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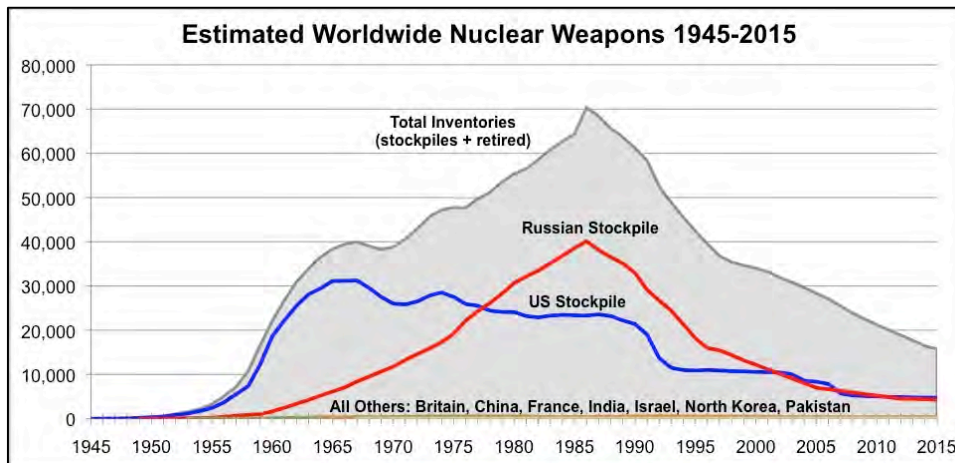
Nuclear Force Modernizations: Russia, China, and the United States

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Presentation to
Nuclear, Biological, and Chemical Weapons Policy and Security
School of Policy, Government, and International Affairs
George Mason University, Fairfax, VA
February 9, 2016



Nuclear Arsenals: Inventories



More than 125,000 warheads produced since 1945

Peak of 64,500 stockpiled warheads in 1986 (70,300 if including retired warheads)

- US stockpile peaked early (1967)
- Russian stockpile peaked late (1986)

Enormous reductions since 1986 peak:

- ~54,000 warhead stockpile reduction
- ~47,000+ warheads dismantled

~10,000 warheads in stockpiles (~15,000 if counting retired warheads awaiting dismantlement)

US and Russia possess 90% of global inventory (94% if counting retired warheads); **each has more than 4 times more warheads than rest of world combined**; 15 times more than third-largest stockpile (France)

Decreasing: US, Russia, Britain, France

Increasing: China, Pakistan, India

Israel relatively steady; North Korea trying



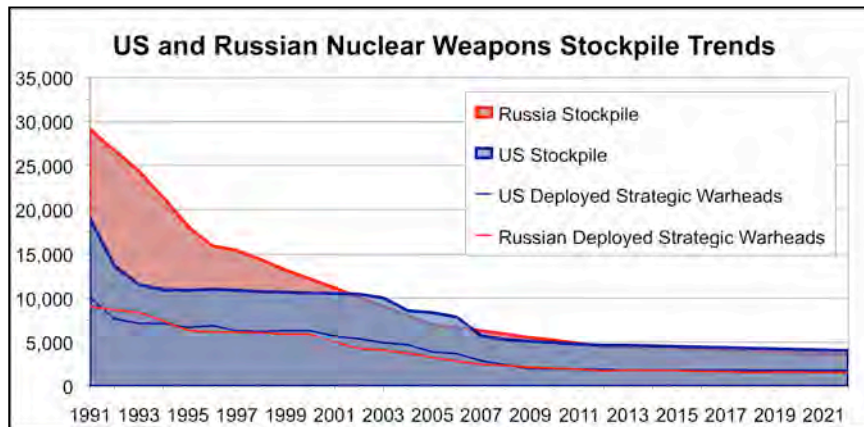
Nuclear Arsenals: Inventories

Estimated Worldwide Nuclear Warhead Inventories 2016				
<u>Country</u>	<u>Deployed</u>	<u>Stockpiled</u>	<u>Retired</u>	<u>Inventory</u>
Russia	1,780	4,500	3,000	~7,500
United States	2,070	4,670	2,300	~7,000
France	240	300		300
China		260	low	260
Britain	120	215	low	215
Pakistan		110-130		110-130
India		100-120		100-120
Israel		80		80
North Korea		?		?
Total	~4,210	~10,250	~5,300	~15,580

Nuclear Arsenals: Trends



Note: retired, but still intact, warheads awaiting dismantlement are not shown



With more than 90% of world inventory, US and Russia have special responsibility to reduce

Reduction of deployed strategic warheads from some 23,000 in 1989 to 3,500 in 2015 (New START counts 3,185)

Readiness level of remaining strategic forces is high: about 1,800 warheads on prompt alert

No official de-alerting, but significant reduction of overall alert numbers: heavy bombers de-alerted, US ICBMs and SLBMs downloaded, non-strategic forces de-alerted

Trend: pace of reduction is slowing

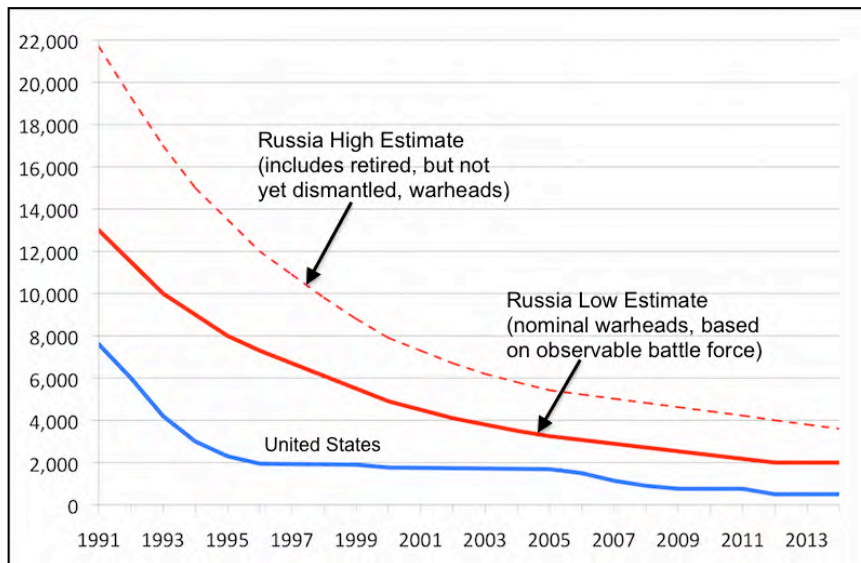
US cut only 396 warheads in 2010-2014, compared with 3,457 warheads cut in 2005-2009

Russia cut an estimated 1,100 warheads in 2010-2014, compared with 2,600 in 2005-2009

Instead of continuing pace or increasing reductions, US and Russian stockpiles appear to be leveling out for the long haul; new emphasis on modernization

New initiatives needed to prevent stalling of arms control

Nuclear Arsenals: Non-Strategic



- Some 2,500 warheads remain assigned to non-strategic forces (Russia ~2,000; United States ~500)
- Several thousands additional retired, but still relatively intact, warheads in storage are awaiting dismantlement
- Stockpiles will likely continue to decline in next decade with or without arms control agreements

- U.S. and Russian combined stockpiles of non-strategic nuclear warheads reduced by roughly 90 percent since 1991. Neither side has disclosed actual numbers
- Russia: two public declarations:
 - 2005: Russian “non-strategic nuclear forces” have been reduced “by four times” since 1991.
 - 2010: “the Russian arsenal of non-strategic nuclear weapons is reduced four times [75%]* in comparison with the USSR arsenal.” All are in central storage
- * Note: PNI declarations do not add up to 75%
- United States: two public declarations:
 - 2010: “The number of U.S. non-strategic nuclear weapons declined by approximately 90 percent from September 30, 1991 to September 30, 2009.”
 - 2014: “The number of U.S. non-strategic nuclear weapons has declined by approximately 90 percent since September 30, 1991.”
- ~180 US B61 bombs forward-deployed in Europe

Nuclear Arsenals: Russia

Gradual phase-out of soviet-era systems and partial replacement with “new” systems by early-mid 2020s.

