U.S. Nuclear Weapons Capability

Assessing the state of U.S. nuclear weapons capabilities presents several challenges.

First, the U.S. has elected to maintain the weapons—based on designs from the 1960s—that were in the stockpile when the Cold War ended rather than take advantage of technological developments to field new weapons that are safer, are more secure, and give the United States improved options for guaranteeing a credible deterrent.

Second, detailed data about the readiness of nuclear forces, their capabilities, and weapon reliability are not publicly available, and this makes analysis difficult.

Third, the U.S. nuclear enterprise is composed of many components, some of which are also involved in supporting conventional missions. For example, dual-capable heavy bombers do not fly with nuclear weapons today, although they did routinely until the late 1960s (and are capable of doing so again if the decision should ever be made to resume this practice). Additionally, the nuclear weapons laboratories do not focus solely on the nuclear weapons mission; they also perform a variety of functions related to nuclear nonproliferation, medical research, threat reduction, and countering nuclear terrorism, including nuclear detection.

Thus, assessing the extent to which any one piece of the nuclear enterprise is sufficiently funded, focused, and effective with regard to the nuclear mission is problematic.

Additionally, the U.S. nuclear weapons enterprise should be flexible and resilient to underpin the U.S. nuclear deterrent. If the U.S. detects a game-changing nuclear weapons development in another country, the ability of the U.S. nuclear weapons complex to adjust is important.

To this end, the U.S. does maintain an inactive stockpile that includes near-term hedge warheads that can be put back into operational status within six to 24 months. Extended hedge warheads are said to be ready within 24 to 60 months. The U.S. preserves some of the upload capability on its strategic delivery vehicles, which means that the nation can decide to increase the number of nuclear warheads on each type of its delivery vehicles. For example, the U.S. Minuteman III intercontinental ballistic missile (ICBM) can carry up to three nuclear warheads, though it is currently deployed with only one.

Presidential Decision Directive-15 (PDD-15) requires the U.S. to maintain the ability to conduct a nuclear test within 24 to 36 months of a presidential decision to do so, but even this extended timeline is proving to be a challenge for the National Nuclear Security Administration (NNSA). Successive governmental reports have noted the continued deterioration of technical and diagnostics equipment and the inability to fill technical positions supporting nuclear testing readiness.

The weapons labs are beset by demographic challenges of their own. Thomas D’Agostino, former Under Secretary of Energy for Nuclear Security and Administrator of the NNSA, has stated that
In about five years, the United States will not have a single active engineer who had “a key hand in the design of a warhead that’s in the existing stockpile and who was responsible for that particular design when it was tested back in the early 1990s.” This is a significant problem because for the first time since the dawn of the nuclear age, the U.S. will have to rely on the scientific judgment of people who were not directly involved in nuclear tests of weapons that they designed, developed, and are certifying.

It is unclear how much of the existing inactive stockpile will go through the life extension program. Hence, our ability to reconstitute nuclear forces could well decline with the passage of time, making certification of warhead safety and reliability more difficult as the small changes inherent in a continuing process of refurbishing aging components inevitably cause the weapons to depart from their original tested design envelope.

The uncertainty regarding the funding and direction of the nuclear weapons complex is one of the factors that complicate the National Laboratories’ efforts to attract and maintain young talent. The shift of focus away from the nuclear mission after the end of the Cold War caused the weapons labs to lose their sense of purpose and to feel compelled to reorient their mission focus. Their relationship with the government also evolved in hindering ways. The NNSA was supposed to address these problems but has largely failed in this task, partly because “the relationship with the NNSA and the National security labs appears to be broken.”

In 1999, the Commission on Maintaining U.S. Nuclear Weapons Expertise concluded that 34 percent of the employees supplying critical skills to the weapons program were more than 50 years old. The number increased to 40 percent in 2009. This is more than the average in the U.S. high-technology industry. In 2012, a number of employees of the Los Alamos National Laboratory were laid off in anticipation of a $300 million shortfall.

The lack of resources has undermined the morale of the workforce. The issue is so serious that the Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise recommended fundamental changes in the nuclear weapons enterprise’s culture, business practices, project management, and organization. Others propose moving the NNSA to the Department of Defense.

