

I. US nuclear forces

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As of January 2014, the United States maintained a stockpile of approximately 4785 nuclear warheads.¹ This included approximately 2100 deployed nuclear warheads, consisting of roughly 1920 strategic and 184 non-strategic warheads (see table 6.2). In addition to this deployed arsenal, about 2685 warheads were held in reserve. Another roughly 2515 retired warheads were scheduled for dismantlement, for a total inventory of approximately 7300 warheads.

The USA has made slow progress in implementing the 2010 Russian–US Treaty on Measures for the Further Reduction and Limitation of Strategic Offensive Arms (New START).² As of 1 March 2014, the USA was counted as having 1585 strategic warheads attributed to 778 deployed missiles and bombers, a modest decrease compared with the count six months earlier, in September 2013.³ The total reduction since the treaty entered into force in February 2011 was 215 strategic warheads and 104 launchers.

Due to the counting rules, however, these numbers do not reflect the actual deployment of strategic warheads and launchers. This is mainly because each bomber is counted as carrying only one weapon, even though it can carry up to 20 nuclear-armed air-launched cruise missiles (ALCMs), and because a large number of bombers that are no longer assigned nuclear weapons are still counted as nuclear launchers.

So far the USA has been implementing New START mainly by reducing so-called phantom weapons, that is, launchers that are no longer assigned nuclear weapon missions but are still accountable under the treaty because they continue to carry nuclear-related equipment. This is now changing. The first actual denuclearization of a nuclear launcher—a B-52H bomber—took place in September 2013.⁴ Starting in 2015, the US Navy will begin reducing the number of missile tubes on each of its nuclear-powered ballistic missile submarines (SSBN) from 24 to 20, and later in the decade the US Air Force (USAF) will reduce its intercontinental ballistic missile

¹ The US Department of State announced in Apr. 2014 that the US nuclear weapon stockpile included 4804 warheads as of 1 Sep. 2013. It is estimated here that a small number of additional warheads has been retired since this date. US Department of State, ‘Transparency in the U.S. nuclear weapons stockpile’, Fact Sheet, 29 Apr. 2014, <<http://www.state.gov/t/avc/rls/225343.htm>>.

² For a summary and other details of New START see annex A, section III, in this volume.

³ US Department of State, ‘New START Treaty aggregate numbers of strategic offensive arms’, Fact Sheet, 1 Apr. 2014, <<http://www.state.gov/t/avc/rls/224236.htm>>.

⁴ McCasland, J., ‘First B-52H becomes New START compliant ground trainer’, Barksdale Air Force Base, 20 Sep. 2013, <<http://www.barksdale.af.mil/news/story.asp?id=123364035>>.

Table 6.2. US nuclear forces, January 2014

Type	Designation	No. deployed ^a	Year first deployed	Range (km) ^b	Warheads x yield	No. of warheads
Strategic forces						~1 920
<i>Bombers^c</i>		89/60				300
B-52H	Stratofortress	78/44	1961	16 000	ALCM 5–150 kt ^d	200
B-2A	Spirit	11/16	1994	11 000	B61-7, -11, B83-1 bombs ^e	100
<i>ICBMs</i>		448/450				470
LGM-30G	Minuteman III ^f					
	Mk-12A	200	1979	13 000	1–3 x 335 kt	220
	Mk-21 SERV	250	2006	13 000	1 x 300 kt	250
<i>SSBNs/SLBMs^g</i>		260/288				1 151
UGM-133A	Trident II (D5) ^h					
	Mk-4	..	1992	>7 400	4 x 100 kt	267
	Mk-4A	..	2008	>7 400	4 x 100 kt	500
	Mk-5	..	1990	>7 400	4 x 475 kt	384
Non-strategic forces						~184
B61-3, -4 bombs		..	1979	..	0.3–170 kt	~184 ⁱ
Total deployed warheads						~2 100
Reserve warheads						~2 685
Total military stockpile						~4 785
Retired awaiting dismantlement						~2 515
Total inventory						~7 300^j

.. = not available or not applicable; 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 number counted as 'deployed' under the New START Treaty. The second figure is the number assigned for nuclear missions.

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

^c The total inventory of B-52H bombers is 93 and of B-2A bombers is 20.

^d The B-52H can also carry B61-7 and B83-1 gravity bombs but is currently only planned for delivery of ALCMs. The total ALCM inventory has been reduced to 528. New START only attributes 1 weapon to each aircraft and does not count weapons stored at bomber bases.

