

# THE TRIDENT SHAMBLES



**REALLY**  
YOU WON'T BELIEVE IT !

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## **The Trident shambles**

The Trident renewal programme is not only politically controversial; it is also in a state of chaos. Throughout its first nine years this huge and very expensive project has been badly managed. The Ministry of Defence (MOD) have significantly downplayed the true cost and underestimated how long it will take to build nuclear-armed submarines. Among other things, a serious defect found at the submarine prototype reactor in Dounreay in 2012 has disrupted the Navy's nuclear plans and staff shortages are compounding the problems of this troubled project.

### **Key points**

- The basic procurement cost has jumped from £15-20 billion to £41 billion
- The Main Gate decision was delayed, then replaced by “staged investment”
- The in-service date of the new submarine has been postponed from 2024 to “early 2030s”
- Vanguard class submarines, which had a design life of 25 years, are due to be kept in service and on patrol for 38 years
- Major restructuring suggests that the defence nuclear programme has been badly managed
- A Fuel Element Breach at the submarine prototype reactor in 2012 has had a major impact on the nuclear submarine programme, including the new Successor submarine
- The new facility for manufacturing nuclear fuel cores has been postponed from 2021 to 2026

- Rolls Royce are having major problems developing the reactor for the Successor submarine because of a shortage of key staff
- The UK paid most of the initial cost of developing the Common Missile Compartment (CMC), but CMC is now scheduled to enter service with the US and UK Navies around the same time
- The new submarines will carry 8 missiles, but will be built with 12 missile tubes
- The Successor submarine is likely to follow the example of Astute – late and over budget
- The Atomic Weapons Establishment is badly managed and there are similar problems with the US nuclear weapons programme
- The equivalent submarine programme in the US, Ohio Replacement, is a major financial headache for the Pentagon
- A new missile would be needed, in due course, for the new US and British submarines, but this requirement has been deliberately ignored.

### **Scope of the Trident renewal programme**

The Government presents the Trident renewal programme as if it is restricted to the replacement of Vanguard class submarines by four new Successor submarines. However the overall project is wider. In June 2007 David Gould, Chief Operating Officer at Defence Equipment and Support, was responsible for Trident renewal. He told a gathering of industry representatives: “This afternoon we are going to outline our plan to maintain the UK’s nuclear deterrent. The intention is to replace the entire Vanguard Class submarine system. Including the warhead and missile.”<sup>1</sup> There is a very substantial and expensive programme to renew nuclear warhead facilities at the Atomic Weapons Establishment (AWE). This rebuilding work has been hampered by problems and delays. The Government tries to pretend that this is unrelated to Trident renewal.

## Cost

The Trident renewal programme was initiated in December 2006 with an exchange of letters between Tony Blair and George W Bush. In March 2007 Parliament endorsed the plan, on the basis that the work would cost between £15 and £20 billion. The following year the National Audit Office (NAO) expressed serious concern about the accuracy of the cost estimates and the lack of contingency funding. These issues were raised again by the Public Accounts Committee when they questioned officials on the NAO's report in 2009. Despite this, a series of ministers have repeated similar figures, adjusted for inflation, for the cost of Trident renewal between 2007 and 2015. For example, in 2011 Liam Fox said that there had been no real cost growth in the submarine element of the programme.<sup>1</sup> The 2011 figures, which included inflation, were repeated in January 2015.

In 2011 the Government appointed the businessman Bernard Gray to the post of Chief of Defence Material, in the light of a series of problems with major defence projects including the Queen Elizabeth class aircraft carriers. When his appointment came to an end, in November 2015, Gray explained that he often found himself challenging entrenched positions. With regard to Trident, he said, "Some of the most difficult confrontations I have had to have in this job have been arguing with people because they were being unrealistic about the numbers".<sup>2</sup> There was an Alice in Wonderland culture within the MOD, divorced from reality.

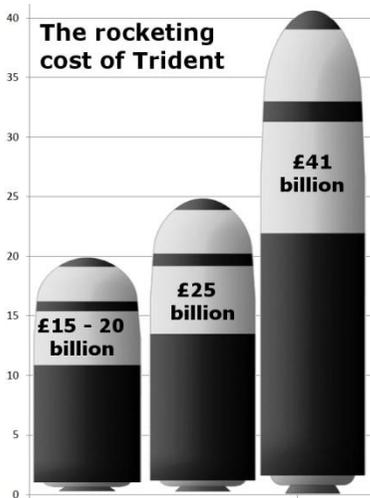
The Strategic Defence and Security Review (SDSR), published in October 2015, announced a dramatic increase in the cost of the Trident renewal programme. The procurement cost jumped from £25 billion to £31 billion.

