

I. US nuclear forces

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As of January 2012 the United States maintained an estimated arsenal of approximately 2150 operational nuclear warheads, consisting of roughly 1950 strategic and 200 non-strategic warheads (see table 7.2). In addition to this operational arsenal, about 2750 warheads are held in reserve, for a total stockpile of approximately 4900 warheads. Another 3100 retired warheads are awaiting dismantlement for a total inventory of roughly 8000 warheads.

The operational force level is comparable to the estimate presented in *SIPRI Yearbook 2011*.¹ The slight reduction in the total stockpile is due to the ongoing retirement of excess W76 warheads.

The USA has released the full unclassified data for its strategic nuclear forces pursuant to implementation of the 2010 Russian–US Treaty on Measures for the Further Reduction and Limitation of Strategic Offensive Arms (New START), including a breakdown of deployed and non-deployed missiles and bombers at individual bases as well as the warheads attributed to them.² As of 1 September 2011, the USA deployed a total of 697 land- and sea-based ballistic missiles and 125 heavy bombers; another 485 non-deployed missiles and 25 bombers were in storage. Combined, the deployed forces were attributed a total of 1790 warheads. Since each of the deployed bombers is only attributed 1 warhead, the ballistic missiles therefore carried 1665 warheads.³

The USA will only have to offload 100 additional warheads over the next seven years to meet the New START limit by February 2018. However, it will have to dismantle 243 launchers to meet the limit of no more than 700 deployed and 100 non-deployed launchers.

Nuclear modernization

In parallel with implementing the modest nuclear force reductions under New START, the USA plans to modernize nuclear delivery vehicles, warheads and warhead production facilities. Over the next decade, as much as

¹ Kile, S. N. et al., 'World nuclear forces', *SIPRI Yearbook 2011*, pp. 319–53.

² US Department of State, Bureau of Arms Control, Verification and Compliance, 'New START Treaty aggregate numbers of strategic offensive arms', Fact sheet, 1 Dec. 2011, <<http://www.state.gov/t/avc/rls/178058.htm>>. For a summary and other details of New START see annex A in this volume. On developments in 2011 see chapter 8, section I, in this volume.

³ For analysis of the US unclassified New START data see Kristensen, H., 'US releases full New START data', FAS Strategic Security Blog, Federation of American Scientists, 9 Dec. 2011, <<http://www.fas.org/blog/ssp/2011/12/newstartnumbers.php>>.

Table 7.2. US nuclear forces, January 2012

Type	Designation	No. deployed ^a	Year first deployed	Range (km) ^b	Warheads x yield	No. of warheads
Strategic forces						~1 950
<i>Bombers</i>		111/60				300
B-52H	Stratofortress	91/44	1961	16 000	ALCM 5–150 kt	200 ^c
B-2	Spirit	20/16	1994	11 000	B61-7, -11, B83-1 bombs	100 ^d
<i>ICBMs</i>		714/500				500 ^e
LGM-30G	Minuteman III					
	Mk-12A	250	1979	13 000	1–3 x 335 kt	250
	Mk-21 SERV	250	2006	13 000	1 x 300 kt	250
<i>SSBNs/SLBMs^f</i>		410/288				1 152
UGM-133A	Trident II (D5) ^g					
	Mk-4	..	1992	>7 400	4 x 100 kt	468
	Mk-4A	..	2008	>7 400	4 x 100 kt	300
	Mk-5	..	1990	>7 400	4 x 475 kt	384
Non-strategic forces						200
B61-3, -4 bombs		..	1979	..	0.3–170 kt	200 ^h
RGM/UGM-109A/TLAM/N		(0)	1984	2 500	1 x 5–150 kt	(0) ⁱ
Total deployed warheads						~2 150^j

.. = not available or not applicable; () = uncertain figure; ALCM = air-launched cruise missile; ICBM = intercontinental ballistic missile; kt = kiloton; SERV = security-enhanced re-entry vehicle; SLBM = submarine-launched ballistic missile; SLCM = sea-launched cruise missile; SSBN = nuclear-powered ballistic missile submarine.

