

# Submission to the Senate Standing Committee on Finance and Public Administration

# **Government Investment Funds Amendment** (Ethical Investments) Bill 2011

# ICAN Australia

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#### Summary

- The International Campaign to Abolish Nuclear Weapons (ICAN) Australia supports the Government Investment Funds Amendment (Ethical Investments) Bill, which prohibits investments in nuclear weapons producers.
- The Future Fund has disclosed to ICAN through freedom of information laws and subsequently to the Senate that it invests taxpayers' money in 14 companies involved in the production and maintenance of nuclear weapons.
- The total value of its holdings in nuclear weapons companies at 19 January 2012 was \$133 million, representing approximately 0.18% of its total investment portfolio. Its holdings remain largely unchanged from April 2011.
- The 14 nuclear weapons companies in its portfolio are involved in the design, production and maintenance of nuclear weapons and their delivery vehicles for the US, British, French and Indian governments.
- ICAN Australia believes that these investments undermine the Australian Government's efforts to advance a world free of nuclear weapons, and appear to conflict with our international law obligation to pursue disarmament.
- The Future Fund has divested from companies involved in the production of other inherently inhumane weapons namely, cluster munitions and landmines and should now be required to divest from nuclear arms makers.

# 1. Introduction

The International Campaign to Abolish Nuclear Weapons (ICAN) Australia supports the Government Investment Funds Amendment (Ethical Investments) Bill 2011. We welcome efforts to establish ethical investment guidelines for the *Future Fund Act 2006* and the *Nation-Building Funds Act 2008* covering the maintenance, development and modernisation of nuclear weapons.

The prohibition of public investment in corporations involved in nuclear weapons work would be consistent with Australia's stated commitment to achieving a nuclear-weapon-free world and domestic legislation that prohibits nuclear weapons, namely, the *South Pacific Nuclear Free Zone Treaty Act 1986*.

At least one of the companies listed in this submission, Honeywell International, is involved in subcritical nuclear testing for the United States, which allows the US to make qualitative improvements to its nuclear arsenal, thus fuelling the ongoing nuclear arms race. Investment by the Future Fund in this company lends legitimacy to this work.

There are strong precedents for the Future Fund to divest from the nuclear weapons industry. Both the Norwegian Government Pension Fund and the New Zealand Superannuation Fund have divested from companies involved in nuclear weapons production and simulated nuclear testing, and the Future Fund itself has divested from the manufacturers of cluster munitions and land mines.

# 2. About ICAN Australia

ICAN was launched in 2007 with the aim of galvanising worldwide public and government support for multilateral negotiations on a nuclear weapons convention. Such a treaty would outlaw the production, testing, possession and use of nuclear weapons by all states, and establish the mechanisms needed to eliminate them within an agreed timeframe.

ICAN is a broad, community-based campaign with organisational partners in 60 countries. In Australia we have 54 partners, including the Australian Conservation Foundation, the Uniting Church, the United Nations Association of Australia, Oxfam Australia and the Medical Association for Prevention of War.

# 3. The Future Fund's investments

At 19 January 2012 the Future Fund had investments worth approximately \$133 million in the following 14 foreign-owned companies that are involved in the manufacture, maintenance and modernisation of nuclear arms and their associated technologies for the US, British, French and Indian governments.

The investments represent around 0.18% of the Future Fund's entire investment portfolio, meaning that an ethical decision to divest from these 14 companies would have minimal or no impact on the fund's performance. However, it would help to reinforce the illegitimacy of the nuclear weapons industry.

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1.	Babcock International	UK	\$127,480
2.	BAE Systems	UK	\$2,222,733
3.	Boeing	US	\$6,354,965*
4.	EADS	Netherlands	\$1,757,321
5.	Goodrich Corporation	US	\$1,286,207
6.	Honeywell International	US	\$96,986,221
7.	Jacobs Engineering	US	\$586,237
8.	Larsen & Toubro	India	\$3,305,949
9.	Northrop Grumman	US	\$2,292,481
10	. Rockwell Collins	US	\$15,429,979
11.	. Rolls-Royce	UK	\$1,766,436
12	. Safran	France	\$713,731
13	Serco	UK	\$119,253
14	. Thales	France	\$264,972
	Total		\$133,213,965
	* Value at 12 April 2011		