A further £10 billion was set aside as contingency funding, bringing the total to £41 billion. There has been no substantial change in what is proposed for the replacement system. Defence Procurement Minister Philip Dunne said that the new figures were the “first really rigorous estimate of costs”.<sup>3</sup> The only conclusion that can be drawn is that the expenditure estimates presented to parliament in December 2006 were not rigorous and were unrealistically low.

Increasing procurement cost of Trident renewal

<b>Source</b>	<b>Basic cost</b>	<b>Contingency</b>	<b>Total</b>
Future of United Kingdom’s Nuclear Deterrent (Dec 2006)	£15-20 billion	-	£15-20 billion
Statement by Philip Dunne (20 January 2015)	£25 billion	-	£25 billion
2015 Strategic Defence and Security Review (23 November 2015)	£31 billion	£10 billion	£41 billion

*Note: The December 2006 figure is at 2006/07 prices. The figures given for January and November 2015 are outturn costs, ie including inflation.*



These costs are not comprehensive. They only cover basic procurement, not the cost of rebuilding AWE or running costs. In 2007 the Defence Committee was told that when the new system was in-service annual running costs would be £1.5 billion per year. In January 2016 the House of Commons Library published a revised estimate of annual running costs of £2.3 billion at 2015/16 prices.<sup>4</sup> Calculating the total through-life cost involves taking account of two other factors. One is the planned life of the Successor Submarine. The Vanguard class now have a projected life of 38 years.<sup>5</sup> One of the advantages of adopting the PWR 3 reactor design for the Successor is that it would give it a longer life. A presentation from Babcocks shows that the Successor was expected to be in service for 39 years.<sup>6</sup> This suggests that running costs would be in the region of £90 billion at 2015/16 prices. When inflation is taken into account then the total will be significantly higher. Crispin Blunt MP, Chair of the Foreign Affairs Committee, calculated that the total through-life costs of Trident renewal, taking account of inflation, would be £167 billion.

### **Key Milestones (Initial and Main Gate)**

MOD procurement programmes have several milestones. The critical one is the Main Gate. This is preceded by the Initial Gate which approves design and assessment work. The Initial Gate for Trident renewal was postponed from September 2009 to May 2011.

When Parliament endorsed the Trident renewal programme, in March 2007, it was made clear that the main contracts for the construction of submarines would not be signed until after the Main Gate. The Main Gate was postponed from 2012-14 to 2016. The 2015 SDSR announced that there would no longer be a Main Gate but a “staged investment programme”. At the same time, Defence Minister Michael Fallon told MPs that there would be a debate in 2016 on plans for the successor and on the principle of keeping one submarine on patrol at all times.

Changes to Key Milestones

<b>Source</b>	<b>Initial Gate decision date</b>	<b>Main Gate decision date</b>
Future of United Kingdom’s Nuclear Deterrent (December 2006)	-	2012-14
National Audit Office Report (November 2008)	September 2009	2014
2010 Strategic Defence and Security Review (October 2010)	By end 2010	2016
Initial Gate Parliamentary Report (May 2011)	May 2011	2016
2015 Strategic Defence and Security Review (November 2015)	-	Replaced by “staged investment”

The delay to these key milestones has not meant a halt to spending. A total of £4 billion was being spent prior to the anticipated Main Gate decision. The decision to abandon the Main Gate will mean that even more money will be spent on an ad hoc basis without parliamentary scrutiny.

**In-service date of Successor submarine**

The 2015 SDSR announced that the timescale for the replacement submarine, called the Successor, had been put back. In 2006 the plan was for the first of the new vessels to be in service by 2024. In 2010 this was postponed to 2028. The SDSR pushed the date back to “the early 2030s”. The review also said that the first of the current Vanguard class submarines to be retired would be withdrawn from service in the 2030s. The Successor submarine does not have to be available until the second Vanguard class submarine has been decommissioned. If the first vessel

was retired in 2030 then the second would probably not be taken out of service until around 2032. This would be a new delay of 4 years.<sup>7</sup> The programme is now running 8 years behind the schedule published in December 2006. So in its first 8 years the project has managed to accumulate delays of 8 years.

