Large and ASSOCIATES

Consulting Engineers

REGINA -v- MS JULIET M^CBRIDE

NEWBURY MAGISTRATES' COURT

CLIENT: BINDMAN & PARTNERS

REF N^O R3166-ALDERMASTON

REVISION N^O	APPROVED	1^ST ISSUE	PRESENT ISSUE
R2		13 February 2008	**18 MARCH 2008**

REGINA -v- MS JULIET MCBRIDE

NEWBURY MAGISTRATES' COURT

1 **QUALIFICATIONS AND EXPERIENCE**

2 I am John H Large of the Gatehouse, 1 & 2 Repository Road, Ha Ha Road, Woolwich, London SEI8.

3 I am a Consulting Engineer, Chartered Engineer, Fellow of the Institution of Mechanical Engineers, Graduate Member of the Institution Civil Engineers, Member of the British Nuclear Society and a Fellow of the Royal Society of Arts.[1]

4 **INSTRUCTIONS**

5 I have been instructed by Mr M Schwarz of Bindman & Partners, a firm of solicitors acting on behalf of Ms J M^{c}Bride being the Accused in this matter.

6 In February 2008 Mr Schwarz instructed me to provide information on the following topics relating to the licensed nuclear site of the Atomic Weapons Establishment (AWE) at Aldermaston:

a) the current research and production activities at Aldermaston;

b) what is planned or has been discussed for its expansion; and

c) timing of alleged actions of the Accused in relation to Parliamentary discussions and decisions.

7 Mr Schwarz also asked me to provide a qualified opinion on the siting of the boundary fences that enclose the AWE site at Aldermaston, particularly in regard to how:

d) the fences relate to the Nuclear Site Licence (NSL) issued by the Nuclear Installations Inspectorate (NII), being a division of the Health & Safety Executive (HSE).

8 On these topics (a to d), I consider myself adequately qualified and experienced to provide evidence and opinion in this matter of R -v- Ms Juliet MacBride, particularly in relation to my past and recent experience with nuclear weaponry.

1 A full CV and Bibliography may be accessed at http://www.largeassociates.com.

9 I give a summary of my opinion and conclusions on topics a) to d) in paragraph 70 following.

10 I have previously prepared and submitted evidence in relation to past activities of the Accused.[2]

11 **UK NUCLEAR WEAPONS ARSENAL - STORAGE, DEPLOYMENT & REFURBISHMENT**

12 The UK's present nuclear weapons system is Trident, comprising four nuclear powered *Vanguard* class (SSBN) submarines, each providing a launch platform for Trident D5 missiles that carry and deliver to target nuclear warheads. Each *Vanguard* class submarine is capable of launching up to sixteen Trident missiles, each of which has a maximum payload of 8 to 12 nuclear warheads, although other launch and MIRV (multiple independently-targetable re-entry vehicles) packages may also be deployed in place of a number of the nuclear warheads carried.

13 However, the UK Government 1998 Strategic Defence Review restricted the total nuclear warheads deployed on each submarine to 48 so, with one SSBN submarine guaranteed to be fully operational at any time, the UK has a minimum capability to attack 48 targets within a range of about 7,500km from the location of the submarine. The submarine itself can be positioned and launch from virtually anywhere in the deep seas of the World.

14 Although the number of nuclear warheads making up the United Kingdom nuclear weapons arsenal is not public information, the UK strategic policy for the deterrent to be continuously deployed at sea requires a second of the four SSBN Trident boats to be nuclear armed and at sea for the changeover when the first armed boat comes off its firing station to return to the United Kingdom home port and, in addition to this, a third boat is held in reserve should there be a mishap at sea making, for whatever reason, the second boat unavailable for deployment.[3]

15 During the sea station changeover period and until the returning submarine has docked and unloaded its Trident missiles, the UK has a launch capability of 96 nuclear warheads. The changeover period may take several weeks to complete, depending on where the submarines are to deploy in the oceans of the World. In periods of heightened international tension, it should be possible for the third SSBN to put to sea thus increasing the UK strike capability to 144 nuclear warheads or more if the present warhead deployment limits were to be abandoned.

---

2 *Matter of Alleged Trespass at AWE Aldermaston, June 2006,* Regina -v- Juliet MacBride, Newbury Magistrates Court, June 2006 – see also *Driving Without Due Care and Attention* – 7 December 2003, Regina -v- Juliet MacBride, Newbury Magistrates Court, 4 November 2004 - http://largeassociates.com/nukedriving.pdf

16 Under the present operational limitation of 48 warheads per boat, there must exist at least (3 x 48=) 144 operations-ready warheads in or readying for deployment with additional spares held in storage at RNAD Coulport, together with minimum of a further equivalent boatload (48) likely to be undergoing refurbishment, modification and/or storage at AWE Aldermaston-Burghfield. On this basis of reckoning, the UK nuclear weapons arsenal and in compliance with the current limitation of warheads deployed, the arsenal should comprise about 200 or so individual *operational* or near *operations-ready* nuclear warheads although, that said, the actual nuclear arsenal, including non-operational warheads undergoing refurbishment, spare components and assemblies etc., is believed to be significantly larger, perhaps up to 500+ warheads.