#### Table: Investments in nuclear weapons companies at 19 January 2012

### Babcock International

#### Future Fund's holdings in Babcock International at 19 January 2012: \$127,480

Babcock International is a British company that provides engineering support services. In 2007 its marine division started the Future Submarines project with BAE Systems and Rolls-Royce. The objective of this project is to develop a new class of nuclear-armed submarine for the British navy, which will replace the present fleet of submarines armed with nuclear-tipped Trident II D5 ballistic missiles.<sup>i</sup>

This division of the company is also involved in the maintenance of the existing *Vanguard*-class submarines. In its 2011 annual report, Babcock International states that the British government had committed to retain the current submarine-based nuclear deterrent, providing a key role for the marine division in the so-called "Vanguard life extension project".<sup>ii</sup> Additionally, the nuclear services division of the company is a frequent subcontractor for the Atomic Weapons Establishment.<sup>iii</sup>

#### BAE Systems

#### Future Fund's holdings in BAE Systems at 19 January 2012: \$2,222,733

BAE Systems is a British defence, security and aerospace company with operations worldwide. Its international division holds a 37.5 per cent share in MBDA, a joint venture with EADS and Finmeccanica responsible for building ASMPA nuclear missiles for the French air force.<sup>iv</sup> These missiles can be launched from the Mirage 2000N fighter plane and the new Rafale fighter plane.

Together with Babcock Marine and Rolls-Royce, BAE Systems in 2007 started the Future Submarines project. The objective of this project is to develop a new class of nuclear-armed submarine for the British navy.<sup>v</sup> Between 1986 and 1999, BAE Systems developed the current *Vanguard*-class submarines, which are equipped with Trident II D5 nuclear missiles.<sup>vi</sup>

#### Boeing

#### Future Fund's holdings in Boeing at 12 April 2011: \$6,354,965

Boeing, which is based in the United States, is the world's largest aerospace company and a leading manufacturer of defence, space and security systems. Since 1958 Boeing has been responsible for the development and production of the US long-range nuclear LGM-30 Minuteman ballistic missiles (versions I, II and III).<sup>vii</sup> These are intercontinental ground-to-ground nuclear missiles.

As a member of the ICBM Prime Integration Team, Boeing is involved in the maintenance of the 500 Minuteman III intercontinental ballistic missiles in the US nuclear arsenal at present. It is responsible for guidance, flight controls, secure codes, ground subsystems, weapons systems testing and engineering in this project led by Northrop Grumman, which will continue into 2012 and likely be extended.<sup>viii</sup>

Boeing also produces the B-52 Stratofortress,<sup>ix</sup> which is a long-range, strategic heavy bomber capable of dropping or launching the widest array of weapons in the US inventory. It entered service in 1954. The latest version, the B-52H, can carry up to 20 air-launched cruise missiles with nuclear or precision-guided conventional ordnance.

#### EADS

#### Future Fund's holdings in EADS at 19 January 2012: \$1,757,321

The European Aeronautic Defence and Space Company, EADS, is based in the Netherlands and engages in the manufacture and sale of commercial aircraft, military aircraft, satellites and defence systems. It is involved in the French nuclear weapons program. Its subsidiary Astrium develops and produces the M4 generation of ballistic missiles, which feature multiple warheads.<sup>×</sup>

Astrium also developed an enhanced version, the M45, with higher-performance TN75 nuclear warheads. Astrium is responsible for maintaining these missiles.<sup>xi</sup> In December 2004 Astrium entered into a contract to build the new M51 nuclear missile for French submarines. It is the lead contractor. The M51 features multiple warheads, with far greater payload mass and volume than the M4. It also offers a longer range, enabling submarines to expand their patrol zones.

EADS also holds a 37.5 per cent share in MBDA, a joint venture with BAE Systems and Finmeccanica.<sup>xii</sup> MBDA produced over 3000 missiles in 2010. It builds the ASMPA nuclear missiles for the French air force, which can be launched from the Mirage 2000N fighter plane and the new Rafale fighter plane.

#### Goodrich Corporation

Future Fund's holdings in Goodrich Corporation at 19 January 2012: \$1,286,207

Goodrich Corporation is a US-based aerospace manufacturing company. It is a wholly owned subsidiary of United Technologies Corporation. It appears on the

exclusion lists of a number of financial institutions owing to its involvement in the US nuclear weapons program.