Replacement began two decades ago.

Old System	New System	MIRV	First Deployed
SS-18	Sarmat (RS-28)	Yes	2020-2025?
SS-19	SS-27 Mod 1 (Topol M)	No	2097
	SS-27 Mod 2 (RS-24)	Yes	2014
SS-25	SS-27 Mod 1 (Topol-M)	No	2006
	SS-27 Mod 2 (RS-24)	Yes	2010
	SS-27 Mod 3 (RS-26)	Yes	2016?
	SS-27 Mod 4 (Rail)	Yes	2020?
SS-N-18	SS-N-32 (Bulava)	Yes	2016-2018?
SS-N-23	SS-N-32 (Bulava)	Yes	2020-2030?
Tu-95MS	PAK-DA		2020-2030?
Tu-160	PAK-DA		2020-2030?

Diverse Nuclear Forces

Strategic

ICBM: 3 types being replaced by 2 in 6 versions

SLBM: 2 types being placed by 1

Bombers: 2 types being replaced by 1

Non-Strategic

Navy: SLCM, SAM, ASW missiles, torpedoes, depth bombs

Air Force: cruise missile, bombs

Army: short-range ballistic missiles, intermediate-range cruise missile

Defense: ballistic missile defense, air-defense, coastal defense

Nuclear Arsenals: Russia

ICBM

- SS-27 Mod 2 (mobile): replacing SS-25s at Novosibirsk, Tagil, Yoshkar-Ola
- SS-27 Mod 2 (silo): replacing SS-19s at Kozelsk
- SS-27 Mod 2 (rail): planned but uncertain
- RS-26 (compact SS-27): to replace SS-25s at Irkutsk and Vypolzovo
- RS-28 (Sarmat): to replace SS-28s at Dombarovsky and Uzhur



SSBN / SLBM

- SS-N-23 SLBM life-extension (Sineva/Layner) in Delta IV SSBN
- Borei SSBN: 8 planned (possibly 10-12)
- SS-N-32 (Bulava): fielding



Bombers

- Upgrades of some Tu-160 (Blackjack) and Tu-95 (Bear)
- New bomber (PAK PA) in development
- ALCM (Kh-102) in development



Tactical

- Tu-22M (Backfire) upgrade underway
- Su-34 (Fullback) fielding
- Yasen (Sverodvinsk) SSGN fielding
- SLCM (SS-N-30, Kalibr) fielding
- GLCM test-launched; not deployed
- SSM (SS-26, Iskander) fielding
- SAM (S-400/SA-21) fielding (nuclear?)
- ABM (A-135) upgrade planned

Nuclear Arsenals: Russia (ICBM)



Nuclear Arsenals: Russia (ICBM)

Third SS-27 unit (39 Guards Missile Division).

First regiment with 9 SS-27 Mod 2 (RS-24) placed on “experimental combat duty” in 2013; second in 2014; third in 2015.

Satellite images show upgrade of regiment base and media photos show SS-27 Mod 2 launchers.

Remaining SS-25s are being phased out.



SS-27 Mod 2 TEL under camouflage (top) and upgrade of first of several regiment bases.



Nuclear Arsenals: Russia (ICBM)

Fourth SS-27 unit (42 Missile Division).

Part of first regiment with 6 SS-27 Mod 2 (RS-24) placed on “experimental combat duty” in 2013; second regiment in 2014; third in 2015.

Satellite images show complete reconstruction of regiment base (bottom) with 9 TEL garages for 3 SS-27 Mod 2 battalions, as well as upgrade of warhead storage and newly arrived camouflaged vehicles at supply base.

Remaining SS-25s being phased out.



Construction of SS-27 Mod 2 base (bottom); camouflaged vehicles at supply base (top left); upgrade to warhead storage (top right). Image: 2 Jun 2014



Nuclear Arsenals: Russia (ICBM)

Fifth SS-27 unit (28 Guards Missile Division).

Deployment of first regiment with 10 SS-27 Mod 2 (RS-24) underway. First 4 became operational in December 2014; first regiment done in 2015.

News media photos show upgrade of silos.

Planned numbers are unknown, but there were 60 SS-19s in 2006 and 60 SS-27s were deployed at Tatishchevo.

Previously with SS-19 (possibly all gone).



Upgrade to SS-27 Mod 2 at Kozelsk missile field in 2012 (bottom) and 2013 (top).



Nuclear Arsenals: Russia (SSBN)

Modernization from Delta to Borei:

6 Delta IV, each with 16 SS-N-23 (Sineva modification)

Will likely be replaced by Borei SSBN in late-2020s

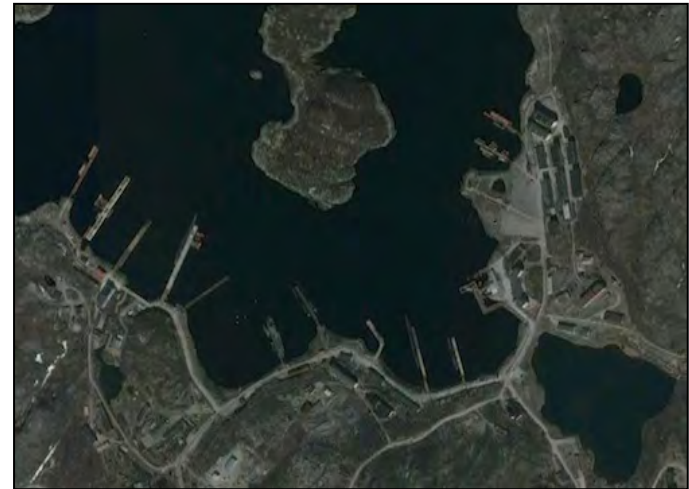
2-3 Delta III, each with 16 SS-N-18

Being replaced by Borei, starting in 2015

8 Borei (planned), each with 16 SS-N-32 (Bulava)



A Borei SSBN captured in the Kola Bay on 20 July 2014 with the aircraft carrier Admiral Kuznetsov.



Russia's SSBN fleet is based at Yagelnaya (Gadzhiiyev) on the Kola Peninsula in the Barents Sea (top) and Rybachiy on the Kamchatka Peninsula in the Pacific.



Nuclear Arsenals: Russia (SSBN)

Implications of modernization:

SSBN fleet will remain relatively stable around 8-10 operational SSBNs.

SLBMs stable at some 144 missiles.

Significant increase in warheads capacity from 528 to 800.

Weapons System	Missiles (2014)	Warheads (2014)	Missiles (2024)	Warheads (2024)
SS-N-18	48*	144	0	0
SS-N-23 (Sineva)	96**	384	32	128
SS-N-32 (Bulava)	-	-	112***	672
Total	144	528	144	800
* It is possible that only two Delta IIIs with 32 SS-N-18s are operational.				
** Not all six Delta IVs are operational any given time; normally 1-2 boats are in overhaul.				
*** Assume 7 of 8 planned Borei SSBNs have entered service.				

Nuclear Arsenals: Russia (Bombers)

A new subsonic, low-observable long-range bomber (PAK-DA) is under development. A Tupolev design apparently was selected in 2013. Expected deployment in the mid-2020s to replace:

Tu-95MS (Bear): roughly 60 left of which perhaps 50 are operational. Carries AS-15B ALCM and bombs. Being upgraded to increase conventional capability.