17 The UK nuclear warhead presently deployed by the Trident weapons system is a thermonuclear (H-Bomb) nuclear device that is manufactured at AWE Aldermaston/Burghfield.[4] Each individual warhead has an equivalent explosive yield of 100+ kilotons (100,000 tons) of conventional high explosive (TNT), although it is believed that the yield and composition of the nuclear detonation is target-selectable down to a few kilotons equivalent TNT.

18 In the earlier years of the UK's nuclear warhead design and development programme, a number of facilities nationwide contributed elements of the weapons development programme although with rationalization, today the nuclear warheads deployed in the Trident system are mostly researched, designed, manufactured and assembled at AWE Aldermaston. Other facilities, such as Fort Halstead at Orpington Kent, are also involved in the research, development and procurement of nuclear warhead components and, it is believed, there are ongoing arrangements with the United States involving the transfer of know-how, design and materials.[5]

19 The fissile and nuclear materials used in the UK nuclear warheads are prepared and/or drawn from UK stockpiles of *unsafeguarded*[6] materials held at locations such as Sellafield in Cumbria. These stockpiles include 'weapons-grade' plutonium, highly enriched uranium, depleted uranium, tritium and

---

3 The fourth boat of the SSBN squadron is assumed to be unavailable because it is docked for refitting, refuelling and/or essential repairs and thus unavailable.

4 The AWE Aldermaston and Burghfield are separate sites (by about 8 miles) although for the purposes of refurbishment and production of nuclear warheads the facilities at each of these sites are essential to the activity overall and, hence, in my description of the production, etc of nuclear warheads I shall refer to the sites jointly as *AWE Aldermaston/Burghfield.* The general split of responsibilities and activities is that, in the main AWE Aldermaston is the centre of research and development and the manufactory of the fissile components of the fissile pits and fusion fuels and blankets, and that Burchfield is where the final assembly of the nuclear warheads takes place.

5 This exchange is believed to be undertaken via the *UK-US Mutual Defence Agreement 1958 (as amended).*

6 Unsafeguarded – ie not subject to safeguards inspections, accountability, etc by the International Atomic Energy Aency under the terms of the Non-proliferation Treaty

other nuclear substances used in the fissile pit or heart of a nuclear warhead and, particularly, in the initiator component that boosts the nuclear detonation sequence. Consignments of these materials and sub-assemblies are regularly transported to and from AWE Aldermaston and Burghfield.

20 As I have previously noted, prior to deployment on the SSBN boats, operations-ready nuclear warheads are stored at the RNAD[7] Coulport in the Clyde area and transferred, complete with the Trident missiles, onto the submarines at a secure loading jetty. The operational deployment at sea is typically three months, although this may extend to six months or more, and warheads might be held in pre- and post-deployment storage at Coulport for 3 to 5 or more years. Certain of the components and materials utilised in the warhead degrade with age and, particularly, the environmental conditions during the deployment period necessitate complete individual warhead assemblies being returned periodically to AWE Aldermaston/Burghfield for refurbishment. For this, consignments of nuclear warheads are routinely transported to and from Coulport to Aldermaston/Burghfield by road in convoys of vehicles under escort of armed troops.[8]

21 **FUNCTIONS AND ROLES OF AWE ALDERMASTON**

22 I have provided this briefest of outline of the UK's nuclear weapons system so that I might venture my opinion on the matters instructed by Mr Schwarz (para 6 and 7):

23 **a) CURRENT RESEARCH & PRODUCTION ACTIVITIES AT AWE ALDERMASTON/BURGHFIELD**

24 The current research, development and production activities are supposedly confined to maintaining the nuclear warhead arsenal and individual warheads *'safe and reliable'*, although these facilities and activities could extend beyond these limited functions.

25 Related to maintaining the strength and operational readiness of the Trident nuclear weapons arsenal, AWE Aldermaston/Burghfield will:

26 **Transport Movements:** AWE Aldermaston/Burghfield receives by road transportation materials and sub-assemblies from manufactories, stores, etc., of materials and components and receives and dispatches complete nuclear weapon assemblies to and from RNAD Coulport. The transportation of

7 RNAD - Royal Naval Armament Depot

8 *Driving Without Due Care and Attention* – 7 December 2003, Regina -v- Juliet McBride, Newbury Magistrates Court, 4 November 2004 - http://largeassociates.com/nukedriving.pdf

the weapon assemblies to and from Coulport is handled by the Ministry of Defence directly, although some AWE personnel accompany the convoys when in transit.

27 Refurbishment of existing warheads requires each individual weapon assembly being stripped down and components, with both conventional chemical and nuclear assemblies,[9] being replaced (or refurbished) from time to time.

28 **Refurbishment and Manufacture:** The production facilities at AWE Aldermaston/Burghfield enable the warheads to be stripped down under radiologically safe and secure conditions so that, as required, the basis fissile materials (the plutonium and uranium) can be processed and refined in account of time-related changes and 'contamination' of the fissile materials; the tritium and californium initiator radioisotopes can be substituted; the conventional explosive compressive lenses and packs replaced, the fissile pit assemblies refabricated and configured,; and so on and so forth. Both AWE Aldermaston and Burghfield sites include highly specialised plants and processes that enable existing warhead assemblies to be refurbished and, when the need arises, for entirely new warheads of the existing Trident design, and variants thereof, to be manufactured afresh.

---

9 A nuclear warhead may assume the form of either an atomic fission device, the atomic or A-Bomb, or a hydrogen fusion device, the thermonuclear or H-Bomb. The Trident nuclear warheads are hydrogen fusion or so-called H-Bombs.