Delays to the in-service date of the Successor submarine

Source	In-service date
Future of United Kingdom’s Nuclear Deterrent (December 2006)	2024
2010 Strategic Defence and Security Review (October 2010)	2028
2015 Strategic Defence and Security Review (November 2015)	early 2030s



Trident replacement planned in-service date: 2019 > 2024 > 2028 > 2032

## **Vanguard class submarine life-extension**

The current fleet of Vanguard class submarines had an original design life of 25 years. The 2006 White Paper said that the lives of the Vanguard class would be extended by five years. The plan was that HMS Vanguard would be retired in 2022. The second Vanguard class submarine, HMS Victorious would be decommissioned in 2024 and at this point the Successor submarine would enter service. The White Paper dismissed any prospect of further life extension, “continuous deterrent patrols could no longer be assured from around this latter point if no replacement were in place by then”.<sup>8</sup>

Despite this, the 2010 SDSR said that the life of the Vanguard class could be extended and that “we can safely operate them into the late 2020s and early 2030s” with the Successor entering service in 2028. The 2015 SDSR then announced a further extension saying: “The Vanguard class of nuclear-armed submarines will begin to leave service by the early 2030s”.<sup>9</sup>

Admiral Lord West has criticised stretching the life of the current vessels, describing it as “bloody dangerous”<sup>10</sup>. He said in the House of Lords - “Running Vanguard on until 2028 was further than many of us wanted to do and was very high risk. Has advice been given that people are content to run Vanguard on for what sounds like another four or five years? That is certainly contrary to the advice that I thought we were getting in the Ministry of Defence some five years or so ago.”<sup>11</sup>

The table below suggests that the MOD now plan to keep Vanguard class submarines in service for 38 years, well beyond the 25 year life for which they were designed.

Delayed decommissioning of Vanguard class

<b>Source</b>	<b>In-service date for Successor</b>	<b>Age of HMS Victorious at decommissioning</b>
Original projection	2019	25 years
Future of United Kingdom’s Nuclear Deterrent (December 2006)	2024	30 years
2010 Strategic Defence and Security Review (October 2010)	2028	34 years
2015 Strategic Defence and Security Review (November 2015)	2032? (early 2030s)	38 years

This table assumes that the Vanguard class would be withdrawn from service in the same order that they were built and that the key date would be when the second submarine to be built, HMS Victorious, was no longer available. In the light of the current refit/refuelling programme this assumption may not be correct, in which case some submarines would be in service for even longer.

Resolution class Polaris submarines were dogged with problems in their final years.<sup>12</sup> The Government of the day did not make the sensible response and withdraw them from operational service. They continued to keep one submarine on patrol at all times, despite a series of major safety concerns. The current Government’s approach, of extending the lives of the Vanguard class while sticking rigidly to the principle of always having one submarine on patrol, shows that they are not willing to give adequate consideration to the risk of an accident in future.

## Management

Bernard Gray, the business leader who took charge of MOD procurement, argued that the sharp increase in cost was a sign of success, not bad management.<sup>13</sup> But if the programme had been properly costed and managed from the start then there would be no need for to increase the budget by £16 billion.

In the first half of 2015 Jon Thompson, the Permanent Secretary at the Ministry of Defence (MOD), and Air Chief Marshall Stuart Peach, then Vice Chief of Defence Staff, led a major review of the UK's Defence Nuclear Programme. So far the MOD has not published any part of their report.<sup>14</sup> In 2015 Thompson told the Public Accounts Committee that financing the nuclear programme was the one thing that kept him awake at night. He described it as a "monster".

The 2015 SDSR announced a major restructuring of the Trident programme. In future all aspects of the defence nuclear programme will be brought together under a new team who will be responsible for day-to-day nuclear policy as well as procurement. Their work will cover the full life-cycle, including disposal, and will embrace work on submarines, nuclear warheads and infrastructure. They will also be responsible for maintaining a skills-base of personnel to support this work.

Currently these activities are managed by civil servants within the Defence Equipment and Support (DES) branch of the Ministry of Defence. In future the work will be led by one key individual. The new team will be headed by "an experienced, commercial specialist". This person will "act as the single sponsor for all aspects of the defence nuclear enterprise". We can expect to see the MOD paying a very large figure to attract a senior manager from industry to take on this critical role.