^e Strategic gravity bombs are only planned for delivery by the B-2A bomber.

^f Downloading of remaining MIRVed ICBMs has commenced in accordance with the 2010 Nuclear Posture Review (NPR) decision to 'de-MIRV' the Minuteman IIIs and retain an upload capability to re-MIRV the force if necessary.

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

^h 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.

ⁱ 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 are in reserve.

^j In addition to these c. 7300 intact warheads, there are c. 20 000 plutonium pits stored at the Pantex Plant, Texas, and perhaps 5000 uranium secondaries stored at the Y-12 facility at Oak Ridge, Tennessee.

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 author's estimates.

(ICBM) force from 450 to 400 missiles. The USAF will also remove nuclear capability from all but 60 of its bombers.⁵

Nuclear modernization

Over the next decade, the US Government plans to spend as much as \$350 billion to modernize and maintain its nuclear forces.⁶ This includes designing a new class of SSBN, a new long-range bomber with nuclear capability and a new ALCM; studying options for the next-generation land-based ICBM; deploying a new nuclear-capable tactical combat aircraft; completing full-scale production of one nuclear warhead and beginning modernization work on two others; and building new nuclear weapon production and simulation facilities.

All existing US warhead types are scheduled to undergo extensive life-extension and modernization programmes over the next several decades. Full-scale production of approximately 1200 W76-1 warheads for the Trident II (designated D5) submarine-launched ballistic missile (SLBM) is well under way, scheduled for completion in 2019 at a total cost of approximately \$3.7 billion.⁷ The production of the B61-12, a guided nuclear gravity bomb, is scheduled to be completed by 2025 and will cost about \$10 billion.⁸ The development of a nuclear warhead for a new ALCM, the Long-Range Standoff (LRSO), will cost another \$8.8 billion up to 2033; including

⁵ US Department of Defense, 'Report on plan to implement the nuclear force reductions, limitations, and verification and transparency measures contained in the New START treaty specified in Section 1042 of the National Defense Authorization Act for Fiscal Year 2012', Apr. 2014, <<http://www.defense.gov/documents/New-START-Implementation-Report.pdf>>.

⁶ US Congressional Budget Office, *Projected Costs of U.S. Nuclear Forces, 2014 to 2023* (US Congress: Washington, DC, Dec. 2013), table 1.

⁷ US Department of Energy (DOE), National Nuclear Security Administration, *Fiscal Year 2015 Stockpile Stewardship and Management Plan*, Report to Congress (DOE: Washington, DC, Apr. 2014), p. 8-13.

⁸ The cost of c. \$10 billion includes c. \$8 billion for the National Nuclear Security Administration (NNSA) and \$205 million for the Department of Defense for warhead components, another \$1.1 billion for the new guided tail kit, plus a few hundred million dollars for integration on the future next-generation long-range bomber. US Department of Energy (note 7), p. 8-12; and US Department of the Air Force, *Department of Defense Fiscal Year 2015 Budget Estimates: Research, Development, Test & Evaluation—Air Force*, vol. 2 (Department of the Air Force: Washington, DC, Mar. 2014), p. 626.

the cost of the new cruise missile to carry the warhead, the LRSO programme could cost as much as \$20 billion.⁹

The National Nuclear Security Administration (NNSA) has also presented a plan for a new family of so-called 'interoperable' (previously called 'common' or 'adaptable') warheads that can be used on both ICBMs and SLBMs.¹⁰ The first of these would be the Interoperable Warhead 1 (IW1), based on the W78 and W88 warheads, for production up to 2039, which could cost \$10–15 billion.

The 2010 US Nuclear Posture Review (NPR) 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'.¹¹ This is intended to prevent a need to resume nuclear explosive testing and enable adherence to the 1996 Comprehensive Nuclear-Test-Ban Treaty (CTBT).¹² 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'.¹³ However, this will depend on how 'new' military capabilities are defined, since the addition of new or improved features outside the nuclear explosive package can also increase a weapon's military capabilities. It is anticipated that the USA will generally seek to increase the accuracy of its nuclear weapons in order to permit a lowering of the yield in modified warheads with improved performance margins.