The fission warhead achieves nuclear detonation by either firing together (a *gun* type) or uniformly compressing (*implosion* type) a core of fissile material. This fissile material comprises either highly enriched uranium (HEU), or a core of plutonium metal. Until the moment of detonation the fissile core or the warhead is held in a sub-critical spatial arrangement as two separate sub-critical masses (*gun*) or as a shell assembly (usually a hollow sphere or fissile pit – *implosion*). To initiate nuclear detonation conventional but high brisance explosive charges are fired to either propel the sub-critical masses together or to uniformly compress the fissile pit down to super-critical volume at which instance neutrons are generated within the core. In turn, these neutrons interact and generate more neutrons to seed a very rapid chain reaction, with each link of the chain liberating energy.

The atomic triggering assembly deployed in the Trident nuclear warheads is an implosion device with a fissile pit of plutonium. In the implosion warhead, the conventional explosive charges are arranged into a series of shaped lenses facetted around the fissile core, all of which are individually triggered to produce an inward coalescing shock front to push or squeeze on the core. The fissile core itself is encased within shells of zirconium alloy, beryllium and depleted uranium which serve respectively to maintain the fissile pit geometry, contain, reflect back the soaring neutron flux, and initially tamp the nuclear process. Within the assembly is an initiator that at the moment of the detonation sequence provides an abundance of neutrons to commence the nuclear process overall.

To prompt fusion, the H-Bomb warhead includes wraps of secondary stage of fusion fuel of deuterium, tritium and lithium overlaid in a blanket of depleted uranium. The nuclear process commences when the conventional high explosive lenses are detonated starting the compression process, and prompting fission of the atomic primary stage. The fissioning atoms vaporise the interior of the warhead casing forming a very hot and dense gas or plasma which in turn compresses the fusion fuel of the secondary stage. This in turn sparks fusion in the secondary stage by transforming lithium into tritium. The tritium fuses with deuterium, producing a great abundance of neutrons which ignite and irradiate the uranium blanket, trapping expanding fusion fuel between two blankets of exploding uranium in a fission-fusion-fission process which liberates enormous fusion/fission energy. The entire thermonuclear process of fission-fusion-fission in these two stages, and in repetitive blanket stages if incorporated in the warhead, occupies only a few micro-seconds.

Thus the innards or nuclear physics package of a fission-fusion warhead is a relatively simply but highly integrated assemblage of precision components. Some of these components are naturally radioactive (the fission core and the blankets) and other components are in concentrated form (the tritium). Also within the nuclear physics package are materials that are highly corrosive (lithium) and very toxic (beryllium), and others that are unstable in chemical (the high explosive lenses) and highly radiotoxic (plutonium) senses. The quantities involved for each Trident warhead of about 100 kiloton yield, includes a few kilograms of depleted uranium required to tamper and contain the early stages of detonation, a few grams of tritium-deuterium to initiate the nuclear sequence, and for the fusion stage, a fuel pack of lithium-deuteride, a few more kilograms of plutonium or enriched uranium, and a further 20kg or so of depleted uranium for the fusion-fission mantle. In physical size each warhead package complete is about the size of an office waste paper bin and, depending on its design function, will weigh upwards of 50-60kg.

29 In short, AWE Aldermaston/Burghfield is a manufactory of nuclear warheads.

30 When these nuclear warheads are deployed and if launched either singularly or in clusters to target or targets, the Trident nuclear warhead has the potential to wreak enormous levels of destruction and, as applied to an urban civilian population, it is an indiscriminate weapon of mass destruction that is consistent with the term *'weapon of mass destruction'* adopted by the UK government.[10]

31 In this respect, the statement of the Accused (Witness Statement of PC Payler of 10 March 2007, CPS1) that *"...you (AWE) have been making weapons of mass destruction"* was and remains entirely correct.

32 **Ongoing Research and Development:** As I have previously touched on, the current Trident nuclear weapons system comprises a number of independently-targetable warheads that are each programmed to home in on preselected targets within an accuracy of about 100m. It follows that with such delivery accuracy and knowledge of the type of target, coupled with the required damage severity, each homing nuclear warhead could be optimised or matched to the specific type of target in terms of the nature and severity of the damage inflicted.

33 In other words, the basic framework design of the warhead includes for varying the weapon's operational parameters, for example the magnitude of explosive yield; whether the detonation is to occur at altitude (air burst), at ground level or undersea; if it is to maximise emf[11] generation to disrupt electronic communications, etc.; if there is to be a greater emission of neutron irradiation (a radiation enhanced or the neutron bomb); and if individual warheads are to be deployed in clusters to maximise blast and the ensuing firestorm damage;[12] and so on.

---

10 For example, see HM Government Cabinet Office 'Iraq's Weapons of Mass Destruction – the Assessment of the British Government', 2002 – http://www.number10.gov.uk/output/Page 281.asp

11 emf – electro magnetic force or pulse which is capable of generating very high voltage potentials across conductors sufficient to burn-out unprotected electronic circuits, etc..