^a The first figure in the 'No. deployed' column is the total number in the inventory, including those for training, test and reserve. The second figure is the number of these that are operational delivery vehicles assigned for nuclear missions. It is not calculated according to New START's counting rules and so differs from the treaty data.

^b Aircraft range is for illustrative purposes only; actual mission range will vary according to flight profile and weapon loading.

^c The B-52H can also deliver B61-7 and B83-1 gravity bombs, but the aircraft serves mainly as a carrier of ALCMs. The total ALCM inventory has been reduced to 528, of which an estimated 200 are deployed. Under New START, each nuclear bomber is only attributed 1 weapon although many more may be stored at bomber bases.

^d Operational gravity bombs are only counted for the B-2A bomber. The B-52H can also deliver bombs, but its nuclear mission is thought to be focused on ALCMs since the bomber is not capable of penetrating modern air defence systems.

^e The 2010 Nuclear Posture Review (NPR) decided to download each ICBM to carry a single warhead in the near future and also to retain an upload capability to re-MIRV (i.e. fit with a multiple independently targetable re-entry vehicle, MIRV) the W78 portion of the force if necessary. The download is scheduled for 2013–17.

^f Of 14 SSBNs, 2 or more are normally undergoing overhaul at any given time. Their missiles and warheads are not included in the deployed total.

^g Although D5 missiles were counted under START as carrying 8 warheads each, the US Navy is estimated to have downloaded each missile to an average of 4–5 warheads to meet the SORT-mandated warhead ceiling. Delivery of the W76-1 warhead began in Oct. 2008.

^h Since 2001 the number of B61 bombs deployed in Europe has been unilaterally reduced by almost two-thirds from 480 to c. 180. Additional warheads remain in reserve.

ⁱ The Tomahawk Land Attack Cruise Missile/Nuclear (TLAM/N) sea-launched cruise missile has been retired in accordance with the 2010 NPR.

^j Including the additional c. 2750 warheads in reserve, the total stockpile is c. 4900 warheads. Another c. 3100 warheads await dismantlement for a total inventory of c. 8000 warheads. A further c. 15 000 plutonium pits are stored at the Pantex Plant in Texas.

Sources: US Department of Defense, various budget reports and press releases; US Department of Energy, various budget reports and plans; US Department of Defense, various documents obtained under the Freedom of Information Act; US Air Force, US Navy and US Department of Energy, personal communication; 'Nuclear notebook', *Bulletin of the Atomic Scientists*, various issues; and authors' estimates.

\$214 billion will be spent on designing a new class of ballistic missile submarines and a new dual-role (nuclear and conventional) long-range bomber; studying options for the next-generation land-based intercontinental ballistic missile; deploying a new nuclear-capable combat aircraft; producing enhanced or modernized nuclear warheads; and building new nuclear weapon production facilities.

All existing US warhead types are scheduled to undergo extensive life-extension and modernization programmes over the next decades. Full-scale production of approximately 1200 W76-1 warheads for the Trident II (D5) submarine-launched ballistic missile (SLBM) is well under way, providing the nuclear-powered ballistic missile submarine (SSBN) fleet with improved targeting capabilities. Production of the B61-12—a consolidation of the B61-3/4/7/10 bombs—is scheduled to follow in 2017–21.

The 2010 Nuclear Posture Review (NPR) of the US Department of Defense (DOD) pledged that the USA 'will not develop new nuclear warheads' but consider the 'full range' of life-extension programme options, including 'refurbishment of existing warheads, reuse of nuclear components from different warheads, and replacement of nuclear components'.⁴ This was intended to preclude resumption of nuclear explosive testing and enable US adherence to the 1996 Comprehensive Nuclear-Test-Ban Treaty (CTBT). The NPR also decided that any life-extension programme 'will use only nuclear components based on previously tested designs, and will not support new military . . . capabilities'.⁵ However, this will depend on how such capabilities are defined, since the installation of a new arming, fusing and firing unit, for example, can significantly enhance a warhead's ability to destroy certain types of target.⁶

⁴ US Department of Defense (DOD), *Nuclear Posture Review Report* (DOD: Washington, DC, Apr. 2010), p. xiv.