Tu-160 (Blackjack): roughly 15 left of which perhaps 13 are operational. Carries AS-15A ALCM and bombs. Upgrade to increase conventional capability. Reproduction announced.

Su-22M3 (Backfire): Intermediate-range but sometimes considered strategic. Carries AS-4 ALCM and bombs. Being upgraded to increase conventional capability.



A new nuclear ALCM (Kh-102) has been under development for some time, possibly to replace the aging AS-15 on the Tu-95MS and Tu-160 bombers.



PAK-DA bomber
(subsonic, stealthy)

Nuclear Arsenals: Russia (Trend)

- Despite widespread claims by some, Russia's nuclear modernization not (yet) a "build-up".
- Russia is already significantly below the New START treaty limit of deployed launchers (about 200 fewer than USA).
- Phase-out of Soviet-era weapons and replacement with newer systems on a less-than-one-for-one-basis continues to shrink the force structure.
- Yet reduction is leveling out and an eye to sustaining a large force for the foreseeable future.



Nuclear Arsenals: Russia (Tactical)



- Widely dispersed forces in four Services: tactical air force, navy, defense, and army (see map)
- Warheads not on bases but in central storage

Nuclear Arsenals: Russia (Tactical)

Weapons System	Remarks
Air Force	
AS-4 ALCM	1967: 47 years old. For Tu-22M3
Bombs	For Tu-22M3, Su-24M, Su-34
Navy	
SS-N-9 (Malakhit)	1969: 45 years old. For ships.
SS-N-12 (Bazalt)	1976: 38 years old. For subs.
SS-N-15 (Vyuga)	1969: 47 years old. For subs/ships.
SS-N-16 (Vodopad)	1981: 33 years old. For subs.
SS-N-19 (Granit)	1980: 34 years old. For ships.
SS-N-21 (Granat)	1987: 27 years old. For subs.
SS-N-22 (Moskit)	1981: 22 years old. For ships.
SS-N-30 (Kalibr)	(2015). For subs. Replacing SS-N-21?
Torpedoes (550/650 mm)	For subs.
Depth Bombs	For ASW aircraft and helicopters.
Army	
SS-21 (Tochka)	1981: 33 years old.
SS-26 (Iskander-K)	2005: Replacing SS-21.
Defense	
S-300/A-135/coastal	Nuclear status of newer systems uncertain.

Large leftover warhead inventory of almost entirely Soviet-era weapons.

Reduced by at least 75% since 1991.

Most estimates vary from 1,800 to 2,000 warheads. DOD mentions unofficial estimates of 2,000-4,000.

All warheads in central storage; not with/on delivery vehicles.

Of current force, only three types are being modernized. Future plans are unknown.

“The general purpose forces – to include dual-use nonstrategic nuclear forces – will continue to acquire new equipment for the near-term, but deliveries will be small and largely consist of modernized Soviet-era weapons.”

US Defense Intelligence Agency, 2013

Nuclear Arsenal: Russia (Tactical)



Nuclear-capable S-300 air-defense units moved into Crimea shortly after invasion in March 2014 (above).

Nuclear-capable forces have been at the Russian Black Sea Fleet in Crimea for decades: submarines, ships, naval aircraft (right).



SS-N-12 SLCM loading on Slava cruiser (above) and SS-N-22 SLCM loading on Dergach corvette (below)



Nuclear Arsenals: Russia (Tactical)

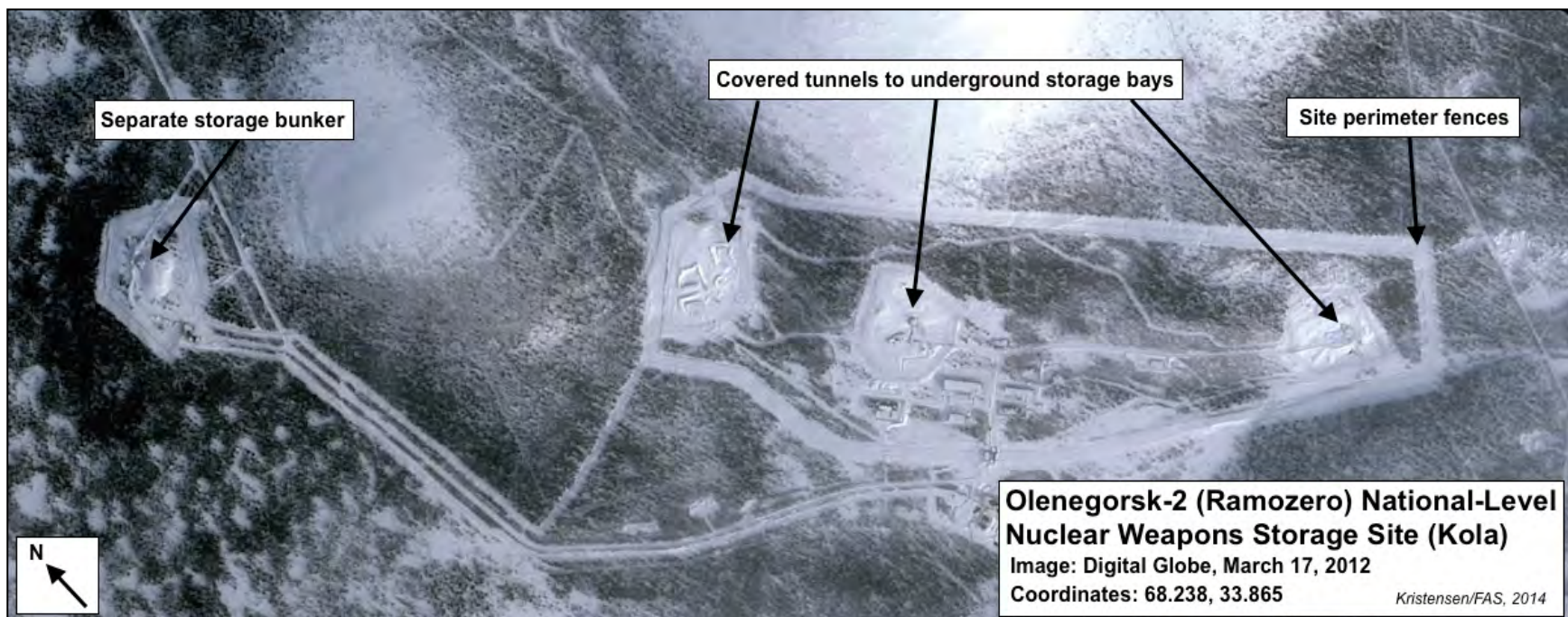


Because they are dual-capable, non-strategic nuclear forces are quickly drawn into conflicts.

Over the past three years Russian exercises “include simulated nuclear attacks on NATO Allies (eg, ZAPAD) and on partners (eg, March 2013 simulated attacks on Sweden)...”

NATO Secretary General Annual Report 2015

Nuclear Arsenals: Russia (Storage)



National-level storage site on Kola Peninsula includes three tunnels to underground warhead storage bays inside multi-layered fence perimeter. A separate storage bunker is located about 1 km from main site. Entire complex spans 3.1 km.