Yet another important indication of the health of the overall force is the readiness of forces that actually operate U.S. nuclear systems. In 2006, the Air Force mistakenly shipped non-nuclear warhead components to Taiwan. A year later, the Air Force transported nuclear-armed cruise missiles across the U.S. without authorization (or apparently even awareness that it was doing so, mistaking them for conventional cruise missiles). These serious incidents led to the establishment of a Task Force on DOD Nuclear Weapons Management, which found that “there has been an unambiguous, dramatic, and unacceptable decline in the Air Force’s commitment to perform the nuclear mission and, until very recently, little has been done to reverse it” and that “the readiness of forces assigned the nuclear mission has seriously eroded.”

Following these incidents, the Air Force instituted broad changes to improve oversight and management of the nuclear mission and the inventory of nuclear weapons, including creating the Air Force Global Strike Command to organize, train, and equip intercontinental-range ballistic missile and nuclear-capable bomber crews as well as other personnel to fulfill a nuclear mission and implement a stringent inspections regime.

The success of these changes has been limited. In January 2014, the Air Force discovered widespread cheating on nuclear proficiency exams and charged over 100 officers with misconduct. The Navy had a similar problem, albeit on a smaller scale. The Department of Defense conducted two nuclear enterprise reviews, one internal and one external. Both reviews identified a lack of leadership attention, a lack of resources to modernize the atrophied infrastructure, and unduly burdensome implementation of the personnel reliability program as some of the core challenges preventing a sole focus on accomplishing the nuclear mission.

The Force Improvement Program was initiated and mostly implemented throughout 2014 and into 2015, and the Air Force shifted over $160 million to address the problem with the ICBM mission. The Air Force has also seen an increase in badly needed manpower. If changes in the nuclear enterprise are to be effective, leaders across the executive and legislative branches will have to continue to provide sufficient resources to mitigate readiness and morale issues within the force.

Fiscal uncertainty and a steady decline in resources for the nuclear weapons enterprise (trends that have begun to reverse in recent years) have negatively affected the nuclear deterrence mission. Admiral Cecil D. Haney, Commander, U.S.
Strategic Command (STRATCOM), testified in 2014 that “[i]n recent years the percentage of spending on nuclear forces has gradually declined to only 2.5% of total DOD spending in 2013—a figure near historic lows,” although he also stated that he fully believes STRATCOM “remains capable and ready to meet our assigned missions.”

Implications for U.S. National Security

U.S. nuclear forces are not designed to shield the nation from all types of attacks from all adversaries. They are designed to deter conventional and nuclear attacks that threaten American sovereignty, forward-deployed troops, and allies.

U.S. nuclear forces have played an important role in the global nonproliferation regime by providing U.S. assurances to NATO, Japan, and South Korea that have led these allies either to keep the number of their nuclear weapons lower than otherwise would be the case (France, the U.K.) or to forgo their development and deployment altogether. North Korea has proven that a country with very limited intellectual and financial resources can develop a nuclear weapon if it decides to do so. Iran continues to be on a path to obtaining a nuclear weapon.

This makes U.S. nuclear assurances to allies and partners ever more important. Should the credibility of American nuclear forces continue to degrade, countries such as South Korea could pursue an independent nuclear option, causing a destabilizing effect across the region.

Certain negative trends could undermine U.S. nuclear deterrence if problems are not addressed. There is no shortage of challenges on the horizon, from an aging nuclear weapons infrastructure and workforce to the need to recapitalize all three legs (land, air, and sea) of the nuclear triad, from the need to conduct life extension programs while maintaining a self-imposed nuclear weapons test moratorium to limiting the spread of nuclear know-how and the means to deliver nuclear weapons. Additionally, the United States must take account of adversaries who are modernizing their nuclear forces.

Deterrence is a complex interplay between U.S. conventional and nuclear forces and the psychology of both allies and adversaries that the U.S. would use these forces to defend both the interests of the U.S. and those of its allies. The requirements of nuclear deterrence and nuclear warfighting may be quite different and thus should be considered within their own contexts and then balanced against each other to ensure that the U.S. nuclear portfolio is structured in capacity, capability, variety, flexibility, and readiness to meet both types of demands. In addition, military requirements and specifications for nuclear weapons might be different, depending on different circumstances, who is being deterred, and what they are being deterred from doing.

