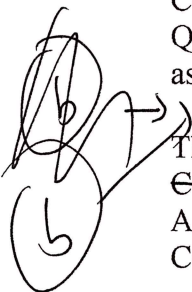


Targeting Trident and nuclear dependence

The town of Corsham in Wiltshire has been a place of secrets for over 70 years. Quarrying for Bath stone in the 19th and early 20th centuries left the area honeycombed with underground tunnels and caverns. In 1935 the Ministry of War converted these into underground ammunitions stores and factories. These had miles of conveyor belts. One store had its own underground rail system. During the Cold War part of this complex took on a new role. Spring Quarry was fitted out to serve as the alternative centre of government. In the event of nuclear war the Royal Family, Prime Minister and over 1,000 officials would all have been ferried to Corsham. The existence of this huge command bunker was only declassified in 2004.¹ The codename used for this bunker was changed every few years. It was initially called SUBTERFUGE, then BURLINGTON and was later known as SITE 3. Site 3 no longer has any military role. It was sold to a media company in 2005.

800 metres away from Site 3, at the end of a short lane there is an artificial mound with a doorway.² This leads underground into the Corsham Computer Centre or CCC. The centre is at the East end of the old Tunnel Quarry ammunitions store. The Quarry is an underground complex with a total area of 44 acres. It has not been used as an ammunition depot since the 1960s.



The Ministry of Defence (MoD) has never told Parliament the purpose of the ~~Corsham Computer~~ Centre. There is a reference to the facility in the 2001 National Assets Register. This says that the land, offices and plant of the Corsham Computer Centre are worth £29.8 million.³

The level of secrecy surrounding the centre has led to various rumours. One theory is that it carries out research into Unidentified Flying Objects. This is not completely wide of the mark. Inside the hidden complex scientists analyse how objects perform in space. But they are not studying UFOs. They are calculating the trajectories that Trident nuclear missiles would follow if they were launched towards their targets.

Two MoD logistical documents reveal the link between Corsham and Trident. They list the supply codes for installations involved in the Trident programme. One refers to the "Corsham Computer Centre" while the other includes the "Corsham Software Facility".⁴

Support for Trident is provided by the Strategic Systems Integrated Project Team (Stratsys IPT). The IPT is based at Abbey Wood in Bristol, 20 miles from Corsham. One of its functions is to provide the hardware and software for targeting Trident. In

¹ In 1998 the MoD would not reveal to Parliament the true purpose of Spring Quarry, saying only that until 1995 it had been used as "a bulk storage area with both military and civil communications facilities". Hansard 21 July 1998.

² The aerial photograph shows a car park for over 70 cars near the Centre which is on Peel Circus. Today there is a large housing development under construction North of the Centre. The development includes the car park site. In 2001 the MoD were granted planning permission to relocate a car park in Peel Circus. The security arrangements for Corsham were reviewed when the housing development was proposed - Hansard 5 December 2001.

³ In comparison Northwood is valued at £76 million. The value may not include computers.

⁴ Listing of Polaris/Trident Services, JSP 336 Vol 11 Part 8 Annex 20.1

http://www.ams.mod.uk/ams/content/docs/jsp336/3rd_ed/vol11/pt8/c20a20_1.doc

; Listing of Trident Customers and UINs Annex A to SCMI 2.32, 20 September 2006

http://www.ams.mod.uk/ams/content/docs/jsp336/3rd_ed/vol11/scmi/pg000054.doc

For Note

2000 the IPT issued a contract to Mass Consultants Ltd for the management of a highly secure computer centre.⁵ The facility concerned is the Corsham Computer Centre. The contract is worth £43 million and runs until 2010.⁶ Several IT companies are involved in the project.⁷

The leader of the Stratsys IPT is also the Chief Strategic Systems Executive (CSSE).⁸ One MoD document refers to the "CSSE Corsham User Community".⁹ This will include people who work in the Corsham Centre and possibly others who can access the system remotely.¹⁰

The document indicates that one function of the Corsham Computer Centre is to assess the performance and effectiveness of the Trident nuclear system.¹¹ This performance and effectiveness assessment work is broken down into three skill areas:

1. Nuclear Weapons Effects ^{Analysts} ~~A practitioner of this skill~~ uses computer programmes to calculate the effect of nuclear weapons on people, equipment facilities and infrastructure.
2. Nuclear Weapons Performance ^{Analysts} ~~Practitioners~~ produce assessments of the performance of Trident. This data is used in operational planning and in effectiveness studies. Those working in this skill area are expected to understand how accuracy, reliability and yield affect the performance of Trident.
3. Nuclear Weapons Effectiveness ^{Analysts} ~~Practitioners~~ use computer tools to analyse the effectiveness of Trident. They produce data files that are used in operational planning and studies. Those working in this skill area are expected to understand:
 - a. Fratricide. This is how one nuclear weapon can destroy another if they are aimed at the same target or at targets that are close together.
 - b. Threats to the system. This will include calculating the effects of Anti-Ballistic Missiles systems, particularly the one around Moscow.
 - c. Battle Modelling
 - d. Weapon interaction with targets and collateral facilities.¹²

⁵ Mathematic and Associated Scientific Services (Mass Consultants) www.mass.co.uk;

⁶ The contract accounts for almost 40 % of the turnover of Mass Consultants Ltd and could employ around 40 of their staff. The company employ around 100 people in total. Acquisition of Mass Consultants by Cohort plc, 2006.

