

Devonport

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Devonport, in the city of Plymouth, is home to both a Royal Dockyard operated by the company Babcock Marine, and a Naval Base run by the Ministry of Defence and serviced by Babcock Marine*. The Dockyard has been a refit facility for nuclear powered submarines since the 1970s and it is here that the four British Trident nuclear weapons submarines undergo refits. After around ten years of service each of the four submarines (HMS Vanguard, Victorious, Vigilant and Vengeance) dock unarmed at Devonport. The refit involves the refuelling of the submarine's nuclear power reactor. The spent fuel rods (highly radioactive) are removed from the submarine and replaced and the whole system is overhauled and updated. Officially this whole process is termed the 'long overhaul period (refuelling) or LOP(R)'.

As the first to be launched, HMS Vanguard was the first to go into refit in February 2002 – the refit took 3 years 6 months. Victorious was next and her refit took 3 years and 8 months (starting January 2005)¹. Vigilant is currently undergoing a refit (started October 2008) and Vengeance will follow once this is completed. Each submarine is powered by a PWR 2 (Pressurised Water Reactor) nuclear reactor. At each Trident submarine's refit, a new reactor core 'Core H' (made by the Rolls Royce plant in Derby) is being fitted. The old reactor core is moved to Sellafield to be stored, as are the spent fuel rods. The new reactor core is designed so that the submarines will not need to be refuelled again in their lifetime. As well as installing a new reactor core the Royal Navy website shows the extent of the refit work on HMS Vigilant:

'The work programme will involve a major

equipment overhaul, installation of improved strategic weapons system equipment, integration of the tactical weapons submarine command system (next generation) ... and 80 other submarine design alterations and additions.'²

The reactor heads (a steel dome 3ft thick and 9ft in diameter weighing up to 28 tonnes) of the Vanguard class submarines are being removed and replaced during refit to allow the submarines to be refuelled. In early 2009 it was reported that the reactor head (considered to be low level radioactive waste) removed from HMS Victorious was being cut up at Devonport. According to Royal Navy sources, this was the first time that such a thing has happened in the UK³. Concerns have been raised that carrying out such work at the Dockyard is not appropriate in a city location and that it will lead the way for the cutting up of decommissioned submarines (including the whole reactor compartments) at the Devonport Dockyard (see below for more information). A 2003 public consultation commissioned by the MoD showed that respondents were insistent that 'the management and storage of nuclear waste should not take place within a city, in close proximity to housing, schools and hospitals.'⁴

Radioactive discharges

Radioactive discharges (airborne released in gas and liquid released in water) are emitted from the Dockyard and mainly contain the radionuclides carbon-14, cobalt-60 and tritium. Liquid radioactive waste is discharged via pipeline into the river Tamar and is likely to contain Tritium. Tritium is a radioactive element

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*Babcock Marine also provides services for Faslane Naval Base where Trident submarines are based and Rosyth naval dockyard

created in the core and coolant system of the nuclear power reactor in the submarines. The coolant water is released from the submarines whilst they are undergoing refit. In the Vanguard class submarines the water coolant is sealed in the reactor units for much longer so it becomes more radioactive. This is to avoid its detection in sea water, giving away the position of the submarines when at sea. This has meant that the discharge agreed by the Environment Agency is over five times more radioactive than previously allowed and so the MoD's operational considerations increase the risk to people in Plymouth. As the increased discharges were authorised without advance consultation with the European Commission, as expected under Euratom Treaty legislation, the European Commission decided to refer the case to the European Court of Justice in 2003. However, the UK government has argued that military facilities are exempt from such rules⁵. A 2005 ruling by the European Court of Justice on nuclear waste from the decommissioning of a small reactor at the former Greenwich Royal Naval College agreed that military sites can be exempt as the Euratom Treaty only applies to the civil use of nuclear power⁶.

Although radioactive discharges from Devonport are said to be comparatively low level, there are concerns that Tritium may be more harmful than previously thought⁷ (it is also discharged from nuclear power stations throughout the world). Research carried out by the Health Protection Agency in 2007 led them to recommend that the maximum acceptable dose limit (set by the International Commission on Radiological Protection) be doubled and noted that although 'Tritium is not highly radioactive', 'it can become widely dispersed in the environment'⁸. A 2004 study by Green Audit suggested that historic radioactive discharges may have already contributed to increases of cancer incidence in the wards close to the dockyard.⁹

Accidents

Accidents relating to the nuclear powered submarines docked at Devonport also raise safety concerns among local people regarding increased radioactive contamination of their environment. Between 1980 and 1998 ten nuclear leaks were reported at Devonport with 570 litres of radioactive liquid lost overall, including a spill of 350 litres in 1985¹⁰. Since then there have been more radioactive leaks: in 2005 refit work was temporarily suspended on HMS Victorious after two radioactive leaks in one week,

although they were said to have been contained within the dock, one was a spillage of 20 litres; in November 2008, around 280 litres of radioactive coolant poured into the river Tamar from a broken hose from HMS Trafalgar; in March 2009 there was a minor leakage onto the casing of HMS Turbulent¹¹.