Due to the complex interplay among strategy, policy, actions that states take in international relations, and other actors’ perceptions of the world around them, it is quite possible that one might never know precisely if and when a nuclear or conventional deterrent provided by U.S. forces loses credibility. Nuclear weapons capabilities take years or decades to develop, as does the infrastructure supporting them. The U.S. has neglected its nuclear infrastructure for decades. We can be reasonably certain that a robust, well-resourced, focused, and reliable nuclear enterprise is more likely to sustain its deterrent value than is an outdated and questionable one.

We know that the U.S. is capable of incredible mobilization when danger materializes. The evidence points to just such a danger maturing on our doorstep with regard to nuclear affairs. The nuclear threat environment is dynamic and proliferating, with old and new actors developing advanced capabilities while the U.S. enterprise is relatively static, potentially leaving the United States at a technological disadvantage. This is worrisome because of its implications both for the security of the United States and for the security of its allies and the free world generally.

Scoring U.S. Nuclear Weapons Capabilities

The U.S. nuclear weapons enterprise is composed of several key elements that include warheads, delivery systems, nuclear command and control, and the physical infrastructure that designs, manufactures, tests, and maintains U.S. nuclear weapons. The complex also includes the talent of people from physicists to chemical engineers to maintainers and operators, without which the continuous maintenance of the nuclear infrastructure would not be possible.
The factors selected below are the most important elements of the nuclear weapons complex. They are judged on a five-grade scale, where “very strong” means that a sustainable, viable, and funded plan is in place and “very weak” means that the U.S. is not meeting its security requirements, which has the potential to damage vital national interests if the situation is not corrected.

**U.S. Warhead Surety Score: Strong**

U.S. warheads must be safe, secure, effective, and reliable. The Department of Energy (DOE) defines reliability as “the ability of the weapon to perform its intended function at the intended time under environments considered to be normal” and as “the probability of achieving the specified yield, at the target, across the Stockpile-to-Target Sequence of environments, throughout the weapon's lifetime, assuming proper inputs.” Since 1993, reliability has been determined through non-nuclear experiments (that is, without the use of experiments producing nuclear yield); sophisticated calculations using high-performance computers; and related evaluations.

Nuclear warhead and delivery system reliability becomes more important as the number and diversity of nuclear weapons in the stockpile decrease, because fewer types of nuclear weapons leave a smaller margin of error should one type of a weapon be affected by a technical problem that requires the decommissioning of a weapon type or its delivery system. Americans and allies must be confident that U.S. nuclear warheads will perform as expected.

As warheads age, they become less able to perform their mission as expected, and this can complicate military planning significantly. Despite creating impressive amounts of knowledge about nuclear weapons physics, the U.S. is not completely certain about the long-term effects of aging components that comprise a nuclear weapon. Former NNSA spokesman Bryan Wilkes said, “We know that plutonium pits have a limited lifetime.” A plutonium pit is a crucial component of a nuclear weapon, and with life extension programs introducing new components to warheads whose radiological effects are not fully known, the level of uncertainty has increased.

The United States has the safest stockpile in the world, but security of long-term storage sites, potential problems introduced by improper handling, or unanticipated effects stemming from long-term handling could compromise the integrity of U.S. warheads. The nuclear warheads themselves contain security measures that are designed to make it difficult, if not impossible, to detonate a weapon absent a proper authorization.

**Grade:** The Department of Energy (DOE) and Department of Defense are required to certify the reliability of the nuclear stockpile annually. This assessment does not include delivery systems, although the U.S. Strategic Command does assess overall weapons system reliability, which includes both the warhead and delivery platforms.

Absent nuclear weapons testing, the assessment of weapons reliability becomes more subjective, albeit based on experience and non-nuclear tests rather than fact. While certainly an educated opinion, it is not a substitute for the type of objective data obtained through nuclear testing. Testing was used to diagnose potential problems and to certify the effectiveness of fixes to those problems. Given that modern simulation is based on nuclear tests that were conducted primarily in the 1950s and 1960s, using testing equipment of that era, there is a great deal that modern testing equipment and computer capability could teach about nuclear physics.