Nuclear weapon employment strategy

The US administration's long-awaited nuclear weapon targeting review (previously referred to as the Post-NPR Review or NPR Implementation Study) was completed in June 2013 with the publication of the presidential nuclear weapon employment strategy guidance (known as Presidential Policy Directive 24, PPD-24).¹⁴ The guidance contains broad directions

⁹ Wolfsthal, J. B., Lewis, J. and Quint, M., *The Trillion Dollar Nuclear Triad* (Monterey Institute of International Studies, James Martin Center for Nonproliferation Studies: Monterey, CA, Jan. 2014), p. 11.

¹⁰ For a description of the 3+2 plan see US Department of Energy (note 7), pp. 1-2–1-4.

¹¹ US Department of Defense (DOD), *Nuclear Posture Review Report* (DOD: Washington, DC, Apr. 2010), p. xiv.

¹² The USA has signed but not yet ratified the CTBT. For a summary and other details of the CTBT see annex A, section I, in this volume.

¹³ US Department of Defense (note 11), p. xiv.

¹⁴ US Department of Defense, 'Report on nuclear employment strategy of the United States, specified in Section 491 of 10 U.S.C.', [12 June 2013], <<http://www.defense.gov/pubs/>>; and White House, 'Nuclear weapons employment strategy of the United States', Fact Sheet, 19 June 2013, <<http://www.whitehouse.gov/the-press-office/2013/06/19/fact-sheet-nuclear-weapons-employment-strategy-united-states>>.

for how the military should plan for the potential use of nuclear weapons.

PPD-24 reaffirmed key elements of current US nuclear strategy. It emphasized the importance of maintaining a triad of ICBMs, SLBMs and strategic bombers, backed up by shorter-range non-strategic nuclear forces, to carry out counterforce missions against the same target categories that were held at risk during the cold war. Indeed, the guidance explicitly rejected a less ambitious minimum deterrence posture as the basis for US nuclear strategy. Moreover, it rejected the deterring of nuclear attacks as the 'sole purpose' for US nuclear weapons but continued to also give them a role in deterring conventional, biological and chemical attacks.

At the same time, PPD-24 contained guidance for modifying three aspects of the existing US nuclear posture. First, it determined that the USA could meet its national security commitments with up to one-third fewer warheads deployed on land- and sea-based ballistic missiles than the 1550 warheads permitted by New START. However, the guidance did not direct any reduction in nuclear forces below New START levels but left that option to the next president, who will take office in January 2017. PPD-24 also adopted a modified strategy for determining how many nuclear warheads are needed in the non-deployed reserve, known as the 'hedge', which would make future reductions of the hedge reserve possible. The potential reductions were conditional on first building new warhead-production facilities.

Second, PPD-24 ordered the Department of Defense (DOD) to examine how to reduce the role played in US strike plans by the Launch Under Attack (LOA) strategy—whereby the USA would launch missiles as soon as it has evidence that enemy missiles have been fired towards it. This reflected the recognition that Russia is unlikely under foreseeable circumstances to launch a disarming first strike against the USA. Yet the guidance also ordered the military to retain the capability to launch under attack and maintain the current readiness level of nuclear forces.

Finally, the guidance directed the DOD to examine how to reduce the role of nuclear weapons by increasing the role that conventional weapons play in the strike plans. This task builds on the trend from the 1970s, and increasingly after the end of the cold war, where increasingly capable conventional weapons have been gradually taking on a growing role in US deterrence and war-fighting missions. The guidance stated, however, that conventional weapons were not a substitute for nuclear weapons.

The policies contained in PPD-24 will be used to update the Nuclear Weapons Employment Policy (NUWEP) prepared by the Secretary of Defense and the nuclear supplement to the Joint Strategic Capabilities Plan (JSCP-N) prepared by the chairman of the Joint Chiefs of Staff. These documents will then guide the revision by the Strategic Command

(STRATCOM) of the strategic nuclear war plan, now known as Strategic Deterrence and Force Employment (or OPLAN 8010-12).¹⁵ The changes could take several years to implement.¹⁶

Bombers

The US Air Force currently operates a fleet of 20 B-2 and 93 B-52H bombers. Of those, 18 B-2s and 76 B-52Hs are nuclear capable.¹⁷ Approximately 60 bombers (16 B-2s and 44 B-52Hs) are thought to be assigned to nuclear missions under the strategic nuclear war plan.¹⁸ They are organized in seven bomb squadrons in three bomb wings at three bases: Minot Air Force Base (AFB) in North Dakota, Barksdale AFB in Louisiana, and Whiteman AFB in Missouri.