#### Honeywell International

*Future Fund's holdings in Honeywell International at 19 January 2012:* \$96,986,221

Honeywell International is a US company involved in aerospace and manufacturing. Honeywell Federal Manufacturing & Technologies manages and operates the Kansas City Plant, a facility of the National Nuclear Security Administration, where around 85 per cent of the non-nuclear components for US nuclear weapons are produced.<sup>xiii</sup>

Honeywell Technology Solutions Inc (HTSI) has a contract with the US government's Defense Threat Reduction Agency. As the instrumentation support contractor, HTSI is responsible for maintaining an inventory of instrumentation to monitor and record data associated with the simulated testing of nuclear weapons on the White Sands Missile Range in New Mexico.<sup>xiv</sup>

Honeywell is also involved, with General Dynamics and Raytheon, in a project that aims to stretch the lifecycle of the Trident II D5 nuclear missiles of the US navy.<sup>xv</sup> In December 2009 this contract was extended. Honeywell International is the most important subcontractor and will produce components for integrated circuits at its factory in Plymouth, the United Kingdom.

#### Jacobs Engineering

Future Fund's holdings in Jacobs Engineering at 19 January 2012: \$586,237

Jacobs Engineering Group is a US-based company involved in aerospace and defence, energy and infrastructure. In December 2008, it acquired a one-third share in the joint venture AWE-ML, the company that manages the United Kingdom's Atomic Weapons Establishment (AWE).<sup>xvi</sup> The AWE provides and maintains the warheads for the country's Trident nuclear arsenal.

The other partners in the joint venture are Lockheed Martin and Serco. AWE's involvement with Trident missiles covers the entire life cycle, from initial concept to assessment, design, component manufacture and assembly, in-service support and decommissioning and disposal.<sup>xvii</sup> AWE-ML has a 25-year non-revocable contract, revised in 2003, to run the AWE.

#### Larsen & Toubro

#### Future Fund's holdings in Larsen & Toubro at 19 January 2012: \$3,305,949

Larsen & Toubro, based in India, is a technology, engineering and construction company. It is involved in designing and building the Advanced Technology Vessel, which is the future nuclear-armed submarine of the Indian navy. The project was initiated in 1970 and its objective is to build five nuclear submarines, each equipped with a dozen K-15 nuclear missiles. In 2008 the company started construction of the second submarine.<sup>xviii</sup>

#### Northrop Grumman

Future Fund's holdings in Northrop Grumman at 19 January 2012: \$2,292,481

Northrop Grumman is a US-based company involved in aerospace, electronics, information systems and shipbuilding. After acquiring TRW Inc in 2002, Northrop Grumman inherited the leadership over the ICBM Prime Integration Team. This project was initiated in 1997 and has a value of US\$6.5 billion.

Northrop Grumman and its partners, including Boeing and Lockheed Martin, are responsible for the production and maintenance of the Minuteman III nuclear intercontinental ballistic ground-to-ground missiles.<sup>xix</sup> Approximately 500 of the Minuteman III missiles form the core of the land-based US nuclear arsenal.<sup>xx</sup>

#### Rockwell Collins

Future Fund's holdings in Rockwell Collins at 19 January 2012: \$15,429,979

Rockwell Collins is a US-based aerospace company. It is involved in a project to extend the lifecycle of the Trident II nuclear weapons of the US navy. It also manufactures aircraft used to deliver US nuclear weapons. It appears on the exclusion lists of a number of financial institutions owing to its nuclear-weapons-related work.

#### Rolls-Royce

Future Fund's holdings in Rolls-Royce at 19 January 2012: \$1,766,436

Rolls-Royce plc, based in the United Kingdom, is a defence and aerospace company. (The manufacturer of Rolls-Royce automobiles is a subsidiary of BMW and not part of Rolls-Royce plc.) Together with Babcock Marine and BAE Systems, it started the Future Submarines project in 2007 to develop a new class of nuclear-armed submarine for the British navy.<sup>xxi</sup>

Rolls-Royce has also been involved in the development and maintenance of the current fleet of submarines. It was initially responsible for developing its nuclear-powered propulsion system. In 2007 Rolls-Royce was awarded a 10-year contract worth £1 billion to support power plant systems for the British fleet of nuclear-powered submarines, which includes the nuclear-armed *Vanguard* class.<sup>xxii</sup>

#### Safran

#### Future Fund's holdings in Safran at 19 January 2012: \$713,731

Safran is a French aerospace, defence and security company. It is involved, with EADS, Thales and others, in a contract concluded in December 2004 to build the new M51 nuclear missile for France's submarines, with an estimated value of  $\notin$ 3 billion.<sup>xxiii</sup> The M51 features multiple warheads, with far greater payload mass and volume than the M4.