<http://www.cohortplc.com/downloads/060727%20Acquisition%20of%20MASS.PDF>

⁷ In addition to Mass Consultants the other firms Matra Bae Dynamics, Computer Sciences Corporation, CSF Solutions, IBM and Planned Management Engineering. INSYS are not listed but are likely to provide support to Corsham.

⁸ The current holder of both posts is Commodore David Jarvis.

⁹ Nuclear Weapon Functional Competence; probably written in Abbey Wood.

<http://www.ams.mod.uk/ams/content/docs/peopacq/comframe/nuc/nucweap.pdf>

¹⁰ Mass Consultants say that they are seen as a member of Stratsys IPT to the "user community" and not as a contractor team. www.mass.co.uk

¹¹ Nuclear Weapon Functional Competence outlines essential skills required to maintain a nuclear capability. Experts in Performance and Effectiveness Assessment are expected to have worked for 3 years as practitioners in the CSSE Corsham User Community.

¹² Ibid.

The assessment procedures described above are part of the nuclear targeting process. Plans are drafted then assessed in simulations. Each draft is adjusted and run through a simulation until the plan is perfected.

If the MoD plans a nuclear attack on a facility in Iran then the Corsham Computer Centre will plot the precise trajectory of the Trident missile and its warheads. They will calculate how close to the target the warhead will land and then work out what damage is done to the target and how many people would be killed and injured by the nuclear blast. They will then plot the fallout from the explosion and determine how many people would be killed by the radiation and the extent of long-term environmental damage.

Corsham works in tandem with the Nuclear Planning and Operations Centre inside the MoD building in London. The US Trident planning system is also split between two sites.¹³ If the tasks are divided on the same basis as the American system, then the target plans are generated in London and processed and validated in Corsham.¹⁴ Corsham is probably responsible for the production of software for the whole system.¹⁵

In 1988 a report on Trident by the National Audit Office said – “proving the effectiveness of the system for UK purposes is dependent on the production in the UK of software for targeting, modelling and effectiveness assessment”.¹⁶ The ~~Audit Office~~ report revealed that the MoD was having problems recruiting people who were able to carry out this work. Six years later Roger Freeman, the Junior Defence Minister, said that this software work had been completed “using a mix of internal expertise and specialist contractor support”.¹⁷

→ But there is an arms regime →

In theory the experts at Corsham should be competent not only to select American tools but also to develop their own techniques and tools for assessing the effectiveness of Trident.¹⁸ In practice they are heavily dependent on US support.

The Applied Physics Laboratory of John Hopkins University in Maryland (APL) have “assisted the UK Royal Navy with evaluations of their FBM fleet” from Polaris to Trident.¹⁹ APL designed the system that collects data during all Trident missile tests. They have produced a detailed report on every missile test from a British submarine. APL analyse the electronic logs from all US Trident patrols and they produce the annual evaluation of the US Trident system. It is likely that APL analyse the logs from British patrols and produce a similar overall assessment of the British system. One of the key components of the Corsham system will be the US Trident Weapon System Accuracy Model. This is heavily dependent on data from APL.

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¹³ In 1994 the Defence Select Committee was told that the introduction of sub-strategic Trident would require an upgrade of the “shore-based target planning system” at a cost of £1 million. In 2004 the Defence Minister revealed that upgrades to this system cost an average of £250,000 per year, but in 2001-02 the cost was £584,000. The term “shore-based target planning system” could refer to the Corsham Computer Centre, NOTC, or both.

¹⁴ US target plans for Trident are generated at STRATCOM in Omaha Nebraska and processed and validated at the Naval Surface Warfare Centre, Dahlgren, Virginia.

¹⁵ In the US system Dahlgren is responsible for software for Trident.

¹⁶ Comptroller and Auditor General Report 1987 para 3.13, Q64.

¹⁷ Letter from Roger Freeman MP to Frank Cook MP, 22 August 1994.

¹⁸ Nuclear Weapon Functional Competence

¹⁹ John Hopkins APL Technical Digest Volume 19, Number 4 (1998)

<http://techdigest.jhuapl.edu/td1904/index.htm> FBM – Fleet Ballistic Missile.

for. Dahlgren to The Trident performance model used at Dahlgren include Accuracy, Trajectory, Emission & Power Plan;

The one company in the UK with a background of research into ballistic missile systems is Hunting Engineering. They played a leading role in the Chevaline system, deployed on British Polaris submarines in the 1980s and 1990s. They probably provide assistance to the Trident programme. However today the company is a subsidiary of the Lockheed Martin, the American firm who designed and built Trident.

