 – AWE Aldermaston - Annual Activity Limits for the Disposal of Radioactive Waste by Transfer For the Purpose of Final Disposal at the Low Level Waste Repository at Drigg

Radionuclide or group of radionuclides	Annual limit
Uranium	55 GBq
Radium-226 plus Thorium-232	0.03 GBq
Other alpha emitters [1]	120 GBq
Carbon-14	0.03 GBq
Iodine-129	1 MBq
Tritium	400 GBq
Cobalt-60	30 GBq
Other radionuclides [2]	230 GBq

1 "other alpha emitters" means alpha emitting radionuclides with half-lives greater than three months excluding uranium, radium-226 and thorium-232

2 "other radionuclides" means:
(a) iron-55 and beta emitting radionuclides with half-lives greater than three months unless individually specified in this Table and
(b) any other radionuclides specified in writing by the Agency

Table 2 – AWE Aldermaston - Annual Volume Limit for the Disposal of Radioactive Waste by Transfer For the Purpose of Final Disposal at the Low Level Waste Repository at Drigg

Annual limit, cubic metres
4000

Schedule 7

LIMITATIONS AND CONDITIONS RELATING TO DISPOSAL OF RADIOACTIVE WASTE BY TRANSFER TO OTHER PREMISES

1. The Operator shall not in any calendar year transfer radioactive waste to a person specified in Tables 1 and Tables 3 to 4 in this Schedule in which, in total:

   (a) the activity of any relevant radionuclide or group of radionuclides exceeds the relevant Annual Activity Limit; or

   (b) the volume of the waste and its immediate packaging exceeds the relevant Annual Volume Limit.

2. The Operator shall not in any calendar year transfer radioactive waste for disposal by incineration where the activity of any relevant radionuclide or group of radionuclides exceeds the relevant Annual Activity Limit or the volume of the waste and its immediate packaging exceeds the relevant Annual Volume Limit in Table 2 in this Schedule.

3. The Operator shall ensure that the transfer of radioactive waste is in accordance with the directions of the person to whom the waste is transferred.

4. The Operator shall:

   (a) ensure that the person to whom waste is transferred receives at the time of transfer of each consignment a clear and legible note signed on the Operator's behalf stating the total activity in the consignment of each relevant radionuclide or group of radionuclides listed in the Tables in this Schedule;

   (b) obtain a record signed on behalf of the person to whom waste is transferred, at the time of transfer, stating that the transfer has taken place.

5. If required by the Agency, the Operator shall ensure that any consignment or part of any consignment of waste found, following transfer, not to be in accordance with the limitations and conditions of this Authorisation:

   (a) is packaged in accordance with the appropriate transport regulations;

   (b) is returned as soon as is reasonably practicable to the AWE Aldermaston Site.

Table 1 – AWE Aldermaston - Waste Disposal by Transfer for Incineration

Person to whom the waste may be transferred	Radionuclide or group of radionuclides	Annual Activity Limit	Annual Volume Limit (cubic metres)
The Incinerator Site Operator at Hythe, Hants	Alpha	60 MBq	1050
	Tritium	0.82 TBq	
	Carbon –14	40 MBq	
The Incinerator Site Operator at Knostrop, Leeds	Tritium	0.82 TBq	510
	Carbon –14	40 MBq	
The Incinerator Site Operator at Colnbrook, Berks	Tritium	0.24 TBq	510
	Carbon –14	40 MBq	

Table 2 - AWE Aldermaston - Annual Total Volume and Total Activity Limits for Transfer for Incineration to Operators specified in Table 1

Radionuclide or Group of Radionuclides	Annual Activity Limit	Annual Volume Limit (cubic metres)
Alpha emitters	60 MBq	1050
Tritium	0.82 TBq	
Carbon-14	40 MBq	

Table 3 – AWE Aldermaston - Transfers of Waste Mercury

Person to whom the waste may be transferred	Radionuclide or group of radionuclides	Annual Activity Limit	Annual Volume Limit (cubic metres)
Transfer, for the purpose of treatment to the person operating Complex B4 and Facilities A50 and A51 on the Winfrith Nuclear Site	Alpha emitters	12 GBq	3
	Plutonium – 241	48 GBq	
	Tritium	1 GBq	
	Other Radionuclides	24 GBq	

Table 4 – AWE Aldermaston - Transfers of Warhead Waste

Person to whom the waste may be transferred	Radionuclide or group of radionuclides	Annual Activity Limit	Annual Volume Limit (cubic metres)
The Site Operator at Foulness, Essex AWE Burghfield	Tritium	300 MBq	50

Schedule 8

LIMITATIONS AND CONDITIONS RELATING TO RECEIPT OF RADIOACTIVE WASTE FOR DISPOSAL FROM OTHER PREMISES

1. The operator shall not receive radioactive waste from premises other than those specified in this Schedule.

Table

Premises from which radioactive waste may be received
AWE plc Atomic Weapons Establishment Burghfield
AWE plc Atomic Weapons Establishment Blacknest
The Site Operator, Foulness, Essex
Waste received as a result of participation in the NAIR Scheme
Other premises approved in writing by the Agency

Schedule 9

IMPROVEMENT AND ADDITIONAL INFORMATION REQUIREMENTS

1. The Operator shall complete the requirements specified in the Table in this Schedule by the relevant completion date and, where relevant, shall notify the Agency, in writing, within 14 days of the completion of each of these requirements.

Requirement	Completion Date
1. The Operator shall provide the Agency with a full report of a comprehensive review of whether the current disposal routes continue to represent the best practicable environmental option for waste disposal from the site, together with a programme for carrying out any necessary changes identified by the review.	3 years from the effective date of this Authorisation and at such intervals thereafter as the Agency specifies in writing.
2.The Operator shall provide the Agency with a full report of a comprehensive review of national and international developments in best practice for minimising all waste disposals, together with a strategy for achieving reductions in discharges.	3 years from the effective date of this Authorisation and at such intervals thereafter as the Agency specifies in writing.
3.The Operator shall provide the Agency with a full report of a comprehensive review of the means used to assess the activity of radionuclides in disposals and to determine compliance with this Authorisation including consideration of national and international developments in best practice.	3 years from the effective date of this Authorisation and at such intervals thereafter as the Agency specifies in writing.
4. The Operator will investigate the practicality of continued reductions in the generation of aqueous radioactive wastes on site and the on-site re-use of the condensate arising from the operation of the radioactive Waste Treatment Plant as part of a continued drive towards reduction of aqueous discharges into the environment and provide a full report to the Agency.	2 years from the effective date of this Authorisation.
5. The Operator shall undertake a programme of work to identify the means to minimise the radioactive aqueous effluent discharged into the environment by use of the route to the Silchester Sewage Works with the end point of determining whether it will be possible to ensure that the activity of the discharge should be equal to, or less than the World Health Organisation screening levels for Drinking Water.	Within 2 years from the effective date of this Authorisation

Annex 5b: AWE Burghfield BZ2028

ENVIRONMENT AGENCY

RADIOACTIVE SUBSTANCES ACT 1993

CERTIFICATE OF AUTHORISATION
AND
INTRODUCTORY NOTE

DISPOSAL OF RADIOACTIVE WASTE
FROM

AWE plc

ATOMIC WEAPONS ESTABLISHMENT
THE MEARINGS
BURGHFIELD
READING
BERKSHIRE
RG3 3PR

AUTHORISATION NUMBER BZ2028

INTRODUCTORY NOTE

IN 1. The following Certificate of Authorisation is issued by the Environment Agency under the provisions of Section 13 of the Radioactive Substances Act 1993 ("the Act"). The Authorisation permits the disposal of the specified radioactive wastes from the specified site, subject to limitations and conditions.