The nuclear submarine *Le Terrible* has been equipped with the M51 since late 2010. The missile will also enter operational service on board the other French new-generation submarines. Safran's subsidiary Snecma is a preferred supplier of the propulsion system for the M51 missile project. Sagem, another subsidiary of Safran, developed the navigation systems for the M51.<sup>xxiv</sup>

Serco

# Future Fund's holdings in Serco at 19 January 2012: \$119,253

Serco Group is a British company involved in a wide variety of sectors, including health, education, transport and defence. It owns a one-third share in the joint venture AWE-ML, the company that manages the United Kingdom's Atomic Weapons Establishment (AWE). The AWE provides and maintains the warheads for the country's Trident nuclear arsenal.

The other partners in the joint venture are Lockheed Martin and the Jacobs Engineering. AWE's involvement with Trident missiles covers the entire life cycle from initial concept to assessment, design, component manufacture and assembly, in-service support, and decommissioning and disposal.<sup>xxv</sup> AWE-ML has a 25-year non-revocable contract, revised in 2003, to run the AWE program.

# • Thales

# Future Fund's holdings in Thales at 19 January 2012: \$264,972

Thales is a French defence, security and aerospace company. It is involved with EADS, Safran and others in a contract concluded in December 2004 to build the new M51 nuclear missile for the new French submarines.<sup>xxvi</sup> The M51 features multiple warheads, with far greater payload mass and volume than the M4. It also offers longer range than the M4, enabling submarines to expand their patrol zones.

# 4. Nuclear weapons under international law

The International Committee of the Red Cross – the guardian of the Geneva Conventions on the laws of arms conflict – said in 2010 that it finds it "difficult to envisage how any use of nuclear weapons could be compatible with the rules of international humanitarian law". The UN General Assembly has also stated that the use of nuclear weapons would violate the UN Charter and constitute a crime against humanity.

Nuclear weapons cannot distinguish between military and civilian targets, or between combatants and non-combatants. Most of the casualties of a nuclear attack would inevitably be civilians. Once the explosive energy of a nuclear chain reaction has been released, it cannot be contained. People in neighbouring and distant countries who have nothing to do with the conflict would suffer from the effects of radioactive fallout. This disproportionate and indiscriminate destructiveness is a violation of international law.

Australia is a party to all major international conventions relating to nuclear weapons. These include the Non-Proliferation Treaty, which forbids Australia from ever acquiring nuclear weapons and obliges the nuclear weapon states to disarm; the Comprehensive Nuclear Test Ban Treaty (CTBT), which establishes a universal ban on nuclear weapons testing; and the South Pacific Nuclear Free Zone Treaty, which establishes a regional zone free of nuclear weapons.

None of these treaties expressly prohibit Australia from investing in nuclear weapons companies. However, the South Pacific Nuclear Free Zone Treaty forbids Australia from facilitating the manufacture of nuclear weapons anywhere in the world, and the NPT requires Australia to advance nuclear disarmament. Additionally, the simulated testing of nuclear weapons carried out by the company Honeywell International, in which the Future Fund invests, is clearly against the spirit of the CTBT.

# 5. Nuclear weapons under Australian law

Australian law explicitly prohibits nuclear weapons. Under the *South Pacific Nuclear Free Zone Treaty Act 1986* (Cth), it is an offence in Australia to manufacture, produce, acquire, possess, have control over or test nuclear weapons. It is also forbidden to facilitate any of these acts. In addition, the *Weapons of Mass Destruction (Prevention of Proliferation) Act 1995* (Cth) makes it illegal in Australia to provide goods or services to anyone if they will or may assist the development, production, acquisition or stockpiling of nuclear weapons or missiles used to deliver them.