Nuclear Arsenals: Russia (Storage)

- Navy and Air Force nuclear storage sites are smaller and closer to bases, or on bases
- The navy storage site at Shchukozero near Severodvinsk on the Kola Peninsula is only 0.5 km long with one igloo (right)
- The air force site at Shatalovo (far right) near Belarus is 1.3 km long with two igloo (far right)
- These smaller sites are probably separate from the “central” storage sites managed by the 12th Main Directorate where Russia says all its tactical nuclear warheads are stored



Nuclear Arsenals: Russia (Storage)

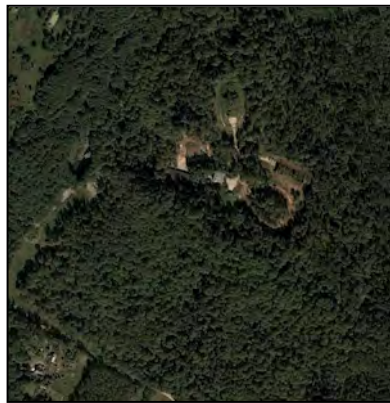


Image: September 22, 2002

Upgrade of apparent nuclear weapons storage site in Kaliningrad (near Chkalovsk). Clearing and improvement of perimeter, weapons igloos



Image: June 26, 2010

One of three igloos has quadruple fence typical of nuclear weapons storage storage facilities

But does it contain nuclear weapons?
Use visit to clarify nuclear status?



Image: July 25, 2012



Nuclear Arsenals: Russia (Storage)



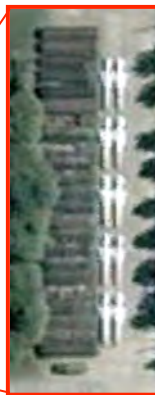
May 2007



July 2007



October 2009



- Some air bases have nuclear remote weapon storage site. Example: Shaykovka Air Base near Belarus (left)
- Tu-22M3 Backfired bombers with AS-4 Kitchen air-launched cruise missiles
- Between 2007 and 2009, the base's nuclear weapon storage site was upgraded with new perimeter and buildings

Nuclear Arsenals: China

ICBM / MRBM

- DF-31A (CSS-10 Mod 2) fielding
- DF-5B (CSS-4 Mod 2) with MIRV
- DF-26 introduced
- New mobile ICBM test-launching
- Development of new mobile ICBM capable of delivering MIRV

SSBN / SLBM

- Jin (Type-094) SSBN fielding (4-5 expected)
- JL-2 (CSS-N-14) SLBM in development
- Type-096 SSBN possibly in development

Cruise Missiles:

- ALCM (CJ-20 on H-6 bomber) in development*
- GLCM (DH-10/CJ-10) fielding**

Note: China is the only of the P-5 (NPT declared) nuclear-armed states that is **increasing** its nuclear arsenal.

* Listed in 2013 AFGSC briefing.

** Listed by NASIC as “conventional or nuclear,” the same designation as the Russian nuclear-capable AS-4 Kitchen ALCM.



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Nuclear Arsenals: China (ICBM)



ICBM modernization from liquid- to solid-fuel more mobile launchers.

MIRV on some silo ICBMs.

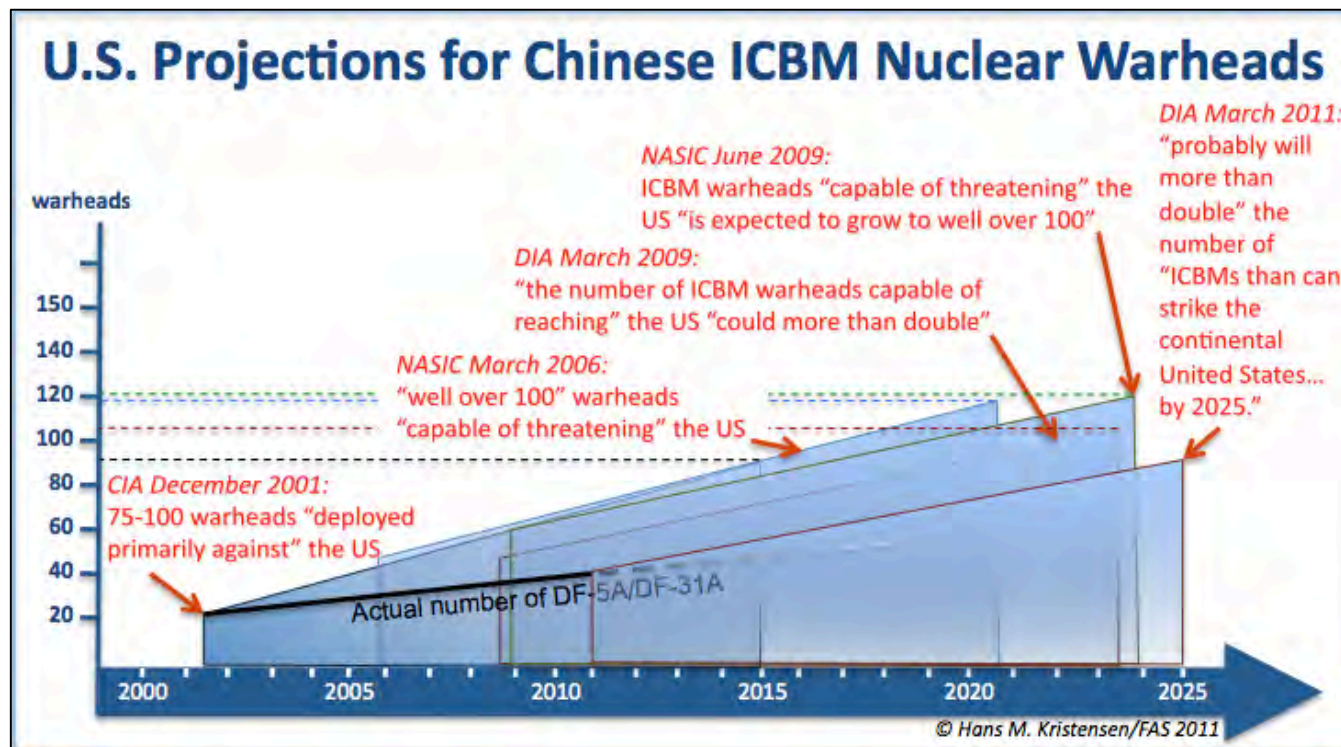


DF-A (top left), DF-31A (top right), DF-5B (below), DF-4A (right)

Nuclear Arsenals: China (ICBM)



Nuclear Arsenals: China (ICBM)



US projections of Chinese ICBMs tend to predict too many too soon

Nuclear Arsenal: China (MRBM)

Approximately 80 nuclear (DF-21 and DF-21A).

Almost completely replaced DF-3A.

Vast training area in Delingha and Da Qaidam.

DF-21C and DF-21D conventional versions deploying.



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Nuclear Arsenals: China (MRBM)

Upgrade from DF-3A to DF-21
MRBM.



Nuclear Arsenals: China (MRBM)



Nuclear Arsenals: China (SSBN)



Building class of 4-5 Jin SSBNs
Each with 12 JL-2.

First seen in 2007 on commercial satellite photos.

4 in service, but JL-2 not yet fully operational.

All 4 said to be based at South Sea Fleet.

Big unknown: will China begin to deploy nuclear warheads on launchers in peacetime?



