US nuclear weapons capability

【Overview】

The basis of the ongoing U.S. modernization of its nuclear weapons system goes back to the Obama administration (2009-2017). The plan is to cut back on surplus warheads dramatically by integrating seven existing types of warhead into a single type and also converting two ICBM warheads and three SLCM warheads into three mutually compatible warheads (NNSA 2018). The Trump administration (2017 – 2021) continued with this plan and added to it the replacement of strategic nuclear submarines and strategic bombers. For these initiatives, there will be an outlay of USD 494 billion between FY2019 and FY2028 (Congressional Budget Office 2019) and, over the next 30 years, USD 1.7 trillion (Arms Control Association 2018).

Furthermore, in 2018 the Trump administration conducted a rethink of the Nuclear Posture Review (NPR), incorporating the development of low-yield nuclear warheads in the prospect of regional attacks, lowering the threshold for use of nuclear weapons, and adopting a policy of expanding the use of nuclear weapons in security. The U.S., having converted the W76-1 into a lower-yield W76- 2 (8 kilotons) (Kristensen, Hans M. & Korda, Matt 2020), began to deploy the variant in February 2020 aboard the USS Tennessee (SSBN-734) (U.S. Department of Defense 2020, FAS Strategic Security Blogs). Furthermore, the FY2021 budget requested provisions to develop a next-generation SLBM warhead, the W93 (NNSA 2020-1). The U.S. also has plans to double its project to upgrade its nuclear warheads over a 20-year period (Kristensen, Hans M. & Korda, Matt 2021-1, NNSA 2020-2), and long-terms plans to develop SLCMs and other nuclear weapons that could be used for preemptive strikes. It is thus clear that the Trump administration was proceeding with the development of new nuclear warheads not originally in the modernization plans.

In the midst of this state of affairs, the Biden administration came to power in January 2021. The nuclear policy of the new Biden administration is not yet clear, but there are signs that it will seek to revise the NPR of the Trump administration. In the House, where the Democrats have a majority, the December 2020 meeting of the House Committee on Appropriations blocked the budget demands in the 2021 defense budget for the W93 warhead development program, which had formed the main pillar of the Trump Administration's nuclear weapon development plan (Kristensen, Hans M. & Korda, Matt 2021-1). Furthermore, the Interim National Security Strategic Guidance issued by the Biden administration on March 3, 2021 (The White House 2021), clearly states: "We will take steps to reduce the role of nuclear weapons in our national security strategy," and with regard to nuclear policy: "We will head off costly arms races and re-establish our credibility as a leader in arms control. That is why we moved quickly to extend the New START Treaty (U.S. Department of State 2021-1) with Russia. Where possible, we will also pursue new arms control arrangements." It appears that the Biden administration is intent on revising the nuclear policy of the Trump administration, and its direction will garner attention in the future.

Currently, the U.S. has around 3,800 nuclear warheads on 800 ballistic missiles and aircraft, the same number as last year. Of these the amount of deployed nuclear warheads is composed of 1,700 strategic and 100 non-strategic warheads deployed in Europe, 1,800 in total (Kristensen, Hans M. & Korda, Matt 2021-2), an increase of 50 from last year. The breakdown of deployed strategic war heads is 400 ICBMs, 1,000 SLBMs (an increase of 100 from last year), and 400 on aircraft such as bombers (a decrease of 50 from last year). The number of strategic nuclear warheads, 1,700, is greater than the 1,357 strategic nuclear warheads in operational deployment registered under the New START as on March 1, 2021 (U.S. Department of State 2021-1). One reason for the discrepancy may be due to the New START Treaty practice of counting only one warhead per strategic bomber, as opposed to accounting for all other warheads stored on-base where bombers are stationed. Besides these, there exist some 2,000 warheads in reserve, bringing the total size of the stockpile for military use to a combined 3,800 warheads. In addition to these there are around 1,750 retired warheads awaiting dismantlement, amounting to a grand total of 5,550, an overall decline of 250 from last year.

The United States has traditionally been considered to be the most transparent (though insufficiently so) of the nuclear-weapon states. In May 2010, the U.S. Department of Defense issued a fact sheet on its nuclear stockpile, which reported

5,113 warheads as of September 2009 (U.S. Department of Defense 2010). Since 2014, it has been updated almost annually. The last update, provided in March 2018, reported a total 3,822 warheads as of September 30, 2017(U.S. Department of Defense 2018), indicating a reduction of 1,291 over an eight-year period. However, in response to an October 1, 2018 petition by the Federation of American Scientists (FAS) seeking status on stocked and dismantled nuclear warheads as of the end of September 2018, the Department of Defense wrote in April 2019 that it could not disclose the data without offering any rationale (Aftergood, Steven 2019). This was probably a reflection of the Trump administration's policy of not revealing the numbers of stocked and dismantled nuclear warheads. There will be a need to watch and see whether or not the Biden administration maintains this secretive stance.

The U.S. is continuing with subcritical experiments without ratifying the Comprehensive Nuclear-Test-Ban Treaty. The Trump administration also conducted Vega in December 2017 (Maskaly, Garry R. 2018), Ediza in February 2019 (LLNL 2019) and Nightshade A in November 2020 (LLNL 2020). subcritical experiments (SCEs) using a downsized mockup of the otherwise identical design.