# 6. Catastrophic effects of nuclear weapons

Nuclear weapons are the most destructive, inhumane and indiscriminate instruments of mass murder ever created. Physicians and scientists have long studied and documented the medical consequences of nuclear war, concluding that human security and survival depend upon ridding the Earth of these indefensible weapons. Even if a nuclear weapon were never again exploded over a city, there are effects related to the production, testing and deployment of nuclear arsenals that are experienced as an ongoing personal and community catastrophe by many people around the globe.

Nine countries today possess an estimated 19,000 nuclear weapons, around 2000 of which are kept on hair-trigger alert – ready for use within minutes. Most of today's nuclear weapons are dozens of times more powerful than the Hiroshima bomb. The failure of the nuclear powers to disarm has heightened the risk that other countries, or terrorists, will one day acquire nuclear weapons. The only guarantee against their spread and future use is to eliminate them without delay.

Nuclear weapons are the only devices ever created with the capacity to destroy all complex life forms on Earth within a relatively short period. A war fought using 1000 nuclear weapons – around 5% of the total global stockpile – would render the planet uninhabitable. In addition to causing tens of millions of immediate deaths, a regional nuclear war involving around 100 Hiroshima-sized weapons would disrupt the global climate and agricultural production so severely that more than a billion people would be at risk of famine.

# 6. Examples of nuclear weapons divestment

Many financial institutions around the world have policies not to finance nuclear weapons companies. The most significant example of a government-owned institution divesting from nuclear weapons stocks is the Norwegian Government Pension Fund. The New Zealand Superannuation Fund has also excluded investments in certain companies owing to their nuclear weapons involvement.

• **Norway:** In 2004 the Norwegian Government Pension Fund, following pressure from parliamentarians, media and non-government organisations, established ethical guidelines for its investments and appointed an advisory council on ethics to make recommendations on implementing them.

In 2005 the advisory council discussed the issues and released a recommendation regarding nuclear weapons. The pension fund then divested from the following companies due to their production of nuclear weapons: BAE Systems, Boeing, EADS, Finmeccanica, Honeywell International, Northrop Grumman, Safran and United Technologies. Other nuclear weapons companies such as Lockheed Martin, General Dynamics and Alliant Techsystems had

already been excluded due to their involvement in the production of antipersonnel landmines and cluster munitions.

According to Pia A. Gaarder, who was involved in the campaign to pressure the pension fund to divest, "The government needs the investments of the [fund] to be perceived as legitimate in the eyes of the Norwegian population. When they are not, as was clearly demonstrated in 2002, it became politically impossible for the government not to divest."

• **New Zealand:** In 2008 the New Zealand Superannuation Fund decided to divest from two companies involved in simulated nuclear weapons testing: Lockheed Martin and Honeywell International. (Australia's Future Fund does not invest in Lockheed Martin owing to its involvement in cluster bomb production, but the Fund does invest heavily in Honeywell International.)

In a press statement, the NZ Superannuation Fund said: "We ... believe that the simulated testing of nuclear explosive devices is critical to the development of those devices. We have therefore decided to exclude from the portfolio companies involved in such testing. This will require our fund managers to divest from holdings, totalling approximately \$13 million, in two such companies."

#### Conclusion

The Future Fund's investments in nuclear weapons companies undermine the Australian Government's efforts to advance a nuclear-weapon-free world. ICAN Australia considers it unacceptable for the Government to provide indirect support to the manufacture and modernisation of weapons whose use has catastrophic humanitarian and environmental consequences and violates international law.

Just as the Future Fund has divested from the producers of other categories of particularly inhumane weapons – cluster munitions and anti-personnel mines – it should now exclude nuclear arms makers from its investment portfolio. This would send a powerful message to the companies that their involvement in nuclear weapons production will not be tolerated.

<sup>&</sup>lt;sup>i</sup> BAE Systems, "Future submarines integrated project team office officially opens", press release, 12 October 2007, available at:

http://www.sanders.com/Newsroom/NewsReleases/2007/autoGen\_107912125611.html.

<sup>&</sup>lt;sup>ii</sup> Babcock International, "Marine activities: Submarines", at:

http://www.babcock.co.uk/opco/marine/activities.php?pageID=75138.

<sup>&</sup>lt;sup>iii</sup> Babcock International, "Nuclear decommissioning: Nuclear waste management strategies", at: http://www.babcock.co.uk/capabilities/infrastructure/nuclear/nuclear-decommissioning.

<sup>&</sup>lt;sup>iv</sup> MBDA, "MBDA: A world leader: An integrated European company", at: http://www.mbdasystems.com/about-mbda/mbda-at-a-glance/.