⁵ US Department of Defense (note 4).

⁶ Kristensen, H. M., 'Small fuze—big effect', FAS Strategic Security Blog, Federation of American Scientists, 14 Mar. 2007, <http://www.fas.org/blog/ssp/2007/03/small_fuze_-_big_effect.php>.

Nuclear strategy and planning

In 2011 the administration of President Barack Obama ordered a review of US nuclear targeting plans and alert postures in preparation for future arms reduction agreements with Russia.⁷ The initial inter-agency phase was completed in early 2012 and is expected to lead to changes in guidance on how the military should plan for the potential use of nuclear weapons, including the US strategic war plan—OPLAN (Operations Plan) 8010-08 Strategic Deterrence and Global Strike.⁸

To exercise that plan, Strategic Command (STRATCOM) in October 2011 conducted the worldwide Global Thunder nuclear exercise to test the readiness of intercontinental ballistic missiles (ICBMs), SLBMs, long-range bombers, refuelling aircraft, and command and control to carry out the strategic nuclear mission.

Land-based ballistic missiles

The USA has 450 Minuteman III ICBMs deployed in silos at three bases: Malmstrom Air Force Base (AFB) in Montana, Minot AFB in North Dakota, and F. E. Warren AFB in Wyoming. The New START data listed 448 deployed ICBMs as of 1 September 2011, with another 324 non-deployed ICBMs (266 Minuteman and 58 Peacekeeper missiles) held in storage.⁹

Most of the deployed ICBMs carry a single warhead, but a small number still have multiple warheads, thus yielding an estimated total of 500 warheads. The NPR decided to complete the process initiated during the administration of President George W. Bush to download all ICBMs to single warhead configuration.¹⁰ The multiple independently targetable re-entry vehicle (MIRV) capability of the ICBMs will be retained, if necessary, with hundreds of warheads kept in storage.

A multi-year multi-billion dollar modernization programme is in its final phase to extend the service life of the Minuteman III missile to 2030.¹¹ The NPR decided that an initial study will begin in 2011–12 to consider a range

⁷ US Mission Geneva, 'Remarks as prepared for delivery by Tom Donilon, National Security Advisor to the President, Carnegie International Nuclear Policy Conference', 29 Mar. 2011, <<http://geneva.usmission.gov/2011/03/31/donilon-future-nuclear-policy/>>.

⁸ For a description of the review see Kristensen, H. M. and Norris, R., 'Reviewing nuclear guidance: putting Obama's words into action', *Arms Control Today*, vol. 41 (Nov. 2011), pp. 12–19.

⁹ The non-deployed ICBMs are not intended for redeployment but for spares and missile flight tests. The Peacekeeper missiles were withdrawn from service in 2003–2005 and their silos will be destroyed.

¹⁰ For a description of the warhead download programme see Kile, S. N., Fedchenko, V. and Kristensen, H. M., 'World nuclear forces, 2007', *SIPRI Yearbook 2007*, pp. 517–19.

¹¹ 'Missile envy: modernizing the US ICBM force', *Defense Industry Daily*, 14 Mar. 2011, <<http://www.defenseindustrydaily.com/Missile-Envy-Modernizing-the-US-ICBM-Force-06059>>.

of deployment options for a replacement missile. This will involve exploring 'new modes of ICBM basing that could enhance survivability and further reduce any incentives for prompt launch. Such an assessment will be part of the Department of Defense's study of possible replacements for the current ICBM force.'¹²

Ballistic missile submarines

The US Navy operates a fleet of 14 Ohio class SSBNs, each equipped with 24 Trident II (D5) SLBMs. Normally, 12 of the 14 SSBNs are considered operational with a total of 288 D5 SLBMs, each of which is estimated to carry an average of 4 warheads for a total of about 1152 warheads.¹³ The number of operational submarines can fluctuate considerably, however, and the New START data shows that, as of 1 September 2011, only 10 of the 14 SSBNs were loaded, with a total of 249 SLBMs (3 SSBNs were empty and 1 partially loaded). By increasing the warhead loading of each missile, the fluctuation can be offset; the New START data indicates that the 10 'deployed' submarines carried a total of roughly 1200 warheads, or an average of 4–5 per missile.