12 Target types will vary from deep bunkers acting as troop barracks, arsenals and/or military command centres for which ground detonating bunker-busting configuration is used; a mid-altitude air-burst against troop and equipment emplacements; relatively low yield a high neutron emission bursts against large troop deployment on open ground, multiple clustering over or nearby large urban areas to maximise radioactive fall-out downwind and firestorm damage; and so on. Different target matches will also require a specifically allocated warhead yield from the present maximum strategic 100 to 120kTon rating of the thermonuclear version of the UK warhead, reducing this yield to the so-termed 'sub-strategic' yield which is probably around 1 to 5kTon, 10 to 18 kTon and above depending on the particular warhead configuration.

34 In effect, the need to match the weapon to any target places an ongoing requirement to modify and adapt the weapon system, with this particularly applying to the nuclear warhead design, for example:

35 Obviously, as potential areas of geo-political conflict emerge there are likely to arise changing targeting strategies, and thus a requirement for optimisation and target matching of the nuclear warheads drawn from the UK nuclear arsenal.

36 There may be changes in the resilience of the various targeted facilities (deep bunkers, silos, etc) requiring a change to the warhead design (deep bunker busting, high-altitude, standoff, etc).

37 And similarly, there will be a requirement to review the nuclear weapon system functions and performance to match the development of counter-attack systems, and/or as the delivery systems develop and their accuracy improves.[13]

38 My understanding is that virtually all of the design and development work necessary to maintain flexibility and target matching of the UK's nuclear warhead is undertaken at AWE Aldermaston. The detail and extent of this work, being to some degree an iterative process could only, I believe, result in a steady progression and improvement of the UK Trident warhead, particularly in terms of reliability, adaptation and improving the flexibility of its range of operational theatres and its overall capabilities. This is quite contrary to the government's assertion that the *". . UK has no plans to upgrade or improve the capabilities of our Trident nuclear warheads"*.[14]

39 That said, I acknowledge that like any other manufactory there are ongoing research and development activities undertaken at AWE Aldermaston/Burghfield and elsewhere aimed at improving the safety and security of the warheads, component materials, and sub-assemblies and, more generally, to increase the efficacy and productivity of the manufactory. Such research and development activities are to be expected but would not,

13 This is because a nuclear warhead forms an integrated element of a weapons systems overall – the physical package of the warhead has to be capable of withstanding the rigours placed upon it by the delivery system, such as high rates of acceleration, vibration, shock loading etc., so even a small change in the way in which the delivery system functions and/or performs will require the nuclear warhead to be proved against that environment.

14 Mr Hoon, then Secretary of State for Defence, in response to a Parliamentary Question on 4 November 1999. In fact Crown ministers are very careful when describing ongoing work at AWE Aldermaston, referring *'The UK has its own programme (like to US Stockpile Stewardship Program) which is designed to maintain the safety and reliability of the UK Trident Warheads as well as preserving long term capability" – see Earl Howe, Lords Hansard, 12 February 1997, Col WA24.*

in themselves, justify the present diversity of the technological resources, both human and plant, maintained at AWE Aldermaston/Burghfield.

40 **b) WHAT IS PLANNED OR HAS BEEN DISCUSSED FOR THE EXPANSION OF AWE ALDERMASTON**

41 In addition to the Polaris launched *Chevaline* warhead until the 1990s the UK deployed variants of the WE 177 nuclear weapon in both naval (air drop bomb and as a depth charge) and air force roles air dropped from strike aircraft. Initially the WE 177 warhead was adapted to the Polaris submarine launched weapons system but was subsequently replaced by *Chevaline* which remained in service until it was eventually phased out in 1998 and replaced by the present Trident nuclear weapons system (ie the submarine launch platform, the Trident ballistic missiles, and the nuclear warheads).

42 The Trident nuclear warhead design is the UK's sole stockpiled nuclear weapon and it is only deployable from the SSBN launch platform, although there is some debate whether certain of the Trident warheads could be rendered tactical by uncoupling the fusion stage (a role previously fulfilled by the WE 177). It is believed that the Ministry of Defence may retain a remnant of the US-UK dual-key arrangement for other (US arsenal) tactical, nuclear warheads to be deployed by the British Army in a non-strategic role.[15]

43 United Kingdom armed forces also deploy other weapons delivery systems that are potentially nuclear capable. For example, Royal Navy attack (SSN) submarines (9 in total presently *Swiftsure* and *Trafalgar* class but with *Swiftsure* class lay ups in account increasing to 10 with the delivery of the 3 *Astute* class SSN submarines) are armed with Tomahawk TLAMs (Tactical Land Attack Missile) which are potentially nuclear-capable.[16]

44 Should the UK government choose not to renew the ageing Trident weapons system (SSBN submarines, Trident missiles and nuclear warheads) but retain a nuclear capability

15 In addition to the Trident submarine launch platform, the United Kingdom armed services have in place arrangements for, and are capable of deploying and firing artillery-sized (gun barrel) warheads procured by prior agreement from the United States nuclear warhead arsenal. This unpublicised arrangement is endorsed by the fact that several classes of British Army artillery pieces are nuclear capable.

16 The United States navy nuclear powered attack submarines deploy the nuclear capable version of the Tomahawk TLAM carrying the US W80 nuclear warhead of 1 to 300kton nuclear yield. To carry nuclear warheads some further modification would be required of the SSN submarine bow compartments and arming and fire control systems – it is unknown to what extent this nuclear capability has been built-in to the *Trafalgar* and *Astute* class submarines presently adapted to launch Tomahawk.

then, if the *'nuclear deterrent'* is to be maintained,[17] a need will arise to develop new nuclear warheads suited to the weapons delivery systems then to be in place and, of course, the weapons systems overall will be required to match the expected types of strategic and tactical roles as these are politically identified. A political decision on these issues has to be made on this issue by the latest in the next parliament if the launch platforms and nuclear warhead variants are to be designed and developed within the time frame.