In addition, the SDSR said that a new body would be set up to procure nuclear submarines and to provide in-service support for them. This body would be given the authority and freedom “to recruit and retain the best people to manage the submarine enterprise”.

Taken in the context of the Thompson-Peach review and against the background of delays and cost increases, these restructuring proposals imply that there have been major failings in the management of the Trident renewal project during its first 8 years. The MOD’s answer is to offer large salaries to attract high-flying business executives. However, the problems may be more deep-seated. The Trident renewal programme is large and complex. It is particularly difficult to manage because of secrecy and safety issues and the reliance on monopoly suppliers.

### **Fuel cores**

Rolls Royce manufacture the reactors for British submarines and their fuel cores at Raynesway in Derby. They also operate a test facility at Dounreay. In January 2012 a Fuel Element Breach was discovered at the prototype reactor. This has had a major impact on the nuclear submarine programme. Unexpected levels of radiation were detected in the cooling water of the reactor. Rolls Royce were unable to identify the source of the leak but it was assumed to be due to microscopic failure in the cladding of the fuel core. The MOD repeatedly said that their latest fuel cores will last the full life of a submarine and there would be no need for refuelling. However this claim would appear to be based on little evidence and the Fuel Element Breach suggests that the fuel cores are not reliable over this period of time.

For two years the MOD kept the problem a secret from the public and the Scottish Government. On 6 March 2014 Philip Hammond told the House of Commons that there had been a fuel cladding failure at the Dounreay

prototype. He explained that, as a result, the MOD would spend £120 million on an unscheduled nuclear refuelling of the oldest Trident submarine HMS Vanguard. This was because the MOD were no longer confident that the existing fuel core would last for as long as had been planned, due to the Fuel Element Breach at the Dounreay prototype. In addition Hammond announced that the MOD would consider whether a similar refuelling of the second submarine, HMS Victorious would also be required.

The MOD have a Core Production Capability (CPC) project, the purpose of which is to rebuild the fuel core fabrication facilities at Derby. The Dounreay problem has had a significant impact on the CPC. The National Audit Office report on MOD Major Projects 2015 said that the problem “has significantly impacted upon CPC along with 8 other projects”.<sup>15</sup> The fuel core production plan has been amended to take account of the additional refuelling of HMS Vanguard. There are plans to produce an extra two fuel cores. Core H10 has been assigned to HMS Vanguard, rather than to the 5<sup>th</sup> Astute class submarine. An additional core is under order for the Astute class. There is also provision for the production of an additional core, H14, for HMS Victorious.

The MOD’s plan was to manufacture the fuel cores that are required over the next few years and at the same time build a series of new facilities. The Dounreay problem has had an impact on the core production programme in two ways. Firstly, it has led to “a substantial increase in the level of inspection required for current manufacturing”.<sup>16</sup> Secondly, the need to produce extra fuel cores for HMS Vanguard, and probably HMS Victorious, has put the manufacturing programme under considerable stress. An additional £196 million was added to the budget for the CPC.

In 2011 the plan was that the new CPC would be fully functioning and able to manufacture a fuel core by May 2021. By 2014 the project was 9

months behind schedule. In March 2015 the completion date was postponed by a further 4 years and 4 months. This additional delay was attributed to the Fuel Element Breach at the Dounreay prototype.

Delay in Core Production Capability

Source	Planned completion date
Core Production Facility Main Gate 2011	May 2021
NAO Major Projects Report 2013	August 2021
NAO Major Projects Report 2014	February 2022
NAO Major Projects Report 2015	June 2026

The audit office report refers to the impact of the Dounreay project on CPC and “8 other projects”. Seven projects are listed as being associated with CPC: Successor, Astute Boat 4, Astute Boat 5, Astute Boat 6, Astute Boat 7, HMS Vanguard refuelling and HMS Victorious refuelling.