According to the late Major General Robert Smolen, some of the nuclear weapon problems the U.S. now faces “in the past would have [been] resolved with nuclear tests.” By 2005, a consensus emerged in the NNSA, informed by the nuclear weapons labs, that it would “be increasingly difficult and risky to attempt to replicate exactly existing warheads without nuclear testing and that creating a reliable replacement warhead should be explored.” When the U.S. did nuclear testing, it was frequently found that small changes in the tested configuration of a weapon had dramatic impact on weapons performance. In fact, the 1958–1961 testing moratorium resulted in weapons with serious problems being introduced into the U.S. stockpile.

In fiscal year (FY) 2014, the NNSA met its goal of maintaining 100 percent of the U.S. nuclear stockpile as safe, secure, reliable, effective, and available.

The lack of nuclear weapons testing does create some uncertainty concerning the adequacy of fixes to the stockpile when problems are found. This includes updates made in order to correct problems that were found in the weapons or changes in the weapons resulting from life extension programs. It is simply impossible to duplicate exactly weapons that were designed and built many decades.
ago. According to former Defense Threat Reduction Agency Director Dr. Stephen Younger, we have had “a number of problems that were never anticipated” and had to fix them by using “similar but not quite identical parts.”328 The high costs of having to certify weapons without nuclear testing are resulting in fewer types of weapons and, as a consequence, a greater impact across the inventory if there is an error in the certification process.

Secretary of Defense Robert Gates warned in October 2008 that, “[t]o be blunt, there is absolutely no way we can maintain a credible deterrent and reduce the number of weapons in our stockpile without either resorting to testing our stockpile or pursuing a modernization program.”329 The U.S. is pursuing warhead life extension programs that replace aging components before they can cause reliability problems. However, the national commitment to this modernization program, including the necessary funding over the long term, continues to be uncertain. As a result, this indicator is graded “strong.”

Reliability of U.S. Delivery Platforms Score: Strong

Reliability encompasses not only the warhead, but the strategic delivery vehicles as well. This includes a successful missile launch, the separation of missile boost stages, the performance of the missile guidance system, the disgorgement of the multiple re-entry vehicle warheads from the missile, and the accuracy of the final re-entry vehicle in reaching its target.330

The U.S. conducts ICBM and submarine launched ballistic missile (SLBM) flight tests every year to ensure the reliability of its systems. Anything from electrical wiring to faulty booster separations could degrade the efficiency and safety of the U.S. strategic deterrent if it were to malfunction. U.S. strategic, long-range bombers regularly conduct intercontinental training and receive upgrades in order to sustain a high level of combat readiness. However, potential challenges are on the horizon. The United States is not seriously considering modernization of delivery platforms infrastructure, including old communication cables, computers, and silos.

Grade: U.S. ICBMs and SLBMs are flight tested annually, and these tests were successful in 2014. To the extent that data from these tests are publicly available, they provide objective evidence of the delivery systems’ reliability. The aged systems, however, occasionally have reliability problems.331 Overall, this factor earns a grade of “strong.”

Nuclear Warhead Modernization Score: Weak

During the Cold War, the United States maintained a strong focus on designing and developing new nuclear warhead designs in order to counter Soviet advances and modernization efforts. Today, the United States is not developing a single new nuclear warhead even though all of its nuclear-armed adversaries are developing new nuclear warheads and capabilities. Since the collapse of the Soviet Union, nuclear weapons and delivery vehicles have not been replaced despite being well beyond their designed service life. This both increases the risk of failure due to aging components and signals to adversaries that the United States is less committed to nuclear deterrence.

New weapon designs could allow American engineers and scientists to improve previous designs and address new military requirements (for example, the need to destroy deeply buried and hardened targets) that have emerged since the end of the Cold War. With new warheads, the safety and security of American weapons could also be enhanced in ways that may not be possible today without nuclear testing.