45 In my assessment, developing a new warhead to suit some future role, perhaps a tactical warhead suited for delivery by a TLAM, would occupy AWE some 10 or more years whilst maintaining the existing Trident warheads fit for service until the Trident launch platform capability was withdrawn. The phase-out of Trident, essentially set by the end of the operational at-sea service life of the *Vanguard* class of SSBN submarine, commences about 2020 and becomes ineffective by about 2027,[18] although the withdrawal and replacement of Trident might be accelerated by other tactical and political considerations.

46 A minimum of a 10 year lead-in life for the replacement warhead design(s) would necessitate the re-equipping and resourcing of the AWE which, with construction delays, etc., would require the 'modernisation' of the Aldermaston site to commence from about 2000 to 2005.

47 Indeed, recent technological and human resources investment at Aldermaston and Burghfield[19] suggest to me that this modernisation is presently underway. This enables the AWE to pursue a development programme that will serve not just to improve the safety

17 The SDR (Strategic Defence Review) 1997, for example, stated that *'. . . for as long as Britain has nuclear forces, we will ensure that we have a robust capability at the Atomic Weapons Establishment to underwrite the safety and reliability of our nuclear warheads'*. It also concluded that *'. . it would be premature to abandon a minimum capability to design and produce a successor to Trident should this prove necessary'*. The 2003 AWE annual report says that AWE must *' . . maintain a capability to provide warheads for a successor system should Her Majesty's Government ever require one'*.

18 This is because to keep one submarine at sea at any time requires a flotilla of at least 3 and ideally 4 operational submarines.

19 The AWE Aldermaston development programme includes the installation of a super-computer, intensive recruitment in the science and engineering fields increasing the workforce by around 1,000 personnel and, particularly, the ORION laser high energy system which will enable conditions of nuclear fission and fusion to be replicated at miniature scale.

Essentially, the **Research and Development** facilities the installation of a supercomputer modelling suite for the simulation the fission and fusion detonation sequences; in support of the computer modelling, the **Orion Laser** presently in installation to replace the present HELEN laser, which provides insight and understanding of the physics of high-yield nuclear weapons (hydrogen bombs) work; the proposed **Core Punch Facility** is a substantial hydrodynamic test laboratory that simulates the implosion primary system of the fission stage of a thermonuclear warhead whereby the almost instantaneous processes are recorded by X-Rays; in the **Material Sciences** development will enable greater research into the role of the various nuclear and conventional materials utilised in the warhead and its casing. Burghfield is benefiting from new **Production Facilities** for the final stage assembly of production warheads; Aldermaston has a new fissile pit assembly and development facility, and in the pipeline are proposals for **highly enriched uranium (HEU)** component manufacture; a new conventional **High Explosives Handling Facility**, and a **Tritium Generator** which is to remove some of the periodic dependence upon the United States for this initiator and fusion component material.

of the existing nuclear arsenal of nuclear warheads[20] but that these facilities[21] are dual-capable and provide design and research capability for the development of new, generally (physically) smaller, nuclear warheads.

48 The introduction of this new capability at Aldermaston is very similar to the combined *Reliable Replacement Warhead* (RRW) and *Life Extension Program* (LEP) now underway in the United States. When reviewing the role of RRW the *House Armed Services Committee*[22] claimed that its value was that it *'reduces or eliminates the need for nuclear testing'* which is certainly not at all related to safety and reliability of an existing nuclear arsenal stockpile. In fact, the UK AWE equivalent of *RRW* design may be well established, sufficient to have been trialled in non-nuclear testing.[23]

49 **c) THE ACCUSED'S PROTEST IN RELATION TO PARLIAMENTARY DISCUSSIONS & DECISIONS**

50 The Accused held her protest at AWE Aldermaston during the morning of 10 March 2007.

51 In the previous week the House of Commons Defence Committee had published its report on the future of the UK nuclear deterrent[24] in response to the government's White Paper of December 2006.[25] Although welcoming the government's proposal to reduce the number of nuclear warheads stockpiles in the nuclear arsenal, the Committee was critical that the number of operational nuclear warheads deployed at any time on the SSBN launch platforms was not to be reduced, noting its uncertainty about the operational significance of reducing the arsenal strength but not the in-service deployment numbers.

---

20 This is the claim of proponents of the expansion at Aldermaston although there is no logical rational how ORION will contribute to this, since much of the function of this facility is to be used to seed the advanced computer simulations of the nuclear detonation sequences required as a design tool in the absence of nuclear testing.

21 The AWE Aldermaston development programme includes the installation of a super-computer, intensive recruitment in the science and engineering fields increasing the workforce by around 1,000 personnel and, particularly, the ORION laser high energy system which will enable conditions of nuclear fission and fusion to be replicated at miniature scale.

22 *US Congress, Senate Committee on Armed Services*, National Defense Authorization Act for Fiscal Year 2006. Report to accompany S. 1042. May 17, 2005.

23 On 23rd February 2006 a nuclear warhead device, designed and manufactured by AWE, was detonated in the Krakatau sub-critical test at the Nevada test site in America.