Nuclear Arsenals: China (SSBN)

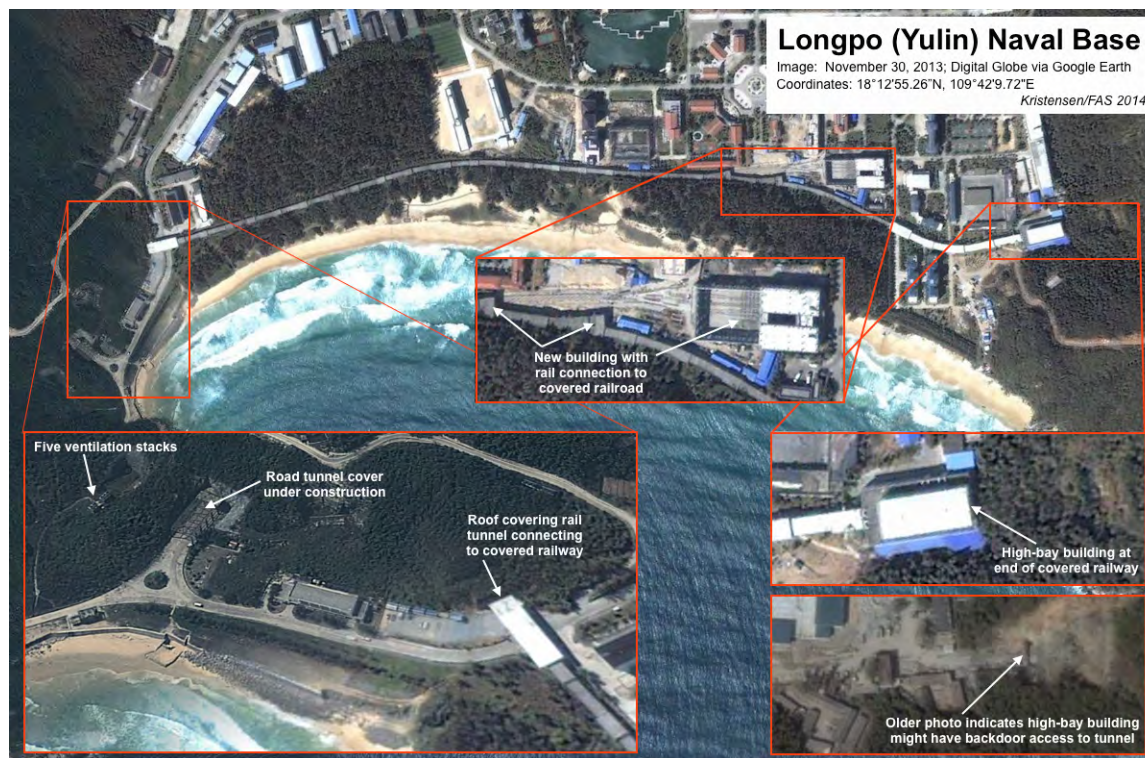


Expansion of Hainan submarine base.

First Jin SSBN presence in 2008.

Base includes demagnetization facility, underground submarine pier, SLBM handling and transportation system.

Nuclear Arsenals: China (SSBN)



Further upgrade of Hainan submarine base.

Missile servicing facilities.

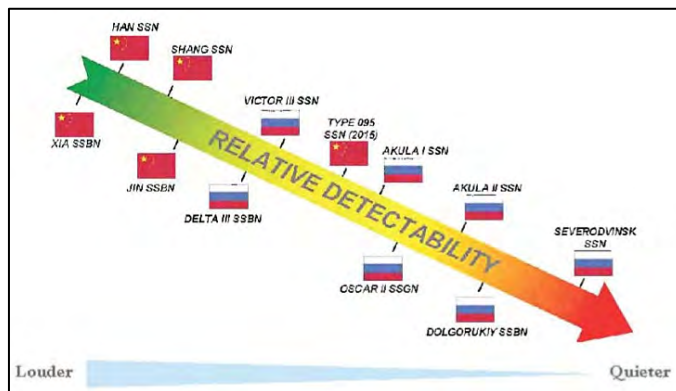
Covered rail track from service buildings to back entrance to underground submarine base.

Nuclear Arsenals: China (SSBN)



Submarine base part of sprawling naval infrastructure that possibly also includes regional nuclear weapons storage facility.

Nuclear Arsenals: China (SSBN)



Important new capability, but...

Jin SSBN noisy compared with Russian SSBNs.

To target USA, a Jin SSBN would have to sail far into Pacific or Sea of Japan.

Command and control capability is limited.

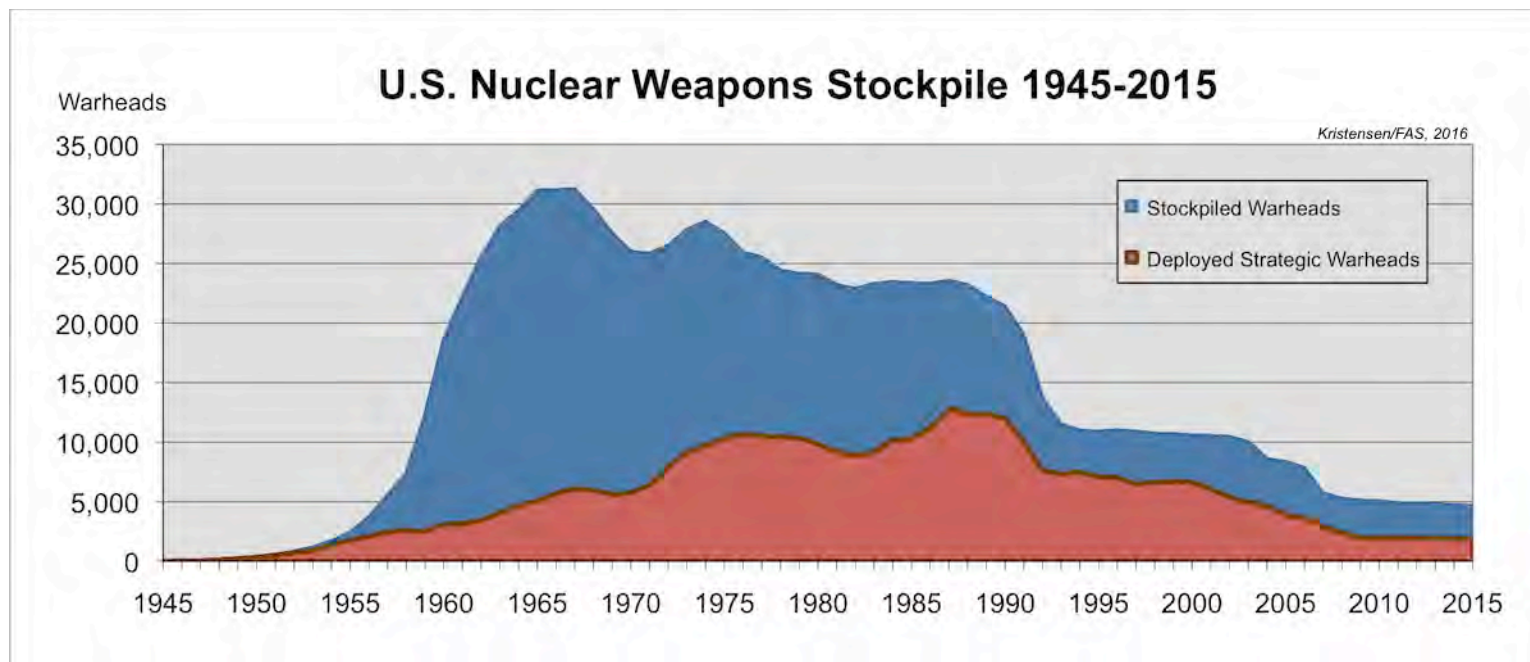


Nuclear Arsenals: USA

Stockpile peaked in 1967; deployed strategic warheads peaked in 1986.

Stockpile and deployed strategic warheads have not changed significantly since 2009.

But unilateral reductions are “built into” current modernization plan.



Nuclear Arsenals: USA

ICBM

- Minuteman III life-extension completing
- Warhead fuzes/interoperable warhead planned
- GBSD (ICBM replacement) in development

SSBN / SLBM

- Trident II D5 SLBM life-extension development
- SSBN replacement development (12 planned)
- W76-1 warhead life-extension deploying
- W88-1 warhead life-extension development

Bombers

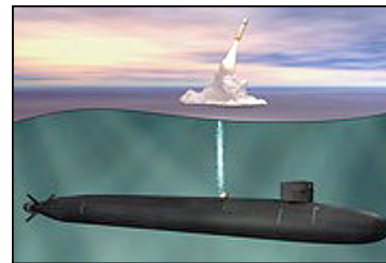
- Upgrade of B-2 and B-52 underway
- LRS-B next-generation bomber in development
- B61-12 guided standoff bomb in development
- LRSO (ALCM) replacement in development

Tactical

- F-35A nuclear capability in development
- B61-12 guided standoff in development

Infrastructure

- Uranium Processing Facility (secondaries) construction
- Plutonium production facilities (primaries) construction
- Warhead surveillance/simulation facilities upgrade



B61-12: Also a nuclear bunker buster?