In his announcement to Parliament about the Fuel Element Breach in 2014, Philip Hammond implied there would be no direct impact on the Successor submarine. He said, “Nor do they have any implications for our confidence in the reactor we are developing for the Successor submarine, which is based on a completely different design.”<sup>17</sup> However the NAO report reveals that a more detailed inspection of Successor submarine fuel cores (core J) has been introduced following the Dounreay problem. The report includes the following item under progress in 2014/15 – “April 2014: Decision to enhance the core production inspection regime for core J following manufacturing review in light of the Fuel Element Breach on H Core”.<sup>18</sup> So the issue affects fuel cores for the Successor submarine (Core J) as well as those on Vanguard class and Astute class submarines (Core H).

## **PWR3 Reactor**

A vital feature is the development and construction of new reactors for the submarines. In the UK this work is being carried out by Rolls Royce who are developing a new reactor design. One description says that the Successor class would have “a new propulsion plant based on a US design, but using next-generation UK reactor technology (PWR-3) and modern secondary propulsion systems”.<sup>19</sup> The Naval Reactors branch of the US government is providing the UK with “technology to facilitate the development of the naval nuclear propulsion plant for the UK’s next generation SUCCESSOR ballistic missile submarine”.<sup>20</sup>

There has been sustained concern that Rolls Royce are unable to recruit sufficient specialist nuclear engineers. Warren East, Chief Executive of Rolls Royce, said to the Financial Times: “I am well aware of the dissatisfaction and what we need to do to address it”.<sup>21</sup>

## **Common Missile Compartment**

A key element of British and American plans is the Common Missile Compartment (CMC). Development of this crucial missile section was one of the earliest parts of the joint US/UK Trident renewal programme. As the Successor submarine was due to enter service before the Ohio Replacement, the UK requirement determined the timescale for the Common Missile Compartment and the UK subsidised much of the initial development costs. In March 2010 the US Government Accountability Office said “To date, the United Kingdom has provided a larger share of funding for this effort”.<sup>22</sup> A press report in May 2010 said “the UK has, to date, funded the vast majority of [the CMC’s] upfront engineering design activity and has established a significant presence in Electric Boat’s Shaw’s Cove CMC design office in New London, Connecticut.”<sup>23</sup>

In October 2014 the US Navy placed a contract with General Dynamics Electric Boat for 17 missile tubes – twelve for the first UK Successor submarine, four for the first US Ohio Replacement submarine and one for a shore test facility.<sup>24</sup>

In April 2015 the House Armed Services Committee were told:

“As the UK will be the first to test, launch and deploy the Trident II (D5) system in a CMC, the US-led design team is progressing at pace to support the UK Successor lead ship construction timeline”.<sup>25</sup>

The delay in the UK programme, revealed in the SDSR, means that the Successor submarine is no longer due to enter service significantly earlier than the Ohio Replacement. The current timetable suggests that the US Ohio Replacement will enter service in 2031 and the UK Successor may be a year later, in 2032.

The delay to the Successor in-service date does not appear to be having any immediate impact on the CMC development programme. It looks as if this continues to be based on the assumption that the British submarine will be built first. For example, in February 2016 a contract was placed with General Dynamics Advanced Information Systems (GDAIS) for work between 2016 and 2019 on the fire control system for the new submarines. Around half of the cost was for research and development and the remainder was for equipment for the first Successor submarine. No similar equipment was ordered for the first new US submarine.

There is close coordination between the UK and US efforts. Vice Admiral Benedict, who runs the US Trident programme, said: “Our programs are tightly coupled both programmatically and technically”.<sup>26</sup> Yet, so far, there has been no sign of how the US will adjust to the 4 year delay to the in-service date for the UK Successor submarine.

In 2010 it was decided that the Successor submarine would only carry 8 missiles. However the vessels will each have 12 missile tubes. As a result, the submarines will be larger and more expensive than required. The extra 4 huge missile tubes will be filled with ballast. This is probably another sign of the MOD's flagrant disregard for common sense. It is possible that it might be designed to leave open the option that the size of the nuclear arsenal could be substantially increased in future

A prototype launch facility, SWS Ashore, is under construction at Cape Canaveral. This is critical to the US/UK plans for Trident renewal. Initial launching of test shapes from SWS Ashore is due in 2017.

### **Astute class submarines**

It looks as if the Successor submarine will follow this example of the Astute class, which has been plagued by cost increases and delays. The first of class, HMS Astute, had been due to enter service in June 2005 but this was delayed until April 2010. The total cost of the first three Astute class boats rose by £1.3 billion, from £2.2 billion to £3.5 billion. The National Audit Office considers that there is a substantial risk that the remaining four Astute class submarines will not be built on time or within budget. Boat 4 is £213 million over budget and 2 years 5 months behind schedule. The Audit Office's Sentinel system uses traffic light colours to illustrate their confidence that projects will be delivered on time and within budget. The project to build Astute boats 4-7 is marked red.