IN 2. The Act is concerned with the control of radioactive material and accumulation and disposal of radioactive waste. The requirements of the Act relating to control of radioactive material and accumulation of radioactive waste do not apply to sites Licensed under the Nuclear Installations Act 1965 because these matters are regulated under the terms of the site licence. However, the AWE Burghfield site consists of an area Licensed under the Nuclear Installations Act 1965 and a much larger area that is not Licensed under the Act, but where radioactive waste is accumulated and from which it is disposed of by transfer to other sites and by burning on site. The conditions attached to this Authorisation are, therefore, concerned with matters that relate to the disposal of radioactive waste from the Operator's Nuclear Site at Burghfield and the accumulation on and disposal of radioactive waste from the Operator's Non-Licensed Site at Burghfield.

IN 3. The certificate authorises the accumulation and disposal of solid and liquid radioactive wastes and the disposal of gaseous radioactive wastes by AWE plc from the premises of the Atomic Weapons Establishment (AWE) at Burghfield. The wastes are produced during the assembly, servicing and disassembly of nuclear warheads and decommissioning of redundant nuclear process plant. The radioactive wastes principally contain tritium, uranium-234, uranium-235 and uranium-238.

IN 4. The Certificate of Authorisation comprises a signed certificate together with 10 Schedules. Schedule 1 contains general conditions that are applicable to all authorised waste types. Schedule 2 specifies the categories of radioactive waste and the disposal routes and accumulations that are authorised. Schedules 3 to 8 include limitations and conditions on the radionuclides in the waste and the physical nature of the waste streams. Schedule 9 includes limitations and conditions relating to receipt of radioactive waste for disposal from other premises. Schedule 10 specifies information to be supplied and improvements to be carried out.

IN 5. Solid radioactive wastes arising from the dismantling of assembled nuclear weapons may be categorised as both "solid waste" for transfer to AWE plc at Aldermaston (before ultimate disposal by transfer to other recipients) or for direct transfer to the Low Level Waste Repository (LLWR) Site Operator at Drigg or may be categorised as "Warhead Waste" for disposal to the Site Operator at Foulness, Essex. Limits and conditions relating to "Warhead Waste" in the authorisation are primarily intended to prevent the disposal of other classes of "solid waste" to the Site Operator at Foulness, Essex.

IN 6. The Authorisation allows the Agency to place requirements on the Operator to carry out various actions. Information concerning the name, function and operation of individual nuclear facilities at the Atomic Weapons Establishment

is subject to National Security restrictions. Details of requirements placed on AWE and associated specifications and approvals are held by the Agency.

IN 7 This note does not form part of the Certificate of Authorisation.

RADIOACTIVE SUBSTANCES ACT 1993

Authorisation to Accumulate and Dispose of Radioactive Waste from the Premises of AWE plc at Burghfield

AWE plc
Certificate Reference Number BZ2028

This certifies that the Environment Agency in exercise of its powers under Sections 16(2), 16(8) and 17(2) of the Radioactive Substances Act 1993 ("the Act") has authorised

AWE plc
(Company Registration No 2763902)
("the Operator")

whose Registered Office is

The Atomic Weapons Establishment
Aldermaston, Reading
Berkshire, RG7 4PR

a. for the nuclear licensed site under Sections 13(1) and 13(3) of the Act to dispose of radioactive waste
and
b. for the non-licensed site under sections 13(1), 13(3) and 14 of the Act, to accumulate the radioactive waste specified in paragraph 3 of Schedule 2 to this certificate on the premises (with a view to its subsequent disposal) and to dispose of the radioactive waste specified in paragraph 1 of Schedule 2 to this certificate,

from the premises which are on the AWE plc site at

Burghfield in Berkshire

subject to the limitations and conditions in the Schedules to this Certificate of Authorisation.

This Authorisation shall come into effect on:

Signed .....

S D Chandler
Authorised to sign on behalf of the Environment Agency
Dated the .....

Schedule 1

GENERAL LIMITATIONS AND CONDITIONS

DISPOSAL

1. The Operator shall use the best practicable means to minimise the activity of radioactive waste produced on the site that will require disposal under this Authorisation.

2. The Operator shall use the best practicable means to:

   (a) minimise the activity of gaseous and aqueous radioactive waste disposed of by discharge to the environment;

   (b) minimise the volume of radioactive waste disposed of by transfer to other premises;

   (c) subject to paragraph 5 in this Schedule, dispose of radioactive waste at times, in a form, and in a manner so as to minimise the radiological effects on the environment and members of the public;

   where the relevant waste types and disposal routes are specified in the Table in Schedule 2.

3. The Operator shall maintain in good repair the systems and equipment provided:

   (a) to meet the requirements of paragraphs 1 and 2 in this Schedule;

   (b) for the disposal of radioactive waste.

4. The Operator shall check, at an appropriate frequency, the effectiveness of systems, equipment and procedures provided:

(a) to meet the requirements of paragraphs 1 and 2 in this Schedule;

(b) for the disposal of radioactive waste.

5. If required by the Agency, the Operator shall only dispose of radioactive waste at such times, in such a form and in such a manner as the Agency specifies.

MANAGEMENT

6. The Operator shall:

   (a) have a management system, organisational structure and resources which are sufficient to achieve compliance with the limitations and conditions of this Authorisation and which include:

      (i) written arrangements specifying how the Operator will achieve compliance with each limitation and condition of this authorisation, to

include arrangements for control of modifications to the design and operation of systems and equipment;

(ii) provision for consultation with such suitable RPAs, or other such qualified experts approved by the Agency in writing, as are necessary for the purpose of advising the Operator as to compliance with the limitations and conditions of this Authorisation and, in particular, on the matters addressed in paragraphs 1, 2, 4, 12 and 13 in this Schedule;

(iii) written Environmental Operating Rules and operating instructions;

(iv) a written maintenance schedule and instructions;

(v) adequate supervision of the disposal of radioactive waste by suitably qualified and experienced persons, whose names shall be clearly displayed with each copy of the Certificate of Authorisation that is posted on the premises as required by Section 19 of the Act;

(vi) adequate supervision by suitably qualified and experienced persons of the operation and maintenance of the systems and equipment provided to meet the requirements of paragraphs 1 and 2 in this Schedule and for the disposal of radioactive waste;

(vii) internal audit and review of the Operator's management system;

(b) inform the Agency in writing, at least 28 days or such shorter period agreed by the Agency before the first disposal of radioactive waste is made under the terms of this Authorisation, of the organisational structure and resources, together with such parts of the management system as the Agency specifies, provided to achieve compliance with the limitations and conditions of the Authorisation;

(c) inform the Agency, at least 28 days in advance or, where this is not possible, without delay, of any change in the management system, organisational structure or resources, which might have, or might reasonably be seen to have, a significant impact on how compliance with the limitations and conditions of this Authorisation is achieved.

SAMPLING, MEASUREMENTS, TESTS, SURVEYS AND CALCULATIONS

7. The Operator shall take samples and conduct measurements, tests, surveys, analyses and calculations to determine compliance with the limitations and conditions of this Authorisation.

8. The Operator shall use the best practicable means when taking samples and conducting measurements, tests, surveys, analyses and calculations to determine compliance with the limitations and conditions of this Authorisation, unless particular means are specified in this Authorisation.