24 HofC, 9th Report, *The Future of the UK's Strategic Nuclear Deterrent*: *the White Paper*, 7 March 2007

25 There was also a related Parliamentary Question of 21 February, 2007 (Annex II: Prime Minister's Questions, February 21, 2007) in which Chris Mullin (Lab) asked *'What is my right hon. Friend's response to Mohamed ElBaradei of the International Atomic Energy Agency, who said recently that Britain could not modernise its Trident missile system and then credibly tell countries such as Iran that they do not need nuclear weapons?* to which the Prime Minister replied *'I should remind my hon. Friend of the non-proliferation treaty, which makes it absolutely clear that Britain has the right to possess nuclear weapons. As Mohamed ElBaradei is the custodian of that treaty's implementation, I think it would be a good idea for him to act accordingly.'*

52 Seemingly undeterred by the Defence Committee's critical findings, the government chose not to delay the motion that *'this House supports the Government's decision as set out in the white paper The Future of the United Kingdom's Nuclear Deterrent (CM6994) to take the steps necessary to maintain the UK minimum strategic nuclear deterrent beyond the life of the existing system and to take further steps towards meeting the UK's disarmament responsibilities under Article VI of the Non- proliferation treaty'*, putting this motion to the House on 14 March 2007, that is in the week following the protest of the Accused.

53 In the run up period to the 14 March parliamentary debate, a number of protests took place or were planned to take place at the nuclear-powered submarine base at Faslane, at the Scottish and Westminster parliament buildings, at AWE Aldermaston (which I understand was quite independent of action taken by the Accused), and in and around the approaches to the Palace of Westminster.

54 Although I do not know it to be fact, I assume that the Accused was aware of the timetable of parliamentary matters and that other protests were occurring and likely to take place around the second week of March 2007, thus coinciding with the debate of the government's motion in the House of Commons.

55 **d) NUCLEAR SITE LICENCE FENCE & BOUNDARY**

56 My understanding is that in accord with the *Nuclear Installations Act 1965* it is the responsibility of the Nuclear Installations Inspectorate (NII a division of HSE) to issue a *Nuclear Site Licence* to permit the operator of the site to undertake specified nuclear activities within that site.

57 The AWE Aldermaston site is defined to occupy the land shown by FIGURE 1 onto which is imposed a representation the nuclear site licence site boundary, being a fair copy of the AWE drawing OSR-C07220, Issue B of 24 January 2000 which is embedded in the Nuclear Site Licence N^{o} 77 of 29 March 2000 (NSL77).

58 I note here that OSR-C07220 may not be the same as the two maps (Exhibit DB/1 and DB/2) referred to by Daniel Bamford in his CPS1 statement of 12 April 2007, but that it is the same as the AWE drawing referred to by Steve Kochli in his statements of 24 April 2007 and 17 May 2007.

59 I understand that the charge against the Accused is that she did trespass on a site designated or protected SOCPA 2005[26] and, specifically, that the '*protected*' site means (in this instance) a *nuclear site* for which a *nuclear site licence* is in force.

60 Applied to AWE Aldermaston, I take this to mean that the *nuclear site* is that specifically defined by the AWE Drawing OSR-C07220 and as specified by NSL77 (para 57) for which the offence of trespass would apply. Put another way, in terms of SOCPA it is the site boundary defined by *Cl*128.1(1A)(a) *'a nuclear site'* that applies and not *Cl*128.1(1A)(b) *'a designated site'* to be defined by the Secretary of State.[27]

61 Referring to the NSL77, the licensee is required to mark the boundary of the licensed site (Cl 2.4 of NSL77) with fences or other *'appropriate means'*. Other than that, NSL77 does not specify the type of fencing it requires to enclose the site other than that the *'licensee shall make adequate arrangements to prevent unauthorised persons from entering the site'*.

62 Not untypically, licensed nuclear sites such as nuclear power stations, are enclosed by a single perimeter fence - a typical boundary fence installation is shown Bradwell nuclear power station (Essex) by FIGURE 2. On FIGURE 2 the dashed line --- marks the NSL for Bradwell whereas the other inner compounds have been added since the events of 9/11 for additional security (but not specifically to improve nuclear safety) – these additional security measures are at the direction of the Office for Civil Nuclear Security (OCNS) and not strictly under the terms of the NSL as granted by the NII.

63 My point here is that in terms of ensuring nuclear safety – that of protecting members of public from radiation exposure, being emitted from the nuclear plant during normal, day to day operation[28] – the NII consider a single fence line to be sufficient and it is this single fence that defines the perimeter of the NSL. Any additional fencing, either within the NSL, as at Bradwell, or outside the NSL fence considered necessary to improve security is not a

26 SOCPA - Serious Organised Crime and Police Act 2005

27 My understanding differs from that of Martin Edmundson in his statement of 19 March 2007 wherein he opines that SOCAP (*sic*) applies to the outer perimeter fence.

28 It might be argued that the main intention of the NII requirement to fence the site is to keep members of public out for their own good. This is because in terms of radiological controls (ie the radiation dose received or exposure) there are applied via the *Ionising Radiations Regulations 1999* different annual limits of permissible whole body equivalent exposure for employees (20mSv per annum) and the public (1mSv per annum) – these are applied on the basis that the workforce can be closely monitored and investigation of whether the cause of exposure triggered by early intervention (at >12mSv per annum projected). The NSL might also require further definition of areas, such as *'Supervised'* and *'Control Areas'*, within the plant that have higher levels of radiation and which may be permanently or temporarily fenced off. In other words the perimeter fence of a NSL (and any compounds within) is there to demark different zones of radiological management and not primarily for security reasons.

matter of the nuclear safety issues determined in the NSL so, accordingly, such additional fencing does not define, or indeed, redefine the perimeter of the NSL.