Each B-2 can carry up to 16 nuclear bombs (B61-7, B61-11 and B83-1 gravity bombs) and each B-52H can carry up to 20 ACLMs. An estimated 1000 nuclear weapons, including 528 ALCMs, are assigned to the bombers. Although only about 300 weapons are deployed at the bomber bases under normal circumstance, the remaining 700 weapons are in central storage at Kirtland AFB in New Mexico.

The Air Force is planning for a new bomber to begin to replace existing bombers from the mid-2020s. Procurement of 80–100 aircraft is envisioned, some of which are planned to be nuclear capable, at a cost of well over \$55 billion.¹⁹ The new bomber, known as the long-range strike bomber (LRSB) or simply the next-generation bomber, will be equipped to deliver the new B61-12 precision-guided bomb (which will replace all other gravity bombs) and the LRSO cruise missile (which will replace the ALCM).

The current ALCM is undergoing a life-extension programme to ensure that it remains operational until 2030. Since the US administration has promised that it will not produce ‘new’ nuclear warheads, the LRSO could either use a life-extended version of the ALCM’s W80-1 warhead or a life-

¹⁵ On the status of the strategic nuclear plan see Kristensen, H. M., ‘US nuclear war plan updated amidst nuclear policy review’, Federation of American Scientists (FAS) Strategic Security Blog, 4 Apr. 2013, <<http://fas.org/blogs/security/2013/04/oplan8010-12/>>.

¹⁶ For analysis of the content and implications of the US administration’s nuclear weapon employment strategy see Kristensen, H. M., ‘Falling short of Prague: Obama’s nuclear weapons employment policy’, Murdock, C., ‘Little content, even less satisfaction in Obama’s nuclear weapons policy’, and Wolfsthal, J. B., ‘Rightsizing the U.S. nuclear arsenal’, *Arms Control Today*, vol. 43, no. 7 (Sep. 2013).

¹⁷ The 3rd heavy bomber, the B-1B, is no longer nuclear capable.

¹⁸ New START counted 101 nuclear bombers as of 1 Sep. 2013, an anomaly caused by counting so-called phantom bombers that are no longer nuclear tasked but still carry some equipment that makes them accountable under the treaty. US Department of State, ‘New START Treaty aggregate numbers of strategic offensive arms’, Fact Sheet, 1 Jan. 2014, <<http://www.state.gov/t/avc/rls/219222.htm>>.

¹⁹ Gertler, J., ‘Budget highlights: Air Force Long Range Strike Bomber’, US Congress, Congressional Research Service, 2 July 2014, available at <<http://fas.org/sgp/crs/weapons/IN10095.html>>.

extended version of the retired W84 warhead that once armed the ground-launched cruise missile (GLCM). The number of LRSOs planned has not been announced but it might involve 400–500 missiles.

Land-based ballistic missiles

The US Air Force operates a force of 450 silo-based Minuteman III ICBMs split evenly across three wings, at F. E. Warren AFB in Wyoming, Minot AFB in North Dakota and Malmstrom AFB in Montana. Each wing has three squadrons, each with 50 missiles controlled by five launch control centres. According to New START data, 448 Minuteman IIIs were operational on 1 September 2013 and an additional 256 missiles were in storage.²⁰

Each Minuteman missile carries either the 335-kiloton W78 warhead or the 300-kt W87 warhead. The downloading of the remaining few Minuteman IIIs still equipped with multiple independently targetable re-entry vehicles (MIRVs) to a single-warhead configuration is expected to be completed in 2014. Despite the download, hundreds of warheads are kept in storage and the ICBM force will retain a ‘re-MIRVing’ capability to increase the warhead loading if conditions called for such an option.

The USA plans to reduce the ICBM force to 400 deployed missiles under New START to meet the treaty’s limit of no more than 700 deployed nuclear missiles and heavy bombers by 2018. Rather than eliminating one squadron of 50 missiles, however, the USAF plans to spread the reduction across all three bases. Moreover, the 50 empty silos will not be destroyed but retained for potential reloading of missiles. The ‘cut’ ICBMs will not be destroyed but kept in storage: the New START Implementation Report lists the same inventory of Minuteman IIIs in 2014 and 2018: 454 deployed and non-deployed missiles.²¹

A multibillion-dollar, decade-long modernization programme to extend to 2030 the service life of the Minuteman III is scheduled for completion in 2015. Although the USA is officially not deploying a new ICBM, the upgraded Minuteman IIIs ‘are basically new missiles except for the shell’.²²

The USAF is studying options for a replacement ICBM, known as the ground based strategic deterrent (GBSD), for deployment from 2030. An analysis-of-alternatives study is scheduled for 2014 in preparation for an initial decision in 2016 on the design.²³ Options range from extending the

²⁰ US Department of State (note 18).