9. If required by the Agency, the Operator shall take such samples and conduct such measurements, tests, surveys, analyses and calculations, including environmental measurements and assessments, at such times and using such methods and equipment as the Agency specifies.

10. If required by the Agency, the Operator shall, as the Agency specifies:

    (a) keep samples;

(b) provide samples;

(c) dispatch samples for tests at a laboratory and ensure that the samples or residues thereof are collected from the laboratory within three months of receiving written notification that testing and repackaging in accordance with the appropriate transport regulations are complete.

11. The Operator shall maintain, in good repair, systems and equipment provided for:

(a) carrying out any monitoring and measurements necessary to determine compliance with the limitations and conditions of this Authorisation;

(b) measuring and assessing exposure of members of the public and radioactive contamination of the environment.

12. The Operator shall have and comply with appropriate criteria for the acceptance into service of systems, equipment and procedures for:

(a) carrying out any monitoring and measurements necessary to determine compliance with the limitations and conditions of this Authorisation;

(b) measuring and assessing exposure of members of the public and radioactive contamination of the environment.

13. The Operator shall carry out:

(a) regular calibration, at an appropriate frequency, of systems and equipment provided for:

(i) carrying out any monitoring and measurements necessary to determine compliance with the limitations and conditions of this Authorisation;

(ii) measuring and assessing exposure of members of the public and radioactive contamination of the environment;

(b) regular checking, at an appropriate frequency, that such systems and equipment are serviceable and correctly used.

RECORDS

14. The Operator shall, subject to paragraph 18 in this Schedule:

(a) make and retain records sufficient to demonstrate whether the limitations and conditions of this Authorisation are complied with;

(b) retain records made in accordance with any previous Authorisation issued to the Operator and related to the premises covered by this Authorisation;

(c) retain records transferred to the Operator by any predecessor operator which were made in accordance with any previous Authorisation related to the premises covered by this Authorisation.

15. The Operator, not later than 14 days after the end of each month or within such longer period as the Agency may approve in writing, shall in respect of all disposals of radioactive waste made during that month:

    (a) make a record of each measurement, analysis, test and survey conducted for the purpose of this Authorisation in relation to those disposals;

    (b) make a record which shows clearly and legibly:

        (i) the type of waste and the disposal route;

        (ii) the name of each radionuclide or group of radionuclides, specified in the relevant Table in the relevant Schedule, which is present;

        (iii) the activity of each such radionuclide or group of radionuclides per cubic metre of the waste, unless otherwise agreed in writing by the Agency;

        (iv) for LLWR Waste, the activity of each such radionuclide or group of radionuclides per tonne of the waste, unless otherwise agreed in writing by the Agency;

        (v) the total activity of each such radionuclide or group of radionuclides;

        (vi) the total volume in cubic metres, unless otherwise agreed in writing by the Agency;

        (vii) for LLWR Waste, the total mass in tonnes;

        (viii) the date and time on which, or period during which, the disposal took place;

        (ix) any other information the Agency may specify.

16. If the Operator amends any record made in accordance with this Authorisation it shall ensure that the original entry remains clear and legible.

17. The Operator shall keep the records referred to in paragraph 15 in this Schedule in a manner and place approved by the Agency.

18. The Operator shall retain the records referred to in paragraphs 14 and 15 in this Schedule until notified in writing by the Agency that the records no longer need to be retained.

PROVISION OF INFORMATION

19. The Operator shall supply such information in such format and within such time as the Agency may specify.

20. The Operator shall inform the Agency in writing, at least 14 days before the first disposal of radioactive waste is made under the terms of this Authorisation, of the techniques being employed to determine the activity of radioactive waste

disposals and shall inform the Agency in writing in advance of any modifications to those techniques.

21. The Operator shall inform the Agency without delay if the Operator has reason to believe that disposal of radioactive waste is occurring, has occurred or might occur which does not comply with the limitations and conditions of this Authorisation, and shall report the circumstances in writing to the Agency as soon as practicable thereafter.

INTERPRETATION

22. (1) In this Certificate of Authorisation :

(a) except where otherwise specified, words and expressions defined in the Radioactive Substances Act 1993 shall have the same meanings when used in this Certificate of Authorisation as they have in that Act;

"activity", expressed in becquerels, means the number of spontaneous nuclear transformations occurring in a period of one second;

"the Agency" means the Environment Agency;

"aqueous waste" means radioactive waste in the form of a continuous aqueous phase together with any entrained solids, gases and non-aqueous liquids;

"Authorisation" means an authorisation issued under the Radioactive Substances Act 1993 or the Radioactive Substances Act 1960;

"best practicable environmental option" means the radioactive waste management option, for a given practice, that provides the most benefit or least damage to the environment as a whole in the long term as well as in the short term, taking into account operational doses and risks, and social and economic factors;

"Bq, kBq, MBq, GBq, TBq and PBq" are used as abbreviations meaning becquerels, kilobecquerels, megabecquerels, gigabecquerels, terabecquerels and petabecquerels respectively;

"calendar year" means a period of 12 consecutive months beginning on 1 January;

"consignment" means an individual shipment of radioactive waste not greater in volume than 40 cubic metres or such volume as specified in writing by the Agency;

"environment" means all, or any, of the media of air, water (to include sewers and drains) and land;

"Environmental Operating Rule" means a mandatory restriction on operation, established by the Operator, which is necessary to ensure compliance with this Authorisation;

"gaseous waste" means radioactive waste in the form of gases and associated mists and particulate matter;

“Low Level Waste Repository Operator” means the current holder of the licence issued under the Nuclear Installations Act 1965 for the Low Level Waste Repository at Drigg;

" Low Level Waste Repository Waste" means solid radioactive waste, including any immediate package, intended by the Operator for final disposal at the Low Level Waste Repository at Drigg;

"maintenance instructions" means instructions for carrying out any maintenance that may have an effect on compliance with this Authorisation;

"maintenance schedule" means a programme for maintenance of all systems and equipment that contribute to achieving compliance with this Authorisation;

"month" means calendar month (ie 1-31 January, 1-28/29 February, 1-31 March, etc.);

"operating instructions" means instructions for carrying out any operation that may have an effect on compliance with this Authorisation;

"organic liquid waste" means radioactive waste in the form of liquid, not being aqueous waste, containing one or more organic chemical compounds;

"package" includes any sack, drum, container or wrapping;

"quarter" means any period of three consecutive months;

“RPA” means a Radiation Protection Adviser appointed under Regulation 13 of the Ionising Radiations Regulations 1999;

"samples" includes samples that have been prepared or treated to enable measurements of activity to be made;

"Schedule" means a Schedule forming part of this Certificate of Authorisation;

“Sellafield Site Operator” means the current holder of the licence issued under the Nuclear Installations Act 1965 for the Sellafield Site;

"week" means a period of 7 consecutive days commencing at a day and time to be notified in writing to the Agency by the Operator at least 14 days before any disposal of radioactive waste is made under the terms of this Authorisation, any subsequent change being notified in writing to the Agency at least 7 days in advance;

"year" means any period of 12 consecutive months;

(b) Other Site Specific definitions;

"Burghfield Site" means those entire premises occupied by AWE plc at Burghfield in Berkshire and is known as the Atomic Weapons Establishment Burghfield;

"Foulness Site Operator, Essex" means the holder of an authorisation under Section 13 of the Radioactive Substances Act 1993 to dispose of radioactive waste of that description at Foulness, Essex.