The U.S. also test-launched the ICBM Minuteman III four times in 2020 (Space Launch Reports 2021) and four times in 2019 (Kristensen, Hans M. & Korda, Matt 2020-1, Space Launch Reports 2020) . Meanwhile, the SLBM Trident II saw two test launches in 2020 (Gady, Franz-Stefan 2020, Kristensen, Hans M. & Korda, Matt 2021-1) and five in 2019 (Kristensen, Han M. & Korda, Matt 2020-1). Also, twice in 2019, on August 18 and December 12, the US test-fired a new ground-launched, intermediate-range cruise missile (GLCM), which used to be banned by the INF Treaty (U.S. Department of Defense 2019).

US nuclear weapons capability

The numbers that have changed since last year are highlighted in red

Updated: June 1, 2021

Type / designation	Missile /bomb	No. of warheads per weapon	No. of warheads	Types of nuclear warheads	Yield (kt)	Year first deployed	Remarks
Deployed	**1,020**		**1,800**				1)
Intercontinental ballistic missile (ICBM)	**400**		**400**				2)
Minuteman III Mk-12A a)	200	1	200	W78	335	1979	
Minuteman III Mk-21/SERV	200	1	200	W87	300	2006	
Submarine-launched ballistic missile (SLBM)	**220**		**1,000**				3)
Trident II D5 Mk-4A b)	135	3~6	590	W76-1	100	2008	Carried by the Ohio-class nuclear submarine c)
Trident II D5 Mk-4A	?	1~2	25	W76-2 [4]	8	2019	
Trident II D5 Mk-5	85	3~6	384	W88	455	1990	
Strategic bomber payloads	**400**		**400**				5)
Cruise missile d)	200	1	200	W80- 1	5 - 150	1961	Carried by the B-52H g)
Strategic nuclear bomb e)	100	1	100	B61-7 B61-11 B83-1	10 - 360 400 low - 1,200	1985 1997 1993	Carried by the B-2A h)
Non-strategic nuclear and airborne weapons f)	100	1	100	B61-3 B61-4	0.3 - 170 0.3 - 50	1979	6)
Reserve / Nondeployed			**2,000**				7)
ICBM			**400**				8)
SLBM			**920**				9)
Air-launched systems (Bombers, etc.)	**680**		**680**				
Strategic bomber Payload	550	1	550				10)
Non-strategic nuclear weapons	130	1	130	B61-3/4			11)
Retired warheads awaiting dismantlement, etc.			**1,750**				12)
Total inventory			**5,550**				

a)

Intercontinental ballistic missile (ICBM)		
Designation	:	Minuteman III
Propulsion	:	Three-stage solid-propellant
No. of warheads	:	Maximum 3 warheads
Launch platform	:	Silo
Specifications	:	Length 18m, Diameter 1.7m, Weight 32.2tons
Range	:	Over 9,600km
Circular error probability	:	110m

b)

Submarine-launched ballistic missile (SLBM)		
Designation	:	Trident II D5
Propulsion	:	Three-stage solid-propellant
No. of warheads	:	Maximum 8 warheads
Specifications	:	Length 13.4m, Diameter 1.85m, Weight 59tons
Range	:	6,500km
Circular error probability	:	120m
Submarine	:	Ohio-Class strategic nuclear submarine

c)

Strategic nuclear submarine		
Model	:	Ohio-Class
Submerged speed	:	25knot (46km/h)
No. of tubes	:	24
Specifications	:	Length 171m, Width 13m, Emissions 16,600tons
No. of submarines in service	:	14

d)

Air-launched cruise missile		
Designation	:	AGM-86
Range	:	2,500km
Specifications	:	Length 6.29m, Diameter 0.62m, Weight 1.4tons
Carried by	:	B52-H Stratofortress

e)

Strategic nuclear bomb		
Type	:	Gravity bomb
Specifications	:	
Carried by	:	B-2A Spirit

f)

Air-launched, Non-strategic nuclear weapons		
Designation	:	Gravity bomb B61-3, B61-4
Specifications	:	Length 3.56m, Diameter 0.33m, Weight 0.32tons
Carried by	:	F-15E, F-16, Tornado
Remarks	:	Deployed in Europe, shared with NATO forces.

g)

Strategic bomber		
Type & Designation	:	B-52H Stratofortress
Max. speed	:	1,200km/h
Specifications	:	Length 48.5m, Span 56.4m
Range	:	16,000km
Payload	:	Capable of carrying twenty AGM-86 cruise missiles
No. of submarines in service	:	93 (Nuclear mission: 44)

h)

Strategic bomber		
Type & Designation	:	B-2A Spirit
Max. speed	:	1,010km/h
specifications	:	Length 21m, Span 52m (stealth aircraft)
Range	:	11,100km
Payload	:	Carrying 16 strategic nuclear bombs
No. of submarines in service	:	20 (Nuclear mission: 16)

【Notes】

1) Figures are based on the latest estimates of operational deployment (**Kristensen, Hans M. & Korda, Matt 2021-2**). The total number of deployed strategic nuclear warheads is estimated to be 400 for ICBM, 1,000 for SLBM, and 300 assigned for bombers, a total of 1,700 in all.