64 At AWE Aldermaston the boundary is marked by two fences, inner and outer fences with a sterile zone between. FIGURES 3 and 4 are photographs taken from outside the *outer* fence viewing into the *inner* fence (that is as a member of public would look into the site from the public space outside the site). Both photographs show a yellow background notice affixed to the *inner* fence – on FIGURE 3 the yellow notice states *'You are entering a Nuclear Licensed Site'* and on FIGURE 4 *'Nuclear Licensed Site'*.

65 My interpretation of the positioning of these notices on the *inner* fence (and there are many more similarly affixed around the site) is that it is the *inner* fence that defines the NSL boundary of AWE Aldermaston.

66 In fact, the Health & Safety Executive (HSE) confirms this when referring to the other AWE licensed nuclear site at Burghfield[29] (there being no obvious reason why the same should not equally apply to AWE Aldermaston):

> *" . . . It is normal for licensees to erect fences coincident with the site boundary . . . and to label the fence showing that it marks the boundary of a nuclear licensed site. This is to prevent inadvertent unauthorised public access on safety, not security, grounds. The signage is therefore applied to the outside of the licensed site fence or boundary markers and is normally placed so that whichever*

29 In the following e-mail, the HSE (NII) states:

> **From:** Andy.Lindley@hse.gsi.gov.uk
> **To:** juliet%macbride.org.uk%HSE@hse.gsi.gov.uk
> **Sent:** Wednesday, November 21, 2007 10:37 AM
> **Subject:** RE: AWE Burghfield
>
> Dear Ms McBride
>
> The nuclear site licence has a number of conditions attached. Condition 2 is entitled "marking the site boundary" which requires the licensee to "...prevent unauthorised persons from entering the site..." and to ".....mark the boundaries of the site by fences or other appropriate means..."
>
> It is normal for licensees to erect fences coincident with the site boundary (although there are some sites where this cannot be done - where there are public rights of way for example - and marker posts are used to supplement the fence) and to label the fence showing that it marks the boundary of a nuclear licensed site. This is to prevent inadvertent unauthorised public access on safety, not security, grounds. The signage is therefore applied to the outside of the licensed site fence or boundary markers and is normally placed so that whichever direction a member of the licensed site approaches the site at least one sign can be seen. Security of licensed sites is not covered by the nuclear site licence.
>
> Regards
>
> Andrew Lindley

> *direction a member of the licensed site approaches the site at least one sign can be seen. Security of licensed sites is not covered by the nuclear site licence. . . "*
>
> [my truncation]

67 Again referring to AWE Burghfield, the HSE differentiates between the NSL fence and any security fence:[30]

> *" . . . The new perimeter fence which AWE has erected is **well outside** the licensed site at Burghfield and as such is not a matter for NII and is covered by the local planning authority. The nuclear licensed site fence has not been replaced or relocated and is well signed as required by the licence conditions . . . "*
>
> [my truncation but original emphasis]

68 Applied to AWE Aldermaston, the fence that has the NSL notices affixed, that is the *inner* fence, defines the Nuclear Site Licence (NSL) perimeter, whereas the *outer* fence is superfluous to the requirements of the *Nuclear Installations Act 1965*. In respect of the alleged trespass, the SOCPA *'protected'* site is that which corresponds to the NSL site so, it follows, that to trespass on the SOCPA protected site the Accused would have to cross or pass over the *inner* fence.

69 **SUMMARY OF MY OPINION AND CONCLUSIONS**

70 In conclusion, I consider that:

---

30 **From:** Andy.Lindley@hse.gsi.gov.uk
To: juliet%macbride.org.uk%HSE@hse.gsi.gov.uk
Sent: Tuesday, November 06, 2007 3:13 PM
Subject: RE: AWE Burghfield

Dear Ms McBride

The nuclear licensed site at Burghfield is **a small part** of the overall Burghfield site and I (am speculating but) think that this is the reason why the drawings showing its location are considered sensitive. I have approached AWE on this but as you might expect am not expecting an answer in the very near future as AWE will have to speak with MoD etc. and so sent you the byelaws link thinking this may help you.

The new perimeter fence which AWE has erected is **well outside** the licensed site at Burghfield and as such is not a matter for NII and is covered by the local planning authority. The nuclear licensed site fence has not been replaced or relocated and is well signed as required by the licence conditions.

When I get an answer on the possibility of releasing the nuclear licensed site drawing I'll let you know but in the meantime I'm out of the office now until Monday 12th November.