Going...

Going...

Gone!

An F-15E drops one of two B61-12 guided nuclear bomb shapes at Tonopah Test Range in Nevada on October 20, 2015. Official images from the test indicate that the B61-12 demonstrated an accuracy of less than 30 meters (98 feet) and that the guided bomb has earth-penetrating capability against underground targets.

Kristensen/FAS, 2016

Nuclear Arsenals: USA

Destruction of underground facilities require ground- or shallow sub-surface bursts to ensure shock wave causes an underground fracture or “damage zone”.

In a sub-surface burst the shock wave moving upward is trapped by the surface material and reflected downward where it reinforces the original chock wave. This “coupling” effect enables an earth-penetrator to destroy underground targets 2-5 times deeper than ground burst weapons.

1 kt: destroys to a few 10s of meters
1 MT: destroys to a few 100s of meters



B61-11 drop test into frozen soil

Nuclear Arsenals: USA

Not just a bigger bomb...

The destructive effect of nuclear weapons is unlike any other created by human beings.

100% fission of 1 kg Pu-239 or U-235 can produce an explosion equivalent to more than 18,000 tons of TNT.



Downtown Hiroshima days after air burst of 13.5 kt HEU gun-type bomb



(Above) The most powerful U.S. conventional bomb – the GBU-43/B Massive Ordnance Air Blast (MOAB) – has an explosive yield of approximately 0.011 kt TNT, roughly 30 times less than the lowest yield setting (0.3 kt) on the B61 nuclear bomb (below). The B61-12 weighs 850 lbs (385 kg), nearly thirty times less than the MOAB's 22,600 lbs (10,300 kg).



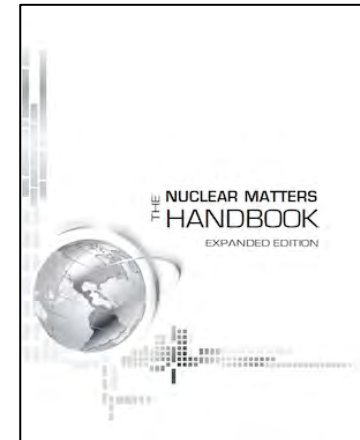
Nuclear Arsenals: USA (Strategy)

(Very) Simply speaking, there are two general types of nuclear employment strategies:

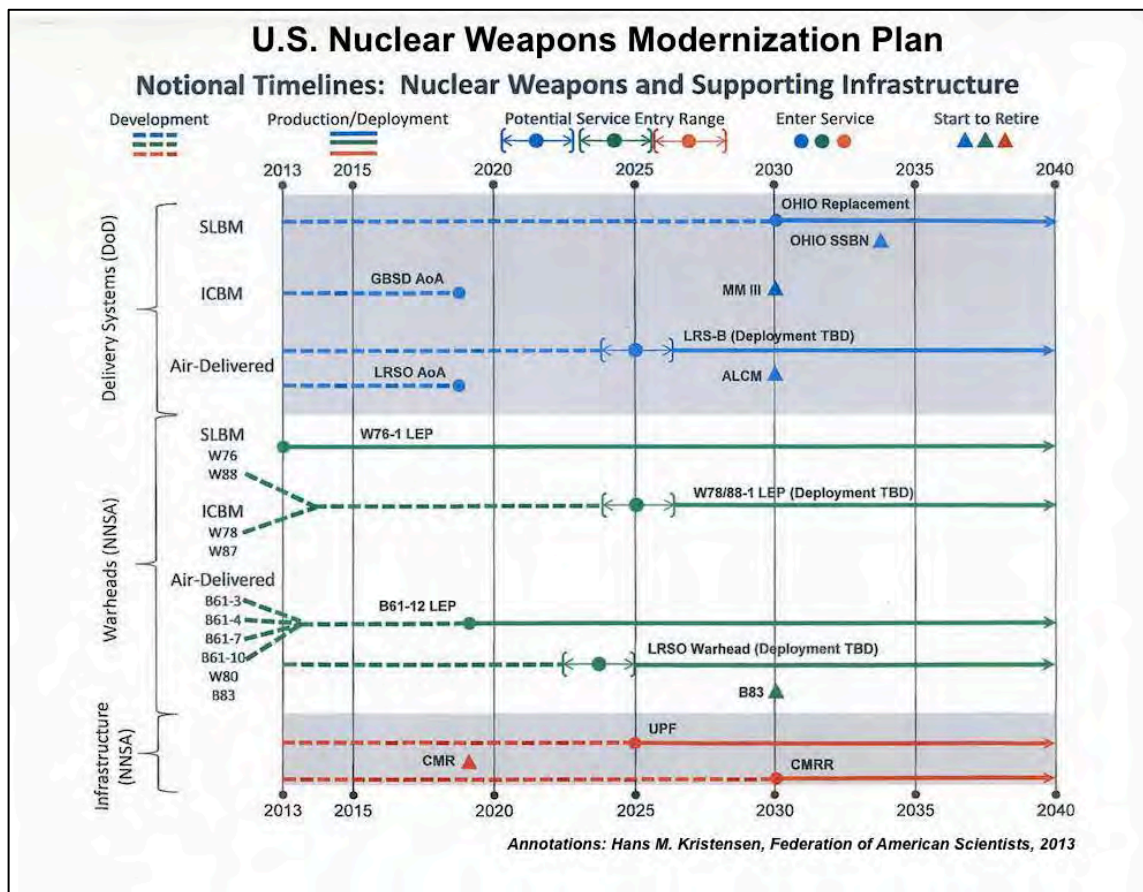
Counter-force: employs nuclear nuclear forces “to destroy the military capabilities of an enemy or render them impotent. Typical counter force targets include: **bomber bases, ballistic missile submarine bases, intercontinental ballistic missile (ISBM) silos, antiballistic and air defense installations, command and control centers, and weapons of mass destruction storage facilities.** Generally, **the nuclear forces required to implement a counter-force targeting strategy are larger and more accurate** than those required to implement a counter-value strategy. Counter-value targets generally tend to be harder, more protected, more difficult to find, and more mobile than counter-value targets.”

Counter-value: directs the “destruction or neutralization of selected enemy military and military-related targets such as **industries, resources, and/or institutions that contribute to the ability of the enemy to wage war.** In general, **weapons required to implement this strategy need not be as numerous nor as accurate as those required to implement a counter-force targeting strategy** because counter-value targets tend to be softer and less protected than counter-force targets.”

Obama administration did not change counter-force focus: The 2013 Nuclear Employment Strategy “requires the United States to maintain significant counterforce capabilities against potential adversaries. The new guidance does not rely on a ‘counter-value’ or ‘minimum deterrence’ strategy.”



Nuclear Arsenals: USA



Next 10 years:

\$350 billion for maintaining and modernizing nuclear forces and infrastructure.