An ability to work on new weapon designs would also help American experts to remain engaged and knowledgeable and would help to attract the best talent to the nuclear enterprise. As the Panel to Assess the Reliability, Safety, and Security of the United States Nuclear Stockpile noted, “Only through work on advanced designs will it be possible to train the next generation of weapon designers and producers. Such efforts are also needed to exercise the DoD/NNSA weapon development interface.”332 Other nations maintain their levels of proficiency by having their scientists work on new nuclear warheads and possibly conducting very low-yield nuclear weapons tests.
Grade: The lack of plans to modernize nuclear weapons—life extension programs are not modernization—and the restrictions on thinking about new designs that might be able to accomplish the deterrence mission in the 21st century more effectively earn nuclear warhead modernization a grade of “weak.”

Nuclear Delivery Systems Modernization Score: Weak

The age of American platforms can have a significant impact on the operational capacity of the U.S. strategic deterrent. The older the weapons, the more at risk they are from faulty components or malfunctioning equipment. Age can degrade reliability by increasing the potential for systems to break down or fail to respond correctly. Corrupted systems, defective electronics, or performance degradation due to long-term storage defects (in the case of nuclear warheads) can have serious implications for American deterrence and assurance. If a strategic delivery vehicle cannot be counted on to operate at all times, its deterrence and assurance value becomes significantly reduced.

While the U.S. Air Force and U.S. Navy have plans to replace each leg of the nuclear triad in the next several decades, fiscal constraints are likely to make such efforts unlikely. Existing ICBMs and SLBMs are expected to remain in service until 2032 and 2042, respectively, and new bombers are planned to enter into service in 2023. Budgetary shortfalls are leading to uncertainty as to whether the nation will be able to modernize all three legs of the nuclear triad. Having three different methods of delivering nuclear weapons increases the risk of successful delivery of those weapons and complicates our adversary’s efforts to prevent such delivery.

Maintenance issues caused by the aging of American SSBNs and long-range bombers could make it difficult to deploy units overseas for long periods of time or remain stealthy in enemy hotspots. The United States can already send a limited number of bombers on missions at any one time. As Bradley Thayer and Thomas Skypek have noted, “Using 2009 as a baseline, the ages of the current systems of the nuclear triad are 39 years for the Minuteman III, 19 years for the Trident II D-5 SLBM, 48 years for the B-52H, 12 years for the B-2, and 28 years for the Ohio Class SSBNs.”

Remanufacturing some weapon parts is difficult and expensive because some of the manufacturers are no longer in business or the materials that constituted the original weapons are no longer available (for example, due to environmental restrictions). The ability of the U.S. to produce solid-fuel rocket motors is another long-range concern.

Grade: U.S. nuclear platforms are in dire need of recapitalization. The U.S. has put into place plans for nuclear triad modernization, and despite some delays, funding has been limited given the circumstance and difficulties caused by sequestration. Uncertainty regarding when the new platforms will enter into force and be nuclear-certified and uncertainty regarding U.S. future stockpile strategy earn this indicator a grade of “weak.”

Nuclear Weapons Complex Score: Weak

A large part of maintaining a reliable and effective nuclear stockpile depends on the facilities where U.S. devices and components are developed, tested, and produced. These facilities constitute the foundation of our strategic arsenal and include the:

- Los Alamos National Laboratories,
- Lawrence Livermore National Laboratories,
- Sandia National Laboratory,
- Nevada National Security Site,
- Pantex Plant,
- Kansas City Plant,
- Savannah River Site, and
- Y-12 National Security Complex.

In addition to these government sites, the defense industrial base supports the development and maintenance of American delivery platforms. These complexes design, develop, test, and produce the weapons in the U.S. nuclear arsenal. Their maintenance is of critical importance. As the 2010 Nuclear Posture Review (NPR) stated:

In order to remain safe, secure, and effective, the U.S. nuclear stockpile must be supported by a modern physical infrastructure—comprised of the national security laboratories and a complex of supporting facilities—and a highly capable
workforce with the specialized skills needed to sustain the nuclear deterrent.\textsuperscript{335}

A flexible and resilient infrastructure is an essential hedge in the event that components fail or the U.S. is surprised by the nuclear weapon capabilities of potential adversaries.\textsuperscript{336} U.