Obsolete submarines

Decommissioned submarines (those that have been taken out of service) undergo a process called Defuel, De-equip and Lay-up Preparation (DDLDP) before being stored afloat. Devonport is home to eight obsolete submarines (four of which are still to be defuelled), Rosyth dockyard is home to seven (see table below). Project ISOLUS (Interim Storage of Laid Up Submarines) renamed the Submarine Dismantling Project (SDP) was set up in 2000 to solve the problem of what to do with these obsolete submarines. Storing them afloat is not a long term storage solution; capacity for storage afloat at the dockyards will be full by 2020¹² and the government has yet to determine what to do with the intermediate level radioactive waste, in particular from the reactor compartments from these submarines. The project's remit encompasses a total of 27 submarines that will need to be dealt with by 2040. Future nuclear-powered submarines such as Astute are not included, however 'any facilities provided as part of the SDP will retain the flexibility to accommodate future classes of submarines if required'¹³. In the long term, the recommended plan for all sources of intermediate and higher level nuclear waste is to store the waste in a geological repository (underground storage) however no such repository has been built yet anywhere in the world. Such facilities in the UK are unlikely to be ready for 100 years and there is even uncertainty about whether ultimately they will be viable.

The decision about what to do with the radioactive reactor compartments (each the size of two double-decker buses and weighing around 750 tonnes¹⁴) from so many submarines is central to the SDP. The reactor compartments could be cut up and the radioactive waste packaged and stored until an underground repository becomes available. But Plymouth people are generally averse to this happening in their area (as explained by the consultation mentioned earlier¹⁵), as cutting up the reactor compartments may increase radioactive contamination of the environment. Another option would be to store the reactor compartments intact until a long term repository

Britain's nuclear powered submarines

Obsolete stored afloat at Devonport	Obsolete stored afloat at Rosyth	Currently in service	Planned
Valiant Warspite Conqueror Courageous Sovereign* Splendid* Spartan* Superb*	Dreadnought Resolution Repulse Renown Revenge Churchill Swiftsure	Sceptre Trafalgar** Turbulent Tireless Torbay Trenchant Talent Triumph Vanguard Victorious Vigilant Vengeance <div style="display: inline-block; vertical-align: middle; margin-left: 10px;">] Trident nuclear armed </div>	7 Astute class 4 Vanguard class replacement
*Awaiting defuel		**Due to be decommissioned in 2009	

becomes available (the SDP project envisages 60 years) and at that point they could then be cut up into smaller parts which could be packaged. In this way radioactive levels would decrease prior to the work being carried out. Local people also fear that the interim storage facilities of the waste might be located in their environs too.

The SDP is ongoing and due to receive 'Main Gate approval' in 2014¹⁶ – the point where contracts and investment will be agreed for the project. Before then an Environmental Strategy Assessment report is expected by early 2010 with a public consultation also planned.¹⁷ In the meantime, the future is uncertain for Devonport.

Costs

In the early 1990s, Devonport Dockyard was chosen over the dockyard in Rosyth in Scotland to carry out refit work on the Trident submarines. This was a controversial decision as Rosyth had formerly carried out all major nuclear submarine refits (including the previous Resolution class of nuclear weapons submarines) and the MoD had already spent more than £100 million on the construction of new submarine facilities there in advance of receiving the work. A major construction programme had to be undertaken at Devonport to ready it for the first Vanguard refit in 2002 – this included a new ship lift to raise the submarines out of the water, and nuclear reactor decontamination buildings¹⁸. Technical problems with the programme meant that some of the large cost overrun –

£890 million worth – had to be met by the MoD¹⁹. Work on the facilities at Devonport is still ongoing; in 2008 the MoD announced that a new defueling facility will be built at a cost of £150 million²⁰. Vanguard and Victorious refits have each cost about £300 million^{21 22}.

Most of the citizens of Plymouth do not gain from the enormous financial investments and refit work at the Devonport Dockyard. Parts of the Devonport area are in the top 1% most deprived areas in England. Plymouth itself has higher than average homelessness, income deprivation, and children living in poverty²³. It is estimated that employment directly related to refit work has dropped by 34% from the 1990s to 2006 and overall employment has declined by over 50% (from 10,000 jobs to 4,700)²⁴. Further job losses are likely with the Defence Secretary announcing in 2009 that Devonport would lose its role as the base for hunter killer submarines (those carrying conventional arms). Over time, these submarines will join the Vanguard class already at the Faslane Naval Base on the Clyde in Scotland to make it the sole base for all British submarines. Also announced was the news that Devonport would lose its status as base for the Royal Navy's frigates with Portsmouth to become the 'main operating base for our most complex warships.'²⁵ On refit work, new Astute class submarines are being fitted with 'long life' cores that do not need refuelling. This will therefore reduce the scale of the refit needed for these and future submarines (planned Trident replacement vessels) so further decreasing employment opportunities at the Dockyard.

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