2) The United States has announced that the number of deployed ICBMs will be 400 on completion of New START implementation (**U.S. Department of Defense 2014**). It was announced that, as of July 1, 2019, there were a total of 398 ICBMs in deployment (**U.S. Department of State 2019**). While the Minuteman III Mark 12A used to carry a maximum of three W78 warheads, single-warhead modification is reported to have been complete by 2014 (**NTI 2014**), so deployed warheads are estimated to be 400. This matches the latest estimate (**Kristensen, Hans M. & Korda, Matt 2021-1**).

3) The United States announced that it would have 240 SLBMs deployed on completion of the New START implementation (**U.S. Department of Defense 2014**). This required cutting back the 24 launch tubes on each of the twelve strategic nuclear submarines in operational deployment to 20 launch tubes. This process was complete by the end of 2017, bringing down the number of warheads to 240 (**Kristensen, Hans M. & Korda, Matt 2019**). According to the New START Treaty data as of July 1, 2019 (**U.S. Department of State 2019**), SLBMs in deployment numbered 209, with no direct reference to warheads involved. Based on the latest estimates (**Kristensen, Hans M. & Korda, Matt 2021-1**)and with reference to the latest 2020 START data we estimate the number of deployed SLBM is 1,000 (**Kristensen, Hans M. & Korda, Matt 2021-1**, **Kristensen, Hans 2020**). This is 100 more than the previous year's figure of 900. It appears that all of the 384 W88 warheads are deployed. In addition, as shown in Note 4, 25 W76-2 have been manufactured, as an upgraded version of the M76-1. Subsequently, the number of W76-1 warheads is around 590, the sum obtained by subtracting from 1,000 the 384 W88s and the 25 new W76-2s. The number of Mk-4A and Mk-5 missiles has been proportionally distributed according to the number of SLBM (220).

4) On February 22, 2019, the Pantex Plant completed the first production unit of the W76-2 warhead, a variant of the W76-1 warhead with reduced yields ranging 8 kilotons. 25 W76-2s were transferred to the Navy by the end of FY2019 (**Kristensen, Hans M. & Korda, Matt 2021-1**) .

5) Of nuclear warheads allocated to bombers in operational deployment, about 300 are estimated to be strategic and 100, non-strategic. Those nuclear-capable bombers are 20 B-2s and 46 B-52Hs (**Kristensen, Hans M. & Korda, Matt 2021-1**). Since the B-2A can carry up to 16 nuclear bombs, our estimate is a total 320. The B-52H carries up to 20 cruise missiles but, considering operational conditions, we estimate their allocation to be 530 warheads. Of these, we see about 100 nuclear bombs and about 200 cruise missiles in operational deployment. 100 weapons are deployed in five European countries for use by NATO forces.

6) These are deployed in the five nations of Belgium, Germany, Italy, the Netherlands and Turkey (**Kristensen, Hans M. & Korda, Matt 2021-1)** but the breakdown is unclear.

7) In March 2018, the Pentagon announced that, as of the end of September 2017, the U.S. stockpile in deployment and reserve consisted of 3,822 warheads (**U.S. Department of Defence 2018**). Based on this figure, we have applied a retirement rate and estimate the current stockpile to be 3,800 warheads. Subtracting 1,800 in operational deployment, we arrived at a reserve storage of 2,000 (**Kristensen, Hans M. & Korda, Matt 2021-2**).

8) These are W78 warheads made redundant by the single-warhead modification on the Minuteman III Mark-12A.

9) From 2,000 warheads in reserve, subtracting 400 in reserve for ICBMs, 550 for strategic bombers, and 130 non-strategic warheads. The figure includes arsenal for two Ohio-class nuclear submarines in overhaul (20 missiles, some 170 warheads) and hundreds of the W76-0s replaced by W76-1s.

10) Of all nuclear weapons allocated to strategic bombers, those stored not on other air force bases but in central storage at Kirtland Air Force Base (**Kristensen, Hans M. & Korda, Matt 2021-1**).

11) They are stockpiled in central storage at Kirtland Air Force Base, New Mexico. This consists of B61-3 and B61-4 warheads only, with all B61-10s retired by the end of September 2016 (**NNSA 2017**). They may be deployed in future on fighter bombers to assist allies outside of Europe.

12) According to the January 2017 fact sheet, there are approximately 2,800 nuclear warheads are currently retired and awaiting dismantlement (**The White House 2017**). Following this announcement, 354 were dismantled by the end of September 2017 (**The Department of Defence 2018**). Assuming further retirement and dismantlement, those warheads retired or awaiting dismantlement are estimated to be 1,750. In addition, 20,000 plutonium pits for primary detonation and 4,000 for secondary detonation are thought be stockpiled at the Pantext (Texas) and Y-12 plants (Tennessee) (**Kristensen, Hans M. & Korda, Matt 2021-2**).

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