"Warhead Waste" means radioactive waste in the form of a solid containing explosives, foams, plastics, rubbers, salts or metal arising from the dismantling of assembled nuclear warheads;

"Winfrith Nuclear Site" means the site at Winfrith, Dorset for which a licence has been issued under the Nuclear Installations Act 1965;

(2) In this Certificate of Authorisation the Interpretation Act 1978 shall apply as it does to an Act of Parliament and in particular words in the singular include the plural and words in the plural include the singular.

(3) (a) In determining whether particular means are the "best practicable" for the purposes of this Authorisation, the Operator shall not be required to incur expenditure whether in money, time or trouble which is, or is likely to be, grossly disproportionate to the benefits to be derived from, or likely to be derived from, or the efficacy of, or likely efficacy of, employing them, the benefits or results produced being, or likely to be, insignificant in relation to the expenditure.

(b) Where reference is made to the use of "best practicable means" in this Certificate of Authorisation, the means to be employed shall include:
(i) the provision, maintenance and manner of operation of any relevant plant, machinery or equipment;
(ii) the supervision of any relevant operation.

Schedule 2

AUTHORISED RADIOACTIVE WASTE TYPES, ACCUMULATION AND DISPOSAL ROUTES

1. Subject to paragraph 2 in this Schedule, the Operator is authorised to dispose only of the radioactive waste types identified in Table 1 in this Schedule and only by the relevant disposal route(s) specified in the Table.

2. The Operator may dispose of radioactive waste, not being waste otherwise authorised to be disposed of, which is collected as a result of the user's participation in the National Arrangements for Incidents involving Radioactivity provided that the Operator:

   (a) transfers the waste to a person whom the Environment Agency has agreed in writing may receive that waste;

   (b) as soon as practicable provides available details in writing of the nature of the radioactive waste, the radionuclides present, their activities and the manner and date of disposal.

Table 1 – Authorised Waste Types and Disposal Routes

Radioactive waste type	**Disposal Route**
Gaseous Waste	Discharge to the environment
Aqueous Waste	Transfer to AWE Aldermaston
Warhead Waste	Transfer to the Site Operator at Foulness, Essex for the purpose of security controlled disposal
Solid Waste	Transfer to AWE Aldermaston
	Transfer, for the purpose of treatment prior to final disposal at the LLWR at Drigg, to the person operating Complex B4 and Facilities A50 and A51 on the Winfrith Nuclear Site
	Transfer to the Sellafield Site Operator at Sellafield for the purpose of final disposal at the LLWR at Drigg
	Transfer to the LLWR Site Operator at Drigg for the purpose of final disposal at the site

3. The Operator is authorised to accumulate on the Non-Licensed Site only, the radioactive waste types identified in Table 2 in this Schedule.

Table 2 – Authorised Accumulation Waste Types

Radioactive Waste Type	Accumulation
Aqueous Waste	on the Non-Licensed Site
Solid Waste	on the Non-Licensed Site
Warhead Waste	on the Non-Licensed Site

Schedule 3

LIMITATIONS AND CONDITIONS RELATING TO DISPOSAL OF RADIOACTIVE GASEOUS WASTE BY DISCHARGE TO THE ENVIRONMENT

1. The Operator shall

   (a) only discharge radioactive gaseous waste to the environment by means of the outlets identified in Table 1 in this Schedule and such other outlets as the Agency may approve in writing.

   (b) not discharge radioactive gaseous waste through any outlet identified in Table 1 in this Schedule that the Agency has notified in writing is not to be used.

2. The Operator shall not in any year discharge gaseous waste in which the activity of any radionuclide or group of radionuclides specified in Table 2 in this Schedule exceeds the relevant Annual Limit.

3. If, in any quarter, the activity in gaseous waste discharged of any radionuclide or group of radionuclides specified in Table 2 in this Schedule exceeds, or is likely to exceed, the relevant Quarterly Notification Level (where specified), the Operator shall provide the Agency with a written submission which includes:

   (a) details of the occurrence;

   (b) a description of the means used to minimise the activity of gaseous waste discharged;

   (c) a review of those means having regard to paragraphs 1 and 2 in Schedule 1;

   not later than 14 days from making the record which demonstrates such excess.

4. For the purposes of demonstrating compliance with the limitations and conditions of this Authorisation relating to " beta/gamma emitting radionuclides associated with particulate matter" and "alpha emitting radionuclides associated with particulate matter" in gaseous waste the Operator shall measure the gross beta and alpha activity of all particulate samples collected for these purposes, after an appropriate period for decay of radon daughters, by using suitable sample preparation methods and a suitable counting system which have been agreed in writing by the Agency.

Table 1 – AWE Burghfield - Authorised Gaseous Discharge Outlets

Authorised gaseous discharge outlets
Group A: Such stacks or outlets as approved in writing beforehand by the Agency and associated with discharges from the minor facilities Engaged Completely or Principally in Operational work in buildings on the Nuclear Licensed Site.
Group B: Such stacks or outlets as approved in writing beforehand by the Agency and associated with discharges from the minor facilities Engaged Completely or Principally in Decommissioning work in buildings on the Non-Licensed Site.
Group C: Such stacks or outlets as approved in writing beforehand by the Agency and associated with discharges from the minor facilities Engaged Completely or Principally in Operational work in buildings or facilities on the Non-Licensed Site.

Table 2 – AWE Burghfield Site Gaseous Annual Activity and Quarterly Notification Levels

Building or Facility Group	Radionuclide or group of radionuclides	Annual Site Activity Limit	Site Quarterly Notification Level
Group A	Alpha Tritium	5 kBq 9 GBq	NA 2 GBq
Group B	Alpha	1 kBq	NA
Group C	Tritium	1 GBq	NA

Schedule 4

LIMITATIONS AND CONDITIONS RELATING TO DISPOSAL OF RADIOACTIVE AQUEOUS WASTE BY DISCHARGE TO THE ENVIRONMENT

1. Disposal of radioactive aqueous waste by discharge into the environment is not authorised.

Schedule 5

LIMITATIONS AND CONDITIONS RELATING TO DISPOSAL OF RADIOACTIVE WASTE BY INCINERATION ON THE PREMISES

1. Disposal of radioactive waste by incineration on the premises is not authorised.

Schedule 6

LIMITATIONS AND CONDITIONS RELATING TO THE DISPOSAL OF RADIOACTIVE WASTE BY TRANSFER FOR THE PURPOSE OF FINAL DISPOSAL AT THE LLWR AT DRIGG

1. The Operator shall not:

   (a) transfer any consignment of LLWR Waste in which the activity of alpha emitting radionuclides exceeds 4 gigabecquerels per tonne or the activity of all other radionuclides exceeds 12 gigabecquerels per tonne;

   (b) in any calendar year transfer LLWR Waste in which, in total, the activity of any radionuclide or group of radionuclides listed in Tables 1 and 3 in this Schedule exceeds the relevant Annual Limit;

   (c) in any calendar year transfer LLWR Waste in which, in total, the volume of the waste exceeds the Annual Limit specified in Tables 2 and 4 in this Schedule.