### **Atomic Weapons Establishment**

There is a £20-billion 20-year project to replace and modernise all the facilities at Aldermaston and Burghfield where nuclear weapons are manufactured. This "Nuclear Weapons Capability Sustainment Programme" has been largely hidden from public and political scrutiny.

The new Enriched Uranium Facility is running behind schedule and over budget, like its American counterpart, the UPF. A new hydrodynamic facility was cancelled and the research work transferred to France. Other projects in trouble include a new nuclear weapons assembly and disassembly plant at Burghfield.

In 2015 there were reports that the MOD was considering terminating the 25-year contract that had been awarded in 2000 to AWE Management Ltd to run Aldermaston and Burghfield. This was because the MOD lacked confidence in AWEML's ability to manage and complete the new-build programme.

The 2015 SDSR indicated that a replacement nuclear warhead would be required in the late 2030s, or possibly later, and that a decision on developing the new warhead "may be required in this Parliament [ie before 2020] or early in the next".<sup>27</sup> The Trident Alternatives Review said that the development of a new warhead would take around 17 years:

"Experts judge that it is likely to take 17 years to design, develop, certify and produce a ballistic missile-based thermonuclear warhead, should one be required. This is based on AWE taking a relatively well-understood concept through to the production of the first fully-certified warhead, with collaboration with the US on the non-nuclear components."<sup>28</sup>

### **United States Ohio Replacement Submarine**

The US equivalent to the Successor is the Ohio Replacement submarine. The US Navy is planning to build 12 of these vessels. The original in-service date for the new submarines was 2029, but this has been postponed to 2031.

The problems of the American Ohio Replacement mirror those of the UK's Successor. The expenditure estimates and the timescale are unrealistic. The Department of Defence has set a target cost of \$4.9 billion for each of the submarines, except the first one. The true costs are likely to be over \$7 billion each. The production plan envisages each of the submarines being build within 84 months. This is the same as the time allotted for building the Virginia class nuclear-powered, conventionally-armed submarine. But the Ohio Replacement is two and a half times the size of the Virginia class. So the construction timetable is probably not achievable.

The Congressional Budget Office (CBO) has identified the plans to build the Trident replacement as the least predictable part of the US Navy's shipbuilding programme –

“The design, cost and capabilities of the 12 Ohio Replacement submarines in the 2016 shipbuilding plan are among the most significant uncertainties in the Navy's and CBO's analyses of the cost of future shipbuilding”.<sup>29</sup>

The Ohio Replacement Program (ORP) is described as the US Navy's number one acquisition program.<sup>30</sup> Despite this, there are serious problems with finding adequate funding. The costs are so high that the Ohio Replacement is undermining other Navy shipbuilding projects. Navy officials told Congress that they might have to cancel plans for 8 Virginia Class submarines, 8 destroyers and 16 other combat ships to pay for the Trident replacement.

A special fund was set up to provide extra money for the new submarines. This “National Sea Based Deterrent Fund” has been criticised, because the money will come from other parts of the defence budget. The Air Force are worried their budget will be reduced in order to subsidise Trident. So they are arguing that a similar fund will be needed for their next nuclear

bomber. Congress has established the National Sea Based Deterrent Fund as a mechanism for allocating more resources to the Ohio Replacement, but it has not yet put real money into the fund. Some Pentagon officials acknowledge that the fund is just an accounting gimmick.<sup>31</sup>

There is uncertainty over how work on the Ohio Replacement will be divided between the two shipyards who build nuclear submarines. The Virginia class are being constructed on the basis of a 50/50 split with vessels being assembled at both sites. This approach has been abandoned for the Ohio Replacement. General Dynamics will carry out 60% of the work and assemble all the submarines. Newport News are unhappy about being only allocated 40% of the workload, making specific components.

The US programme to develop a new reactor for the Ohio Replacement is a critical project with a tight timeframe. If the reactor is not available on time then the Navy will not be able to meet the 2031 in-service date.