In practice some components of the British system are purchased from the US and others are created with assistance from American contractors. The Fire Control software on the submarines is bought from the US Navy under the Polaris Sales Agreement.²⁰ US contractors assist in the development of the software for shore-based target planning and analysis.²¹ The same models lie at the heart of both the submarine and the shore-based components of the system. One contract shows that these reference, simulation and targeting models are purchased from the US.²² The programmers working in the Corsham bunker maintain, update and modify the American models so that they can be used in the suite of computer codes used in the British system.

Some US nuclear planning material is classified Top Secret SIOP-ESI and can only be handled by US citizens with the appropriate clearance. Software and documents that originally had this classification can be processed at Corsham and at the Nuclear Operations and Targeting Centre in London.²³ However the material is sanitised in the US before it is handed over to any British citizens.

The process for the computer models ^{for} used at Corsham is as follows:

- The models are created in America for the US Trident system. They include components which are US-only.
- The American software writers remove the US-only components to create models for the UK Trident system.
- An American contractor assesses the models and verifies that all US-only items have been removed.
- The models are transferred to the Corsham Computer Centre.
- Experts at Corsham integrate the models into their system and verify them.

²⁰ There are numerous references to the Fire Control software for UK Trident in contracts placed by the US Navy. The software is regularly revised. "Each new release of Trident fire control software is certified by the US Government under the terms of the Polaris Sales Agreement (as amended for Trident). Under the agreement, the UK has the capability to validate the software models for software performance and verify that the findings are correct. This is undertaken and independently verified by UK experts to ensure the software meets our requirements before being issued to Royal Navy submarines." Hansard 6 July 2006 reply by Des Browne.

²¹ "The UK shore-based target planning system for Trident is validated through a range of UK and US research programmes. UK experts then independently verify the system against requirements before issuing it to Royal Navy submarines" - Hansard 12 October 2006 reply by Adam Ingram.

²² Statement of Work for an Omnibus Contract for K Department Dahlgren;
http://www.egginc.com/seaportenhanced/TO/006/BP/K_Omnibus_SOW-Final.pdf

²³ The two points of contact for Top Secret SIOP-ESI information in Britain are the UK Strategic Targeting Cell in London and the Director General Strategic Weapons Systems (DGSWS) in Bath. The second reference is to the Corsham Computer Centre which is only a few miles from Bath. CJSI 3231.04C, 6 July 2004, listed in Compendium of Current CJSI Directives, 14 January 2005.

- The models are released for use at Corsham, on submarines and/or in the London targeting centre as appropriate.²⁴

The failure to be able to independently produce the software required for Trident leaves the system vulnerable to deliberate sabotage by the Pentagon. From an American perspective it would be understandable if they deliberately crippled the software to prevent Britain from using Trident without US approval. The process above shows that Corsham checks the software before it becomes operational. However it also reveals that there will be substantial holes in the programme code, data tables and the software manuals where every reference to US-only components has been removed. Because the system includes these highly classified gaps, the British experts cannot really verify that it has not been crippled to prevent Britain from launching Trident outwith US plans.

6 The site for the Corsham Centre ~~has~~ *is* carefully chosen. It is inside a deep bunker, ~~to~~ *2* providing ~~some~~ protection in the event of a nuclear attack. It is also less than 500 metres from the hub of the British military communications system at Basil Hill Barracks. Basil Hill controls the communications system at the operational ~~headquarters~~ *links* in Northwood and will have high-grade secure ~~communications~~ *to the* MoD building in London. ~~They will also have access to a wide range of systems that could be used to send targeting instructions to Trident submarines.~~ Basil Hill is also the focal point for MoD cryptography work. *Control VLF*

Assessment of the Trident system is probably not all that goes on in the Corsham Centre. The equivalent US facility at Dahlgren ~~does not just produce and analyse the software for Trident.~~ It also generates the targeting data. This comes in two forms. *(a)* Prearranged targets plans are produced on Magnetic Tape Catridges. These are taken on submarines when they sail on patrol. *(b)* Radio messages to attack targets at short notice are created in the form of Targeting Change Messages.

It is likely that the Corsham Computer Centre produces not just the software for British Trident submarines but also the highly classified target data. ~~This can be produced in the form of magnetic tapes or radio messages.~~ It is likely that specialised US software is used to format and compress the data.²⁵

²⁴ "For the QA of UK models, the contractor shall assist K52 by analysing the software, data and documentation to verify that all US-only items have been removed" - Statement of Work for an Omnibus Contract for K Department Dahlgren; "The ~~UK shore-based~~ target planning system for Trident is validated through a range of UK and ~~US research~~ programmes. UK experts then independently verify the system against requirements ~~before issuing it to Royal Navy submarines~~" - Hansard 12 October 2006 reply by Adam Ingram.

²⁵ One US contract refers to the software for the UK SCSI Media Generation System for Trident.