On average, 64 per cent of the SSBNs (eight or nine boats) are at sea at any given time, with each boat normally conducting three 70–100-day patrols each year in an operational tempo comparable to that of the cold war. Up to five of those SSBNs are on 'hard alert', with 120 missiles carrying an estimated 540 warheads.

The US Navy is designing a new SSBN class to begin replacing the Ohio class SSBN in 2029. The new class, currently known as SSBN(X), will include 12 boats, each equipped to carry 16 Trident II (D5) SLBMs. The Congressional Budget Office (CBO) projected in 2010 that \$100 billion will be required to develop and build the new class. In approving the defence budget for financial year 2012, the US Congress required the DOD to consider alternative SSBN design options to save money.¹⁴

Non-strategic nuclear weapons

As of January 2011 the USA retained approximately 760 non-strategic nuclear warheads. This included nearly 200 B61 gravity bombs deployed in Europe and 300 reserve bombs in the USA. Some 260 warheads for the Tomahawk Land-Attack Cruise Missile (TLAM/N) are scheduled to be retired in the near future.

¹² US Department of Defense (note 4), pp. 23, 27.

¹³ The 48 missiles and 192 warheads for the two SSBNs in overhaul are not included in the total.

¹⁴ On the US military budget see chapter 4, section III, in this volume.

The B61 bombs are deployed at six airbases in five European member states of the North Atlantic Treaty Organization (NATO): Belgium, Germany, Italy, the Netherlands and Turkey.¹⁵ Approximately half of the bombs are earmarked for delivery by US F-15E and F-16 combat aircraft. The aircraft of non-nuclear weapon NATO countries that are assigned nuclear strike missions with US nuclear weapons include Belgian, Dutch and Turkish F-16 combat aircraft and German and Italian Tornados.

The NPR decided to equip a portion of the F-35 (Joint Strike Fighter) Block IV aircraft with nuclear capability but did not explicitly state that nuclear weapons should be deployed in Europe. The F-35s will carry the new B61-12, a modified version of the B61-3/4/10 and -7 bombs.

The B61-12 bomb will bring significant new military capabilities to Europe when deployment begins in 2018. It will use the nuclear explosive package of the B61-4, which has a maximum yield of approximately 50 kilotons. However, since the B61-12 also has to meet the mission requirements of the more powerful strategic B61-7 (360-kt maximum), it will be equipped with a \$700 million guided tail kit to increase its accuracy. This will give the B61-12 an improved capability to destroy underground targets and enable strike planners to select lower yields for other targets to reduce collateral damage.¹⁶

¹⁵ During a NATO briefing on the NPR in Sep. 2009, the US Principal Under Secretary of Defense for Policy, James Miller, mentioned '180 NATO sub-strategic warheads'. He may have been referring to the number of weapons listed in the US deployment authorization plan for Europe. The plan allows for a deviation of $\pm 10\%$ from the authorized warhead number. US Mission to NATO, 'PDUSDP Miller consults with allies on Nuclear Posture Review', Cable to US State Department, no. 09USNATO378, 4 Sep. 2009, <<http://wikileaks.org/cable/2009/09/09USNATO378.html>>, para. 17.

¹⁶ For a description of the B61-12 and its implications see Kristensen, H. M., 'B61 LEP: increasing NATO nuclear capability and precision low-yield strikes', FAS Strategic Security Blog, Federation of American Scientists, 15 June 2011, <<http://www.fas.org/blog/ssp/2011/06/b61-12.php>>.