### **United States Nuclear warhead programme**

In the US the manufacture, renewal and decommissioning of nuclear weapons is carried out by the National Nuclear Security Administration (NNSA), which is a branch of the Department of Energy (DOE). In 2012 Congress initiated a major review of the NNSA's work by Norman Augustine and Admiral Mies. This found that major projects for nuclear weapons upgrades had been delayed and that there were serious problems with the major construction work, including a new Uranium Processing Facility (UPF).<sup>32</sup> The report said these issues were the result of weakness in the basic NNSA management system. It said:

“Unfortunately, the unmistakable conclusion of our fact-finding is that, as implemented, the ‘NNSA experiment’ involving the creation of a semi-autonomous organization has failed. The current DOE-NNSA

structure has not established the effective operational system that Congress intended. This needs to be fixed as a matter of priority, and these fixes will not be simple or quick, and they need to recognise the systemic nature of the problem”.<sup>33</sup>

Subsequent reports to Congress by the Government Accountability Office (GAO) in 2014 and 2015 show that, over the last two years, the NNSA has failed to address these systemic issues of governance.<sup>34</sup>

### **Replacement for Trident Missile**

The need for a replacement missile is another major issue. The Ohio replacement is due to be in service until the 2080s. The Trident D5 missile is only intended to remain in service until the 2040s. It is likely that a replacement missile will be needed. In April 2015 Vice Admiral Benedict told the House Armed Services Committee “We have also started initial planning on the timing of when a follow-on to Trident II (D5) will be needed”.<sup>35</sup> The development of a new missile is controversial because of the cost involved. Discussion of it has been repeatedly postponed.

### **Conclusion**

In 2007 the public and the House of Commons were deceived when they were told that replacing Trident would only cost £15-20 billion and that the new submarine would be available by 2024. The MOD had failed to rigorously assess their proposals and they misled MPs about the timescale and budget of Trident replacement. We can have little confidence that the current figures and dates are accurate.

There has been mismanagement of the projects to construct new nuclear-armed submarines and to rebuild the nuclear bomb factories. The equivalent programmes in the US are also facing serious problems. The Ohio Replacement submarine programme is so expensive that it will have

a major impact on other naval shipbuilding and the wider Pentagon budget.

Renewing Trident would mean squandering billions of pounds on Weapons of Mass Destruction. It would be an insult to Scotland's Parliament, Government and MPs, who have called for the removal of nuclear weapons. In addition, as this report highlights, the Trident renewal project has been, and is likely to remain, a prime example of how the MOD mishandles public funds.

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<sup>1</sup> Presentation by David Gould to Future Deterrent Industry Day, Abbey Wood, Bristol, 29 June 2007. Released to Scottish CND under the Freedom of Information Act (FOIA). The final phrase “Including the warhead and missile” was redacted from the version initially release and was only disclosed following an internal FOIA review.

<sup>2</sup> Liam Fox revised the submarine cost from £11-14 billion to £20-25 billion, but said this was due to the initial figures being based on 2006 prices whereas the revised figures were outturn costs, ie including inflation. Hansard 18 May 2011, Column 352.

<sup>3</sup> <http://www.ft.com/cms/s/0/51f0d67e-a180-11e5-bc70-7ff6d4fd203a.html#axzz3vYBcld1V>

<sup>4</sup> Replacing the UK’s Nuclear Deterrent, Claire Mills, House of Commons Library, 27 January 2016

<http://researchbriefings.parliament.uk/ResearchBriefing/Summary/CBP-7353#fullreport>

<sup>5</sup> This compares with the planned 42 year life of the US Ohio Replacement.

<sup>6</sup> The successor was expected to enter service in 2028 and be withdrawn in 2067.

<sup>7</sup> Some newspaper reports suggest a 5 year delay.

<http://www.ft.com/cms/s/0/51f0d67e-a180-11e5-bc70-7ff6d4fd203a.html#axzz3vYBcld1V>

<sup>8</sup> The Future of the United Kingdom’s Nuclear Deterrent, December 2006

<sup>9</sup> National Security Strategy and Strategic Defence and Security Review 2015, Cm 9161, November 2015

<sup>10</sup> Financial Times, 24 November 2015, <http://www.ft.com/cms/s/0/62c6e428-92cd-11e5-bd82-c1fb87bef7af.html#axzz40KIDep1u>

<sup>11</sup> House of Lords 23 November 2015

<sup>12</sup> Cracking Under Pressure: The response to defects in British nuclear submarines, Scottish CND, 1992

<http://www.banthebomb.org/archives/magazine/cracking.htm>

<sup>13</sup> Head of defence procurement agency bullish on Trident costs. Financial Times 29 November 2015. <http://www.ft.com/cms/s/0/a26d422c-9681-11e5-9228-87e603d47bdc.html#axzz3zZdjmpH7>

<sup>14</sup> Scottish CND has requested a copy of the report under the Freedom of Information Act, but not yet received a substantive reply.