Comprehensive modernization:

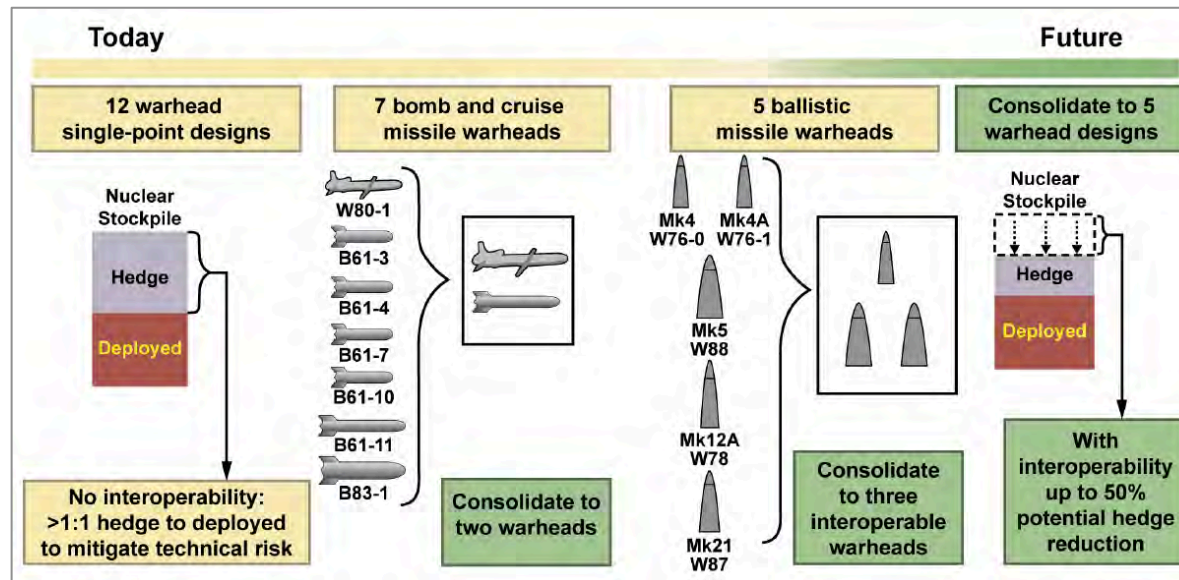
- All three legs of strategic triad
- Tactical dual-capable aircraft
- Warhead production complex

Consolidation and modification of warhead types.

Some delays happening; more expected.

Extending nuclear deterrent through 2080.

Nuclear Arsenals: USA



Alleged advantages:

- Fewer warhead types permit reduction of hedge
- Modified warheads with increased safety, use control, and performance margin
- Fewer warheads will be cheaper to maintain and deploy

Possible risks:

- Modified warheads further from tested designs; reliability issues?
- Reduced stockpile diversity
- Complex and expensive programs prone to delays and cost overruns
- Modified warheads “new”?
- Costs highly uncertain and estimates probably underrated

Fundamental questions:

- Why is hedging necessary for missile warheads but not bomber weapons?
- Why must US hedge when Britain and France do not?
- Why is “deployed” warheads the same in the future?

3+2 strategy: reduction from 12 warhead versions (8 basic designs) to 5 types:

3 “Interoperable” or “adaptable” warheads on ICBM and SLBM
IW-1 (W78/W88-1), IW-2 (W87/W88-1), IW-3 (W76-1)

2 non-interoperable warheads on bombers and fighters

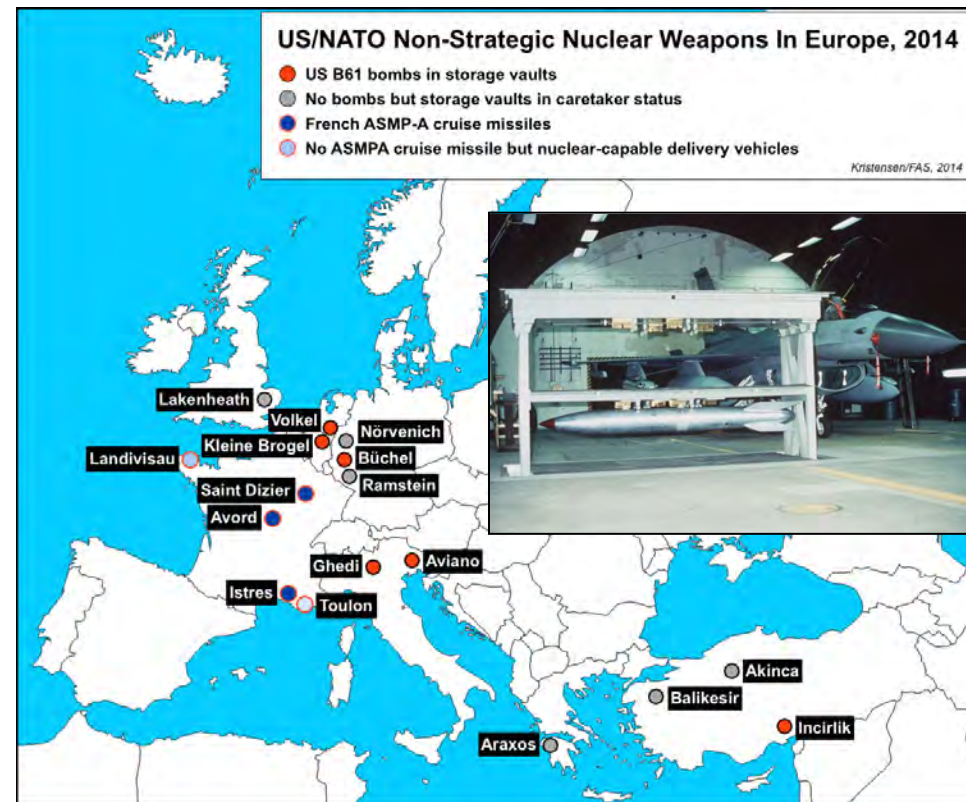
ALCM (LRSO) with W80-1 or W84
B61-12 guided standoff bomb

Nuclear Arsenals: USA (Tactical)

- 180 U.S. B61 bombs scattered in 87 underground vaults underneath 87 aircraft shelters at six bases in five European countries:

Country	Base	Vaults	B61s
Belgium	Kleine Brogel	11	20
Germany	Buchel	11	20
Italy	Aviano	18	50
	Gheddi Torre	11	20
Netherlands	Volkel	11	20
Turkey	Incirlik	25	50
Total		87	180

- Additional bombs in the United States for extended deterrence missions elsewhere.
- 50 French ASMPA cruise missiles at three bases for 3 squadrons (2 air and 1 naval).



Nuclear Arsenals: USA (Tactical)