2. The Operator shall not transfer LLWR Waste:

   (a) unless it has been treated or packaged in such a way as to render it, so far as is reasonably practicable, insoluble in water and not readily flammable;

   (b) which contains any of the following materials, unless otherwise agreed in writing by the Agency:

      (i) metals and other materials which readily react either with water or air with the evolution of heat or flammable gases;

      (ii) explosive materials;

      (iii) liquids with flashpoint less than 21 °C absorbed on solid materials;

      (iv) strong oxidising agents;

      (v) pressurised gas cylinders or pressurised aerosol containers;

      (vi) materials which generate or are capable of generating toxic gases, vapours or fumes harmful to persons handling the waste;

      (vii) chemical complexing or chelating agents.

3. The Operator shall ensure that the transfer of LLWR Waste is in accordance with the directions of the person to whom the waste is transferred.

4. The Operator shall:

(a) ensure that the person to whom LLWR Waste is transferred receives, at the time of transfer of each consignment, a clear and legible note signed on the Operator's behalf stating:

(i) that the activity of alpha emitting radionuclides in the consignment does not exceed 4 gigabecquerels per tonne and that the activity of all other radionuclides does not exceed 12 gigabecquerels per tonne;

(ii) the total activity in the consignment of each radionuclide or group of radionuclides listed in Tables 1 and 3 in this Schedule;

(b) obtain a record signed on behalf of the person to whom LLWR Waste is transferred, at the time of transfer, stating that the transfer has taken place.

5. If required by the Agency, the Operator shall ensure that any consignment or part of any consignment of LLWR Waste found, following transfer, not to be in accordance with the limitations and conditions of this Authorisation:

(a) is packaged in accordance with the appropriate transport regulations;

(b) is returned as soon as is reasonably practicable to the Burghfield site.

Table 1 – AWE Aldermaston or Low Level Waste Repository at Drigg:
Disposal Activity from the Nuclear Licensed Site

Radionuclide or group of radionuclides	Annual limit
Uranium	1.5 GBq
Radium-226 plus Thorium-232	0.0 GBq
Other alpha emitters [1]	0 GBq
Carbon-14	0 GBq
Iodine-129	0 MBq
Tritium	1.6 GBq
Cobalt-60	0 GBq
Other radionuclides [2]	0 GBq

1 "other alpha emitters" means alpha emitting radionuclides with half-lives greater than three months excluding uranium, radium-226 and thorium-232

2 "other radionuclides" means:
(a) iron-55 and beta emitting radionuclides with half-lives greater than three months unless individually specified in this Table and
(b) any other radionuclides specified in writing by the Agency

Table 2 – Annual Limit AWE Aldermaston or Low Level Waste Repository at Drigg:

Volume Limit from the Nuclear Licensed Site

Annual limit, cubic metres
600

Table 3 – AWE Aldermaston or the Low Level Waste Repository at Drigg: Disposal Activity Limits from the Non-Licensed Site

Radionuclide or group of radionuclides	Annual limit
Uranium	0 .9 GBq
Radium-226 plus Thorium-232	0.1 GBq
Other alpha emitters [1]	0 GBq
Carbon-14	0 GBq
Iodine-129	0 MBq
Tritium	5 GBq
Cobalt-60	0 GBq
Other radionuclides [2]	1 GBq

1 "other alpha emitters" means alpha emitting radionuclides with half-lives greater than three months excluding uranium, radium-226 and thorium-232

2 "other radionuclides" means:
(a) iron-55 and beta emitting radionuclides with half-lives greater than three months unless individually specified in this Table and
(b) any other radionuclides specified in writing by the Agency

Table 4 – Annual Limit AWE Aldermaston or Low Level Waste Repository at Drigg: Volume Limit from the Non-Licensed Site

Annual limit, cubic metres
200

Schedule 7

LIMITATIONS AND CONDITIONS RELATING TO DISPOSAL OF RADIOACTIVE WASTE BY TRANSFER TO OTHER PREMISES

1. The Operator shall not in any calendar year transfer radioactive waste to a person specified in Tables 1 to 3 in this Schedule in which, in total:

   (a) the activity of any relevant radionuclide or group of radionuclides exceeds the relevant Annual Activity Limit; or

   (b) the volume of the waste and where appropriate its immediate packaging exceeds the relevant Annual Volume Limit.

2. The Operator shall ensure that the transfer of radioactive waste is in accordance with the directions of the person to whom the waste is transferred.

3. The Operator shall:

   (a) ensure that the person to whom waste is transferred receives at the time of transfer of each consignment a clear and legible note signed on the Operator's behalf stating the total activity in the consignment of each relevant radionuclide or group of radionuclides listed in Tables 1 to 3 in this Schedule;

   (b) obtain a record signed on behalf of the person to whom waste is transferred, at the time of transfer, stating that the transfer has taken place.

4. If required by the Agency, the Operator shall ensure that any consignment or part of any consignment of waste found, following transfer, not to be in accordance with the limitations and conditions of this Authorisation:

   (a) is packaged in accordance with the appropriate transport regulations;

   (b) is returned as soon as is reasonably practicable to the AWE Burghfield Site.

Table 1 – Disposal of Aqueous Wastes by Transfer to AWE Aldermaston from the AWE Burghfield Nuclear Licensed Site

Radionuclide	Annual Limit	Volume Limit
Uranium	5 MBq	300 m^3
Beta/Gamma Emitters	1 MBq	
Tritium	1 GBq	

Table 2 – Disposal of Aqueous Wastes by Transfer to AWE Aldermaston from the AWE Burghfield Non-Licensed Site

Radionuclide	Annual Limit	Volume Limit
Alpha Emitters	1 MBq	200 m^3
Beta/Gamma Emitters	1 MBq	
Tritium	0.5 GBq	

Table 3 – Transfer of Warhead Waste From AWE Burghfield to the Site Operator, Foulness, Essex

Radionuclide	Annual Limit	Volume Limit
Tritium	6 MBq	50 m^3

Schedule 8

ACCUMULATION OF SOLID AND AQUEOUS WASTE ON THE AWE BURGHFIELD NON-LICENSED SITE

1. The user may only accumulate aqueous waste on the Non-Licensed Site at AWE Burghfield if -

   a. it is disposed of as soon as reasonably practicable;

   b. the activity of any radionuclide or group of radionuclides in the waste listed in Column 1 of Table 1 does not exceed the maximum annual activity limit specified in Column 2 of Table 1 nor shall it exceed the maximum 3 month accumulated activity limit in Column 4 of Table 1;

   c. it contains only the radionuclides listed in Column 1 of Table 1 other than decay products in amounts which could be present through radioactive decay of a listed radionuclide in the waste;

   d. its maximum annual volume does not exceed that specified in Column 3 in Table 1 nor shall its maximum 3 month volume limit exceed that specified in Column 6 in Table 1; and

   e. the period of accumulation does not exceed that specified in Column 5 in Table 1.

Table 1 – Accumulation of Aqueous Waste on the AWE Burghfield Non-Licensed Site

Column 1 Radionuclide or group of radionuclides	Column 2 Annual Activity Limit	Column 3 Annual Volume Limit (m^3)	Column 4 3 month Accumulated Activity Limit	Column 5 Accumulation Period	Column 6 Volume Limit (m^3)
Alpha emitters	1 MBq	200	0.25 MBq	3 months	50
Beta/gamma emitters	1 MBq		0.25 MBq		
Tritium	0.5 GBq		0.15 GBq		

2. The user may only accumulate solid waste on the Non-Licensed Site at AWE Burghfield if -

   a. it is disposed of as soon as reasonably practicable;

   b. the activity of any radionuclide or group of radionuclides in the waste listed in Column 1 of Table 2 does not exceed the relevant limit specified in Column 2 of Table 2;

c. it contains only the radionuclides listed in Column 1 of Table 2 other than decay products in amounts which could be present through radioactive decay of a listed radionuclide in the waste;

d. its volume does not exceed that specified in Table 3 ; and

e. the period of accumulation does not exceed that specified in Table 4.