<sup>&</sup>lt;sup>v</sup> BAE Systems, "Future submarines integrated project team office officially opens", press release, 12 October 2007, available at:

http://www.sanders.com/Newsroom/NewsReleases/2007/autoGen\_107912125611.html.

<sup>vii</sup> Boeing, "LGM-30 Minuteman Missile", at: http://www.boeing.com/history/boeing/minuteman.html.

<sup>viii</sup> Boeing, "Intercontinental ballistic missile systems", at: http://www.boeing.com/defense-space/ic/icbmsys/index.html.

<sup>ix</sup> Boeing, "B-52 Stratofortress", at: http://www.boeing.com/defense-space/military/b52-strat/index.html.

<sup>x</sup> Astrium, "M45", at: http://www.astrium.eads.net/node.php?articleid=105.

<sup>xi</sup> Astrium, "M51", at: http://www.astrium.eads.net/en/programme/m-51.html.

<sup>xii</sup> MBDA, "MBDA: A world leader: An integrated European company", at: http://www.mbdasystems.com/about-mbda/mbda-at-a-glance/.

<sup>xiii</sup> Nuclear Watch, "Kansas City and the US nuclear weapons complex", 2010, available at: http://nukewatch.org/facts/nwd/KC\_NWC.pdf.

<sup>xiv</sup> New Mexico Partnership, "New Mexico: aviation and aerospace", at: http://nmpartnership.com/uploads/navigation/Aviation\_Aerospace\_PDF/Aviation.pdf.

<sup>xv</sup> Defense Industry Daily, "Trident II D5 missile: Keeping up with changing times", at: http://www.defenseindustrydaily.com/Trident-II-D5-Missile-Keeping-Up-with-Changing-Times-06037/.

<sup>xvi</sup> Jacobs Engineering, "Jacobs agrees to acquire share in AWE Management Limited", at: http://www.jacobs.com/News.aspx?id=5242.

<sup>xvii</sup> AWE, "About AWE: What we do", at: http://www.awe.co.uk/aboutus/what\_we\_do\_27815.html.

xviii Global Security, "India ATV", at: http://www.globalsecurity.org/military/world/india/atv.htm.

<sup>xix</sup> Northrop Grumman, "Northrop Grumman celebrates 10th year as prime integrating contractor for nation's land-based ICBMs", press release, 5 October 2007, at: http://www.northropgrumman.com/news/is/2007/10/128128.html.

<sup>xx</sup> Global Security, "LGM-30 Minuteman III", at: http://www.globalsecurity.org/wmd/systems/lgm-30\_3.htm.

<sup>xxi</sup> BAE Systems, "Future submarines integrated project team office officially opens", press release, 12 October 2007, available at:

http://www.sanders.com/Newsroom/NewsReleases/2007/autoGen\_107912125611.html.

<sup>xxii</sup> Rolls-Royce, "About: market sectors: submarines", at: http://www.rolls<2011>royce.com/marine/about/market\_sectors/submarines/.

<sup>xxiii</sup> EADS, "Contract for production of the M51 weapon system", press release, 23 December 2004, at: http://www.eads.net/1024/en/pressdb/archiv/2004/en\_20041223\_m51.html.

<sup>xxiv</sup> Safran, "M51: The key to French deterrence", 2007, at: http://www.safran.ru/IMG/pdf/SAFRAN2UKp28.pdf; NewEurope Online, "SAGEM to provide the navigation system of the *Terrible* SSBN", at: http://www.neurope.eu/article/sagem-provides-navigationsystem-terrible-ssbn.

<sup>xxv</sup> AWE, "About AWE: The company", at: http://www.awe.co.uk/aboutus/the\_company\_eb1b2.html; AWE, "About AWE: What we do", at: http://www.awe.co.uk/aboutus/what\_we\_do\_27815.html.

<sup>xxvi</sup> EADS, "Contract for production of the M51 weapon system", press release, 23 December 2004, at: http://www.eads.net/1024/en/pressdb/archiv/2004/en\_20041223\_m51.html.

<sup>&</sup>lt;sup>vi</sup> Federation of American Scientists, "Vanguard-class ballistic missile submarine", at: http://www.fas.org/nuke/guide/uk/slbm/vanguard.html.