²¹ US Department of Defense (note 5), p. 3.

²² Pampe, C., ‘Life extension programs send missiles into the future’, US Air Force Global Strike Command, 24 Oct. 2012, <<http://www.afgsc.af.mil/news/story.asp?id=123323606>>.

²³ US Department of the Air Force (note 8), pp. 129–31.

service life of the Minuteman III missile another 20 years beyond 2030 to fielding an entirely new mobile ICBM.

Three Minuteman III flight tests were conducted during 2013, on 22 May, 22 September and 27 December 2013. The latter tests involved missiles taken from silos at Warren and Malmstrom AFBs, respectively.

Ballistic missile submarines

All of the US Navy's 14 Ohio class SSBNs (8 based in the Pacific and 6 in the Atlantic) carry Trident II (D5) SLBMs. Normally, 12 of the SSBNs are considered operational, with the 13th and 14th boat in overhaul at any given time. According to the unclassified New START aggregate data, fewer than 12 SSBNs are routinely equipped with full missile loadings. As of 1 September 2013, for example, only 260 missiles were counted as deployed, 28 fewer than the capacity of 12 boats, so at most 10 SSBNs carried all their missiles at the time of the count.²⁴ Starting in 2015, the number of missile tubes on each Ohio class SSBN will be reduced by 4, from 24 to 20. The reduction is intended to reduce the number of deployed SLBMs to no more than 240 SLBMs at any given time to meet the limit on deployed strategic delivery vehicles set by New START for 2018.

The warhead loading of the deployed SLBMs is not specified in the New START aggregate data. In practice, the missiles probably carry 3–6 warheads, depending on the requirements of their particular strike package assigned under war plans. Loading with fewer warheads increases the missiles' range.

Three versions of two basic warhead types are deployed on the SLBMs: the 100-kt W76-0, the 100-kt W76-1 and the 455-kt W88. The W76-1 is a refurbished version of the W76-0, with the same yield but with dual strong link detonation control added. Moreover, a new arming, fusing and firing (AF&F) unit is being installed on the re-entry body (Mk4A) as part of the W76-1 life-extension production with improved targeting capabilities. Full-scale production of an estimated 1200 W76-1s is under way at the Pantex Plant in Texas and is scheduled to continue until 2019. The W76-1–Mk4A combination is also being supplied to the United Kingdom for use on its SSBNs (see section III below).²⁵

The annual number of deterrent patrols that the SSBN fleet conducts each year has declined by more than 56 per cent, from 64 patrols in 1999 to 28 in 2013. Despite a reduction from 18 to 14 SSBNs a decade ago, each SSBN now spends less than half of the year on deterrent patrol—the

²⁴ US Department of State (note 18).

²⁵ Kristensen, H. M., 'British submarines to receive upgraded us nuclear warhead', Federation of American Scientists (FAS) Strategic Security Blog, 1 Apr. 2011, <<http://fas.org/blog/security/2011/04/britishw76-1/>>.

purpose for which it was built—compared with 60–70 per cent a decade ago. In fact, today’s patrol rate is the lowest ever for the Ohio class SSBNs. Each patrol lasts an average of 70 days but the duration can vary significantly, from as few as 30 days to more than 100 days. More than 60 per cent of the patrols take place in the Pacific Ocean, reflecting nuclear war planning against China, North Korea and eastern Russia.²⁶

The US Navy has an ambitious modernization plan to replace the Ohio class SSBNs with a new design that is 2000 tonnes larger than the Ohio class submarine but equipped with 16 instead of 24 missile tubes.²⁷ Twelve replacement SSBNs (tentatively known as SSBNX) are planned, a reduction of two boats compared with the current fleet of 14, at an estimated cost of \$90.4 billion.²⁸ Procurement of the first boat is scheduled for 2021 with deployment on deterrent patrol starting in 2031.

During the first decade of its service life, the new SSBNX will be armed with a life-extended version of the current Trident II (D5) SLBM (the D5LE), which has a new guidance system designed to ‘provide flexibility to support new missions’ and make the missile ‘more accurate’.²⁹ Starting in 2017, the D5LE will also be back-fitted onto existing Ohio SSBNs for the remainder of their service life (up to 2042) and will also be deployed on British SSBNs.