Table 2- Accumulation of Solid Waste on the AWE Burghfield Non-Licensed Site

Column 1 Radionuclides	**Column 2 Activity Limit**
Alpha Emitters Beta/Gamma Emitters Tritium	1 GBq 1 GBq 5 GBq

Table 3 - Maximum Volume of Accumulated Solid Waste on the AWE Burghfield Non-Licensed Site

200 m^3

Table 4 - Maximum Period of Accumulation of Solid Waste on the AWE Burghfield Non-Licensed Site

24 months

Schedule 9

LIMITATIONS AND CONDITIONS RELATING TO RECEIPT OF RADIOACTIVE WASTE FOR DISPOSAL FROM OTHER PREMISES

1. The operator shall not receive radioactive waste from premises other that those specified in this Schedule.

Table

Premises from which radioactive waste may be received
AWE plc Atomic Weapons Establishment Aldermaston
The Site Operator, Foulness, Essex
Other premises approved in advance by the Agency

Schedule 10

IMPROVEMENT AND ADDITIONAL INFORMATION REQUIREMENTS

1. The Operator shall complete the requirements specified in the Table in this Schedule by the relevant completion date and, where relevant, shall notify the Agency, in writing, within 14 days of the completion of each of these requirements.

Requirement	Completion Date
1. The Operator shall provide the Agency with a full report of a comprehensive review of whether the current disposal routes continue to represent the best practicable environmental option for waste disposal from the site, together with a programme for carrying out any necessary changes identified by the review.	3 years from the effective date of this Authorisation and at such intervals thereafter as the Agency specifies in writing.
2. The Operator shall provide the Agency with a full report of a comprehensive review of national and international developments in best practice for minimising all waste disposals, together with a strategy for achieving reductions in discharges.	3 years from the effective date of this Authorisation and at such intervals thereafter as the Agency specifies in writing.
3. The Operator shall provide the Agency with a full report of a comprehensive review of the means used to assess the activity of radionuclides in disposals and to determine compliance with this Authorisation including consideration of national and international developments in best practice.	3 years from the effective date of this Authorisation and at such intervals thereafter as the Agency specifies in writing.

Annex 6 - The disposal of Warhead Wastes at Foulness, Essex

Executive summary

- A major programme of nuclear warhead decommissioning was undertaken between 1998 and 2003.
- Radioactively contaminated Warhead Wastes were transferred from AWE sites at Aldermaston and Burghfield to the MOD at Aldermaston and Burghfield under RSA93 Authorisations held by AWE.
- The Environment Agency has approved the transfer of tritium contaminated Warhead Wastes by the MOD to Foulness.
- The Foulness Site includes an explosives range and is therefore able to dispose of redundant high explosives in larger amounts than is permitted for either of the AWE sites.
- These wastes have been safely and securely transported to Foulness by AWE plc on behalf of the MOD.
- The transportation of these wastes is regulated by the Department for Transport.
- Warhead Wastes have been disposed of safely by open hearth burning and controlled explosion.
- The disposals at Foulness have been authorised by the Environment Agency under the Radioactive Substances Act 1993 (RSA93).
- Disposals have met the conditions of the RSA93 Authorisations and the Foulness site has been periodically inspected by the Environment Agency.
- The radiation dose to members of the public is extremely small.
- The radiological impact on local habitats is negligible.
- The major programme of nuclear warhead decommissioning is complete. However there is a continuing need, resulting from the on-going Trident Stockpile maintenance and evaluation programme for a security controlled disposal route for this type of waste.
- There are no environmental or safety grounds for stopping this disposal route for tritium contaminated Warhead Waste and this disposal route should remain available for as long as needed.

Introduction

Warhead Wastes contaminated with tritium, a low energy, beta emitting radionuclide have been disposed of at Foulness in Essex. These disposals have been authorised and regulated by the Environment Agency.

This report has been prepared by the Environment Agency and its content agreed by the Ministry of Defence, QinetiQ, AWE plc and the Environment Agency. It is intended to be a helpful addition to the consultation documents, which are already available, on our proposals to revise AWE's RSA93 authorisations. The report provides a summary of the history of radioactive waste disposals, the regulatory controls in force to ensure that these wastes are safely managed and the environmental impact of these disposals. It also details the Environment Agency's proposals for future disposals and permitting at Foulness.

Information relating to historical use of the Foulness site and in particular with regards to land quality assessment was provided directly by the Ministry of Defence.

Background and history

1998-2003

The decommissioning of Chevaline nuclear warheads and WE177 free-fall bombs generated waste components and it was recognised that some components from these warheads could be slightly contaminated with radioactive materials. Tritium, a weakly radioactive isotope of hydrogen and to a much smaller extent uranium were the radioactive materials causing the contamination.

Warhead Waste consists of primarily two types of materials: high explosives and actual warhead components. Decommissioning experience with similar types of warheads in the USA, where the levels of potential contamination were assessed, led the MOD to seek a safe, secure and effective disposal route for this waste.

There were two main issues to contend with, namely:

- Tritium contaminated high explosives;
- The security sensitivity of recognisable weapon components.

The potential amounts of radioactivity in the wastes enable them to be categorised at the lowest level – as Low Level Waste (LLW). The usual disposal route for LLW is to the Low Level Waste Repository (LLWR) near Drigg in Cumbria. However, high explosive wastes cannot be sent to the LLWR because the explosive risk is far greater than any radiological risk. The risks from inappropriate disposal of the HE far outweigh any radiological considerations and compliance with the Explosives Safety Regulations naturally has primacy. Security classification of weapon components also precludes disposal at the LLWR where personnel do not possess the required level of security clearance. The security clearance issue, coupled with the capability of the Foulness Site to dispose of larger amounts of high explosive waste than is possible at either Aldermaston or Burghfield, provides the justification for disposing of the waste to QinetiQ at Foulness.

In 1998 the Ministry of Defence applied for Environment Agency approval to transfer Warhead Waste from Aldermaston and Burghfield to Foulness Island in Essex for disposal by security controlled destruction.

At the time the application was covered by a National Security Direction and the Environment Agency processed the MOD application accordingly. A security classified approval was issued to the MOD in 1998 to dispose of the following quantities of radioactivity and radionuclides to the Defence Evaluation and Research Agency (DERA) at Foulness:

- Annual Volume Limit: 200 cubic metres
- Annual Activity Limit: tritium – 3 Gigabecquerels

Although the MOD had recognised that Warhead Waste may be contaminated with uranium in addition to tritium no approval to transfer uranium contaminated waste to DERA was given. AWE is storing uranium-contaminated waste and has no plans to transfer it to MOD.

At the same time an application for an authorisation to accumulate and dispose of radioactive waste was received from DERA at Foulness. We assessed the application before then issuing an authorisation to DERA to accumulate and dispose of radioactive wastes. Details of the authorisation are provided below.
Current proposals on transfers of radioactive wastes from AWE sites at Aldermaston and Burghfield to Foulness.

In April 2005 we began the process of reviewing the authorisations for AWE sites at Aldermaston and Burghfield for the discharge and disposal of radioactive wastes.