Regards

Andrew Lindley
0151 951 3722

a) the current research and production activities at AWE Aldermaston provide for the design, improvement and manufacture of weapons of mass destruction – I consider that the research and development facilities presently in place at Aldermaston enable the AWE to advance and improve the capabilities of the Trident nuclear warheads beyond that of confining the activities to solely maintaining safety and reliability of the warheads;

b) the planned developments (some of which are currently in the process of construction and installation) of the AWE Aldermaston site, further increases AWE's ability to develop and produce new nuclear warhead designs, including tactical nuclear weaponry, all suited to possible future delivery systems than the current SSBN submarine launch platform;

c) in the week before the protest of the Accused, the House of Commons Defence Committee had published its 9th Report which was critical of the government's planning of the future of the United Kingdom's nuclear deterrent; for the week following government had already placed a motion on Trident for Commons debate, although it had set no time aside for Parliament to consider the Defence Committee 9th Report; and two or so weeks earlier the Prime Minister chose to snub Mohamed ElBaradei (Director of the International Atomic Energy Agency) for his public criticism of the UK for modernising its Trident system - in light of all of this political chicanery, a number of members of public protested, or were planning to protest, at key nuclear and naval installations so, in this respect, the alleged actions of the Accused might not be considered at all exceptional; and

d) if I am correct in my deduction, as endorsed by the HSE, that it is the *inner* of the two perimeter fences at AWE Aldermaston that defines the SOCPA protected site and since, according to PC Payler in his statement of 10 March 2007, the Accused had climbed *'up the inner fencing'*, but there is no mention of her crossing over the fence then I must assume that she could not have trespassed into the SOCA protected site.

JOHN H LARGE

LARGE & ASSOCIATES
CONSULTING ENGINEERS

DETAIL OF LOCALITY OF THE ALLEGED TRESPASS

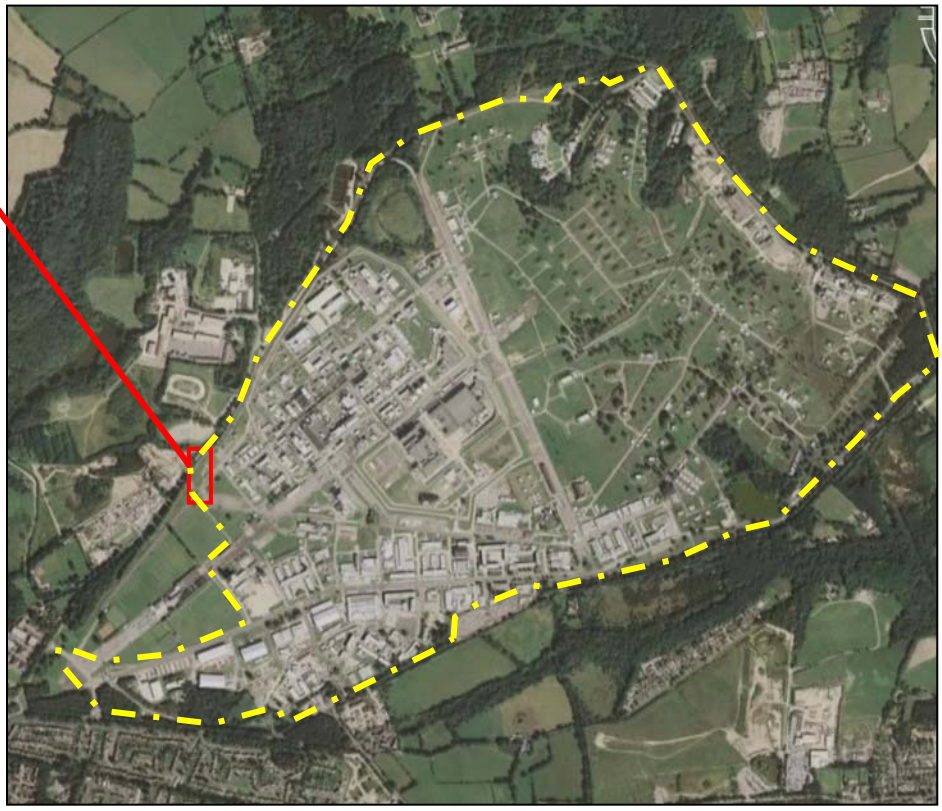
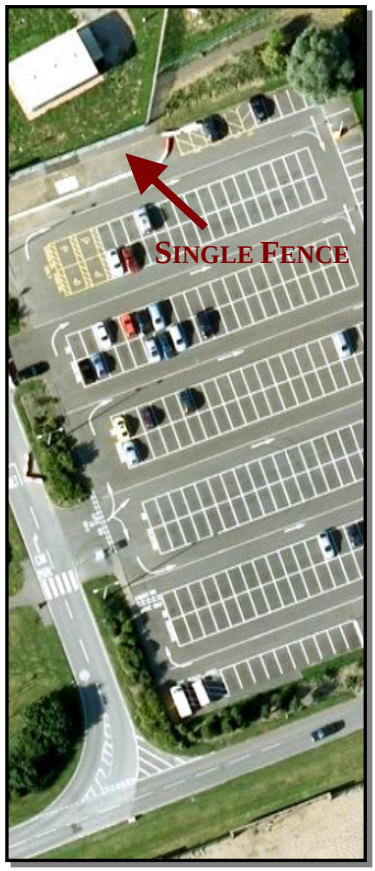


FIGURE 1 – AWE ALDERMASTON SITE

NUCLEAR LICENSED SITE BOUNDARY **APPROXIMATE**

FIGURE 2 BRADWELL MAGNOX POWER STATION – NUCLEAR SITE



DETAIL OF CAR PARK SHOWING SINGLE FENCE

FIGURE 3 – NUCLEAR SITE LICENCE NOTICE ON *INNER* FENCE

FIGURE 4 – NUCLEAR SITE LICENCE NOTICE ON *INNER* FENCE