Eight Trident II (D5) SLBMs were test launched in 2013 from two submarines. The first salvo took place in April when the USS *Pennsylvania* (SSBN-735) fired four missiles, including the second flight test of the new Mk6 Mod 1 guidance system for the D5LE.

Non-strategic nuclear weapons

The USA has one type of non-strategic weapon in its stockpile—the B61 gravity bomb. The weapon exists in three modifications (B61-3, B61-4 and B61-10). It is estimated here that approximately 500 tactical B61 bombs of all versions remain in the stockpile. A little over 180 of these (versions -3 and -4) are deployed at six bases in five European countries: Belgium,

²⁶ For analysis of US SSBN patrols see Kristensen, H. M., ‘Declining deterrent patrols indicate too many SSBNs’, Federation of American Scientists (FAS) Strategic Security Blog, 30 Apr. 2013, <<http://fas.org/blogs/security/2013/04/ssbnpatrols/>>.

²⁷ For overviews of the SSBNX programme see Brougham, W. J., US Navy, ‘Ohio replacement program’, Presentation, 2012 Navy Submarine League, 18 Oct. 2012, <<http://news.usni.org/news-analysis/documents/ohio-replacement-program>>; and O’Rourke, R., *Navy Ohio Replacement (SSBN[X]) Ballistic Missile Submarine Program: Background and Issues for Congress*, Congressional Research Service (CRS) Report for Congress R41129 (US Congress, CRS: Washington, DC, 18 Oct. 2012).

²⁸ O’Rourke (note 27), p. 13.

²⁹ ‘Keeping Trident ever ready’, Draper Laboratory, *Explorations*, spring 2006, p. 8; and ‘Underwater wonder, submarines: a powerful deterrent’, Naval Surface Warfare Center, Crane Division, *Warfighter Solutions*, fall 2008, p. 14.

Germany, Italy, the Netherlands and Turkey. The Belgian, Dutch and Turkish air forces (with F-16 combat aircraft) and German and Italian air forces (with PA-200 Tornado aircraft) are assigned nuclear strike missions with the US nuclear weapons, but the weapons are under the control of US Air Force personnel until their use is authorized by the US president and approved by the North Atlantic Treaty Organization (NATO) in a war.

A small number of the remaining non-strategic weapons stored in the USA are for potential use by US fighter-bombers in support of allies outside Europe, including in the Middle East and North East Asia.

NATO has approved a modernization of the nuclear posture in Europe through deployment at the beginning of the next decade of the B61-12 guided nuclear gravity bomb.³⁰ The new B61 bomb will use the nuclear explosive package of the B61-4, which has a maximum yield of approximately 50 kt, but will be equipped with a guided tail kit to increase its accuracy. The B61-12 will be able to hold at risk hardened targets that could not be destroyed with the B61-3 or -4, and it will enable strike planners to select lower yields for existing targets to reduce collateral damage. Moreover, several of the NATO allies that currently have a nuclear strike mission plan to upgrade their fighter-bombers to the stealthy US-built F-35A (Joint Strike Fighter). Until the new aircraft is ready, the B61-12 will be back-fitted onto existing F-15E, F-16 and Tornado aircraft.³¹ Combined, the B61-12 and F-35A represent a significant enhancement of the US non-strategic nuclear posture in Europe.³²

³⁰ US Government Accountability Office (GAO), *Nuclear Weapons*, GAO-11-387 (GAO: Washington, DC, May 2011), p. 13.

³¹ Kristensen, H. M., 'B61-12 nuclear bomb integration on NATO aircraft to start in 2015', Federation of American Scientists (FAS) Strategic Security Blog, 13 Mar. 2014, <<http://fas.org/blogs/security/2014/03/b61-12integration/>>.

³² For analyses of the military implications of the enhanced B61-12 see Kristensen, H. M., 'B61-12 nuclear bomb design features', Federation of American Scientists (FAS) Strategic Security Blog, 14 Apr. 2014, <<http://fas.org/blogs/security/2014/04/b61-12features/>>; and Kristensen, H. M., 'B61 LEP: increasing NATO nuclear capability and precision low-yield strikes', Federation of American Scientists (FAS) Strategic Security Blog, 15 June 2011, <<http://fas.org/blogs/security/2011/06/b61-12/>>.