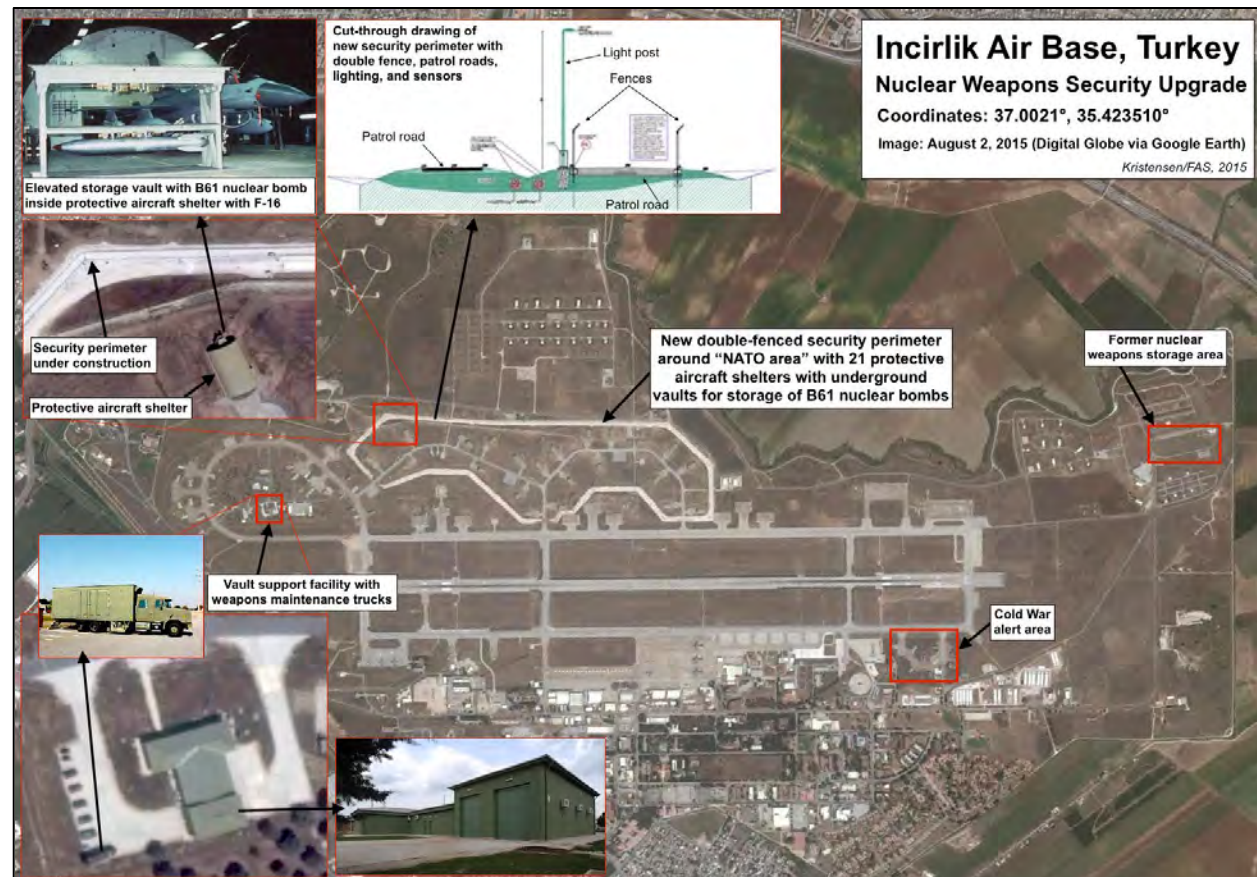
Upgrade underway of WS3 system at seven (six active) bases in Europe

Security and infrastructure upgrades underway at USAF base at Incirlik, Turkey (50 bombs stored)

Only 110 km (68 miles) from border with war-torn Syria; Inside Turkey with an armed civil war

Similar security upgrade at USAF base at Aviano, Italy

No similar security upgrades seen yet at national bases in Belgium, Germany, Italy, Netherlands



Operations

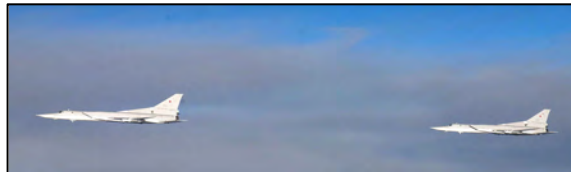
Both Russia and US/NATO are increasing/modifying operations of nuclear-capable forces

May not be explicit nuclear signal, but is being seen as also a nuclear signal

Russia: Long-range bomber flights increasing closer to NATO countries; “snap” exercises increasing in frequency, size, visibility; explicit nuclear threats issued by officials



Baltic Sea: Su-24 fighter-bomber intercept



Baltic Sea: Tu-22M bombers



Televised ICBM/SLBM launch



North Sea: Tu-95 bomber intercept



Baltic Sea: SS-N-22 SLCM loading



Luga: SS-26 return from Kaliningrad deployment

Operations

Both Russia and US/NATO are increasing/modifying operations of nuclear-capable forces

US/NATO: Long-range bombers integrated closer into EUCOM strike plans; exercises in Eastern Europe increasing in frequency, size, visibility; fighter-bomber rotational deployments and exercises in Baltic States, Poland, Sweden; first SSBN port visit to Europe in 25 years



F-16 deployments to Estonia, Poland, Sweden



B-52, B-2 deployment to United Kingdom



B-52 over Latvia



B-52s over BALTOPS exercise



SSBN visit to Scotland

Nuclear Arsenals: France

SSBN / SLBM

- TNO warhead on M51.2 SLBM.
- M51.3 SLBM development.

Bombers

- Rafale K3 to replace Mirage 2000N at Istres Air Base.
- Next-generation ALCM in development.

Infrastructure

- Megajoule at CESTA development.
- Airix/Epure hydrodynamic test center at Valduc development (partly Joint French-UK warhead surveillance testing center).



Nuclear Arsenals: Britain

SSBN / SLBM

- SSBN (Vanguard replacement) in development (3-4 planned).
- SLBM (Trident II D5LE) in development (USA).
- Mk4A/W76-1 type warhead fielding.

Infrastructure

- Joint UK-French warhead surveillance testing technology center development.



Nuclear Arsenals: Pakistan

MRBM / SRBM

- Shaheen III MRBM (Hatf-6) in development
- Shaheen II MRBM (Hatf-6) fielding
- NASR SRBM (Hatf-9) in development
- Abdali SRBM (Hatf-2) in development*

Cruise Missiles

- GLCM (Babur/Hatf-7) in development
- ALCM (Ra'ad/Hatf-8 on Mirage) in development
- SLCM (naval version of Babur) in development?

Infrastructure

- Khushab-IV reactor #4 construction
- Uranium enrichment facility upgrade

* Listed by Pakistani ISPR but not by 2013 NASIC report



Nuclear Arsenals: Pakistan



Shaheen-II mobile launcher. Detected TELs fitting out at National Defense Complex. Not yet deployed in 2009, but probably now part of 110-130 warhead estimate. Extended-range Shaheen-III in development.

Nuclear Arsenal: India

ICBM / IRBM / MRBM

- Agni VI ICBM development (MIRV?)
- Agni V ICBM in development
- Agni IV IRBM in development
- Agni III IRBM fielding

SSBN / SLBM

- Arihant SSBN development (3+ expected).
- K-15/K-4 SLBM development.
- Dhanush SLBM fielding.

Cruise Missiles

- GLCM (Nirbhay) development*

Infrastructure

- One plutonium production reactor developing.
- Breeder reactors?

* Reported by news media but not listed in 2013 NASIC report.



Nuclear Arsenals: Israel

IRBM

- Jericho III IRBM development?

SSG / SLBM

- Dolphin SSG fielding
- SLCM (Popeye Turbo/Harpoon) rumored*

Bomber

- F-35A acquisition



* Reported by news media but denied by officials. US public intelligence reports omit references to Israeli nuclear forces

Nuclear Arsenals: North Korea

ICBM / IRBM / MRBM

- No Dong MRBM fielding
- Musudan IRBM in development
- Hwasong-13 (KN-08) ICBM in development (fielding?)
- Taepo Dong 2 SLV/ICBM in development

SSBN/SLBM

- SSBN/SLBM in early development
- Faked SLBM launch

Cruise Missiles

- KN-09 coastal defense cruise missile in development ?**

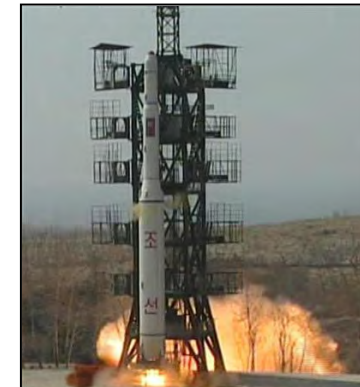
Infrastructure

- Yongbyon plutonium production reactor re-start
- Uranium enrichment production construction

Big unknown: Does North Korea have miniaturized and weaponized warhead that can be delivered by ballistic missile?

* Despite three underground nuclear tests, there is no known public evidence that North Korea has miniaturized its test devices sufficiently for delivery by ballistic missiles

** Listed by 2013 AFGSC briefing but not in 2013 NASIC report. 2014 update of AFGSC does not list KN-09



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QUESTIONS?