We felt that the intermediate transfer to MOD was an unnecessary step, possibly lacking the degree of regulatory transparency that we require of nuclear operators. MOD agreed with us that it would be more appropriate for AWE sites to transfer this waste directly, eliminating the need for an intermediate transfer and making the whole process open and transparent.

There is a continuing programme of maintenance and stockpile management and inspection of the in-service Trident Warhead and it was established that there was a need to maintain this disposal route despite no Warhead Wastes being transferred to Foulness since 2003.

We also undertook to review the volumes, the radionuclides and the amount of radioactivity in the wastes that would need to be transferred in the future. The major programme of nuclear weapon decommissioning ended in 2003 and we felt that the existing volumes, radionuclides and activity limits were in excess of the actual requirements for the nuclear weapons programme. It is our aim, wherever possible, to ensure that authorisations to dispose of such wastes are set as low as possible and that the margin between actual disposals and authorised limits is minimal.

By doing so we ensure that the operator uses the best practicable means to dispose of wastes. We have been consulting on some of our proposed limits and these are that:

- A reduced volume limit is appropriate so we propose a reduction from 250 to 100 cubic metres per year.
- As a result of the design of the current weapon system we proposed a reduction in the activity limit of tritium from 3.3 gigabecquerels to 0.3 gigabecquerels, a significant reduction.
- In addition, although no uranium-contaminated waste is authorised to be disposed of at Foulness we wish to revoke the current permitted route for transferring any of this type of waste to the MOD at Aldermaston and Burghfield. We feel that there are more appropriate means of disposing of this waste and are addressing this directly with AWE.

These proposals, amongst others, were included in our Consultation Document distributed to consultees and made available on our Internet site from 15 May 2006. Our consultation began on 15 May 2006 and is due to complete on 7 August 2006. We will extend the period of consultation if required. Amongst the organisations provided with our consultation pack were Rochford District Council and QinetiQ at Foulness.

Our process, after consultation and collation of consultee responses will enable us to prepare documentation outlining our decisions regarding future disposals of

radioactive waste from the two AWE sites. This will be distributed for comment in the late autumn.

Nuclear warhead decommissioning work at AWE Aldermaston and AWE Burghfield

AWE Aldermaston and AWE Burghfield have undertaken warhead-decommissioning work on behalf of the MOD. Authorisations under the Radioactive Substances Act 1993 enabled AWE to transfer Warhead Wastes to the MOD at Aldermaston and Burghfield and for the MOD to transfer these wastes to DERA at Foulness. In 2002 the MOD approval was amended to reflect the change in site management to QinetiQ. This approval remains valid to date.

AWE sites are currently authorised to transfer the following volumes of radioactivity and radionuclides to the MOD at Aldermaston and Burghfield:

<u>From AWE Aldermaston to the MOD at Aldermaston:</u>

- Volume: 50 cubic metres
- Annual Activity Limit: tritium – 300 Megabecquerels
- Annual Activity Limit: uranium - 2 Megabecquerels

<u>From AWE Burghfield to the MOD at Burghfield:</u>

- Volume: 200 cubic metres
- Annual Activity Limit: tritium – 300 Gigabecquerels
- Annual Activity Limit: uranium - 2 Megabecquerels

All wastes are solid in nature and there is no authorisation to transfer any liquid wastes to the MOD and for disposal at Foulness or at any other receiving site. As stated above no uranium contaminated warhead waste has been transferred to the MOD from either AWE Aldermaston or AWE Burghfield. Over the period 1998-2003 AWE transferred wastes to the MOD and these were duly transferred to Foulness for disposal:

YEAR	TRITIUM ACTIVITY MBq	PERCENTAGE OF MOD TRANSFER APPROVAL
1998	110	0.03
1999	0.6	NA
2000	3.1	NA
2001	2.7	NA
2002	0.1	NA
2003	2400	0.8

An indication of the amount of tritium activity transferred to Foulness in relation to the authorised limits for the two highest transfer years is provided for completeness. Transfers ended in 2003 and no wastes have been sent to Foulness from the MOD at Aldermaston or Burghfield since that year.

Accumulation and disposal of Warhead Waste at Foulness

As stated above it was originally DERA that was authorised by us to accumulate and dispose of Warhead Waste at Foulness. This authorisation was transferred to QinetiQ in 2002 as a result of the re-organisation of Defence Research Establishments.

The QinetiQ RSA93 Authorisation to Accumulate and Dispose of Radioactive Wastes permits the following to be undertaken:

Accumulation of solid wastes containing tritium for a maximum of 2 months before undertaking work to dispose by:

- Incineration, open hearth or cage burning (for components other than HE)
- Detonation in the case of High Explosives.
- A daily disposal activity limit for tritium of 750 Megabecquerels
- A monthly disposal activity limit for tritium of 1.5 Gigabecquerels
- An annual disposal activity limit for tritium of 3 Gigabecquerels.
- Disposal of residual ash as Very Low Level Waste.

In the case of warhead wastes disposed of by open hearth, cage burning and incineration a small amount of ash residue will remain. As tritium is one of the lightest radionuclides (it is radioactive hydrogen) burning will drive off the greater part of the radioactivity into the atmosphere where it will be rapidly dispersed.

There is a very small probability that some tritium will remain in the residual ash and consequently this is disposed of under specific conditions within the QinetiQ RSA93 Authorisation. The ash is classed as “Very Low Level Waste” and is similar to the types of waste created in incinerators throughout the United Kingdom resulting from disposals by hospitals, research and development work, pharmaceutical industry and academic institutions. This type of waste is safely disposed of by a large number of waste generating facilities by being mixed in with large volumes of domestic refuse before disposal at landfill sites.

Environment Agency site regulation

Pollution Prevention and Control

QinetiQ operate two explosive waste incinerators that are used to dispose of waste propellant, explosive and pyrotechnic items. The two incinerators are similar and are operated independently of each other. Each consists of a small, heavy-duty rotary kiln. Feedstock is brought from a designated explosive storage area and fed at a pre-determined rate into the gas oil fired kiln by means of a feed conveyor.

Combustion products from the kiln pass through a gas-oil fired afterburner where ammonia solution is injected to reduce the oxides of nitrogen concentration and after indirect cooling enter the abatement plant. Sodium bicarbonate is added to reduce the acidic gas content and particulates are then removed. The cleaned gases are released via a 9m stack (EWI 1) or a 10m stack (EWI 2). The concentrations of pollutants in the stack gases from both incinerators are continually monitored. After

being certified as free from explosives, residual solid wastes are disposed of by a contractor.

The Environment Agency regulates the use of incinerators under the Pollution, Prevention and Control (PPC) Regulations. Specific conditions detailing the requirements of the relevant articles of the Waste Incineration Directive have been incorporated into the Permit for the Foulness site.

Our routine inspection programme has enabled us to determine that operation of these incinerators meets the requirements of the PPC Regulations and the Waste Incineration Directive.

Radioactive Substances Act 1993 – site regulation

All operators who wish to accumulate and dispose of radioactive waste must be authorised to do so. The Environment Agency has a regular programme of site inspections and the Foulness site is included in our programme. Due to the very small amounts of radioactive waste that QinetiQ is authorised to accumulate and dispose our physical inspection programme is undertaken about once every two years. In addition we are provided with regular information from sites in the form of discharge and disposal reports.

We assess these reports against the site activity limits, thereby ensuring that limits are not being breached. We last inspected the QinetiQ site in August 2004 and were satisfied that the site was compliant with all of the conditions laid down in their RSA93 Authorisation to accumulate and dispose of radioactive wastes.