<sup>15</sup> National Audit Office, Major Projects Report 2015.

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- <sup>16</sup> National Audit Office, Major Projects Report 2015.
- <sup>17</sup> <https://www.gov.uk/government/speeches/nuclear-submarines>
- <sup>18</sup> National Audit Office, Major Projects Report 2015.
- <sup>19</sup> Navy Ohio Replacement (SSBN-X) Ballistic Missile Submarine Program: Background and Issues for Congress, Ronald O'Rourke, Congressional Research Service, 17 December 2015, p 8
- <sup>20</sup> ibid
- <sup>21</sup> <http://www.ft.com/cms/s/0/51f0d67e-a180-11e5-bc70-7ff6d4fd203a.html#axzz3vYBcld1V>
- <sup>22</sup> Navy Ohio Replacement (SSBN-X) Ballistic Missile Submarine Program: Background and Issues for Congress, Ronald O'Rourke, Congressional Research Service, 17 December 2015, p 15
- <sup>23</sup> ibid
- <sup>24</sup> [http://www.navy.mil/submit/display.asp?story\\_id=84166](http://www.navy.mil/submit/display.asp?story_id=84166)
- <sup>25</sup> Statement of Vice Admiral Benedict, Director, Strategic Systems Programs before the Subcommittee on Strategic Forces of the House Armed Services Committee, 15 April 2015.  
<http://docs.house.gov/meetings/AS/AS29/20150415/103008/HHRG-114-AS29-Wstate-BenedictUSNT-20150415.pdf>
- <sup>26</sup> ibid
- <sup>27</sup> National Security Strategy and Strategic Defence and Security Review 2015, Cm 9161, November 2015
- <sup>28</sup> Trident Alternatives Review , Cabinet Office, 16 July 2013.
- <sup>29</sup> Navy Ohio Replacement (SSBN-X) Ballistic Missile Submarine Program: Background and Issues for Congress, Ronald O'Rourke, Congressional Research Service, 17 December 2015
- <sup>30</sup> Statement of Vice Admiral Benedict, Director, Strategic Systems Programs before the Subcommittee on Strategic Forces of the House Armed Services Committee, 15 April 2015.  
<http://docs.house.gov/meetings/AS/AS29/20150415/103008/HHRG-114-AS29-Wstate-BenedictUSNT-20150415.pdf>
- <sup>31</sup> <http://breakingdefense.com/2015/12/national-sea-based-deterrence-fund-myth-vs-reality/>
- <sup>32</sup> There were delays in 2014 and 2015 to the W78/88 interoperable warhead, B61-12 and W88 Alt370. There was a lack of transparency in cost estimates for UPF and CMRR. Statement of David Trimble, Director, Natural Resources and

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Environment, GAO, to Senate Armed Services Committee hearing 15 April 2015 on NNSA (<http://www.gao.gov/assets/670/669668.pdf>)

<sup>33</sup> Interim Report of the Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise, Norman Augustine and Admiral Richard Mies, US Navy (retired). <https://www.fas.org/sgp/othergov/doe/cap-interim.pdf>

<sup>34</sup> Statement of David Trimble, Director, Natural Resources and Environment, GAO, to Senate Armed Services Committee hearing 15 April 2015 on NNSA ( <http://www.gao.gov/assets/670/669668.pdf> ) and transcript of the hearing (<http://www.armed-services.senate.gov/imo/media/doc/15-41%20-%2015-15.pdf>)

<sup>35</sup> Statement of Vice Admiral Benedict, Director, Strategic Systems Programs before the Subcommittee on Strategic Forces of the House Armed Services Committee, 15 April 2015. <http://docs.house.gov/meetings/AS/AS29/20150415/103008/HHRG-114-AS29-Wstate-BenedictUSNT-20150415.pdf>

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