Radiological dose to the public

We have determined the impact of tritium on humans using an assessment tool developed by our Radiation Monitoring and Assessment Team in conjunction with the NRPB (now the Radiological Protection Division within Health Protection Agency), the Food Standards Agency (FSA) and the national environment agencies in Scotland (SEPA) and Northern Ireland (DOE). The impact of tritium, a weakly energetic beta emitting radionuclide, has been determined making several very pessimistic assumptions. The most significant of these are, that:

- the total annual activity limit is disposed of by open hearth burning at a single point in time ;
- a member of the public is standing 100 metres downwind of the burning site during the duration of a open hearth burning:

By making these assumptions we determine the worst possible case for what is referred to as ”THE CRITICAL GROUP”, although it is virtually impossible to receive such a dose. At Foulness the closest a member of the public could get to the burn site would be about 400 metres and any impact will be dramatically reduced.

We have assessed that the critical group would receive a radiation dose by inhalation of 0.0005 (ie 1/2000th of a microsievert. The Ionising Radiations Regulations 1999 (IRRs 99) limits exposure arising from artificial and occupational exposures to 1 millisievert (ie 1000 microsieverts). The pessimistic dose to a member of the public exposed to the annual activity limit released at Foulness would equate to about 2

million times less than the dose limit for a member of the public. Put into context against the average exposure to background radiation of 2700 microsieverts arising from all causes (eg solar, medical, naturally occurring radionuclides in food) the risk from disposals at Foulness would pessimistically equate to an increase in exposure of less than an additional minute per day of natural background radiation.

In comparison:

- For AWE Aldermaston: tritium discharges at the current site limit (again pessimistic) of 170 Terabecquerels (TBq) could give a total dose of 6.4 microsieverts a year to the critical group. This is over 12000 times the pessimistic dose calculated for disposals at Foulness.

- Tritium discharges to air at current site limits of 3.5 TBq from a Magnox Power Station Site such as Bradwell (when it was operating) or Sizewell A could pessimistically give an inhalation dose of 0.13 microsieverts a year to the critical group. This is over 250 times the pessimistic dose calculated for disposals at Foulness.

In reality the activity of wastes disposed of by open hearth burning has only reached a maximum of 0.8% of the authorised limit with the effect that the pessimistic dose to any critical group will be much too small to measure and of no radiological significance.

Environmental Impact Assessment

We have assessed the impact of burning tritium-contaminated waste onto biota. The Conservation (Natural Habitats &c) Regulations 1994 requires us to assess the impact of regulated activities on the environment. We have used our Habitats Assessments Process and an assessment tool developed in partnership with English Nature. Our spreadsheets enable us to calculate radiation doserates to a wide variety of species and to determine whether any adverse effects would result from disposals of such wastes as tritium at Foulness.

We have made an assessment of potential doserates to plant and animal life at the current annual limits for disposals at Foulness (3 Gigabecquerels). We have compared the results with international guidance and the European FASSET Project. FASSET provides a framework for the assessment of environmental impact of ionising radiation in European ecosystems. Natural background radiation dose averages about 40-50 micrograys per hour and we have adopted an additional dose rate value of 40 micrograys per hour above background as an assessment criterion. We have concluded that if biota are exposed at levels up to 100 micrograys per hour there should be no adverse effect caused by radioactive discharges.

Our results, by assessment, indicate that at current discharge limits to the atmosphere (ie direct to air) no increase in radiation dose rates to any type of biota could be physically detectable. Although we do not allow liquid radioactive waste to be disposed at Foulness we have undertaken an assessment using the extremely pessimistic assumption that the annual limit for discharge of tritium entered the estuarine environment. As for our assessment of the airborne impact no increase in measurable dose rate to any form of biota could result.

Assuming a local background level of 50 micrograys per hour we have concluded that no regulatory action is required as a result of discharges of tritium during work undertaken at Foulness and that there is no adverse effect on local biota eg cockles and other locally harvested seafood.

The environmental impact of using these processes at Foulness (incineration and open hearth burning) has been assessed as being not likely to have a "significant effect" on the European Sites of Benfleet and Southend Marshes SPA, Crouch and Roach Estuaries SPA, Dengie SPA, Foulness SPA and Essex Estuaries SAC. There are no other European sites within ten kilometres of the installation that would require us to undertake any further assessment work.

Transportation of radioactive Warhead Wastes to Foulness

Radioactive waste transportation is subject to the Radioactive Material (Road Transport) Regulations 2002, (as amended) and is regulated by the Department for Transport (DfT). We routinely consult the DfT on relevant aspects of topics during our reviews of RSA93 Authorisations for nuclear site operators (such as AWE plc).

In addition the transportation of explosives is subject to the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment (CDGUTPE) Regulations 2004 and is now also regulated by the Department for Transport.

The explosive hazard associated with these wastes takes primacy in the classification for Road Transport. These goods would therefore be moved in accordance with CDGUTPE Regulations. Consignment (packaging and transportation) of warhead waste is undertaken by AWE on behalf of the MOD.

The vehicles utilised for these movements hold the appropriate Type Approval Certificate in accordance with CDGUTPE Regulations.

The current authorisations allow for the disposal of significant volumes of waste. Between 1998 and 2001 there were between 10 and 20 road transfers of waste each year to Foulness. The volume transferred in these years was between 30 and 50 cubic metres of waste. In 2002 and 2003 there was one journey each year. In 2002, 0.04 cubic metres was transferred and in 2003 6.5 cubic metres was transferred. There have been no road transfers since 2003.

This low number of journeys was possible because we allowed the MOD to store waste at Aldermaston and Burghfield until enough waste has been accumulated to justify its transportation to Foulness. This policy avoids multiple journeys carrying minimal volumes and activities of Warhead Waste.

In our review of disposals of radioactive waste from the AWE sites we aim to reduce the volume transferred to Foulness. In addition we will continue to authorise the local accumulation of these wastes at Aldermaston and Burghfield until such time as a justified volume is available for transfer to Foulness. Both ourselves, AWE plc and the MOD are, however, conscious of the need to transfer high explosive wastes for disposal at regular intervals and that the high explosive characteristics of these wastes will always have predominance over any radioactive (tritium) contamination.

Conclusions

The need to securely dispose of components from the decommissioning of nuclear warheads was recognised by the MOD in 1998. After undertaking assessments and evaluating a request from the MOD the Environment Agency issued an Approval under the Radioactive Substances Act for the MOD to transfer these wastes to Foulness for security controlled disposal. Radioactive wastes were transferred to Foulness between 1998 and 2003.

The Environment Agency regularly reviews the permits that allow for the transfer and disposal of radioactive wastes. We have been carrying out a review of AWE authorisations to dispose of radioactive wastes and intend to make transfers of waste more open and transparent. We aim to do this by authorising the AWE plc sites at Aldermaston and Burghfield to transfer these wastes directly to Foulness without a need to do so via the MOD.

The MOD has told us that there will be a continuing need to maintain a transfer route for Warhead Waste in order that it can be disposed of securely. We recognise that as a result of the high explosive content of much of the waste that the existing transfer route for disposal at Foulness represents an environmentally safe option.

We therefore support the proposal by AWE plc for a direct transfer route. We have also taken the opportunity to assess the future requirements for waste transfers arising from Trident stockpile maintenance and disassembly work at AWE sites. As a result we propose to reduce the volume and radioactivity of the waste that can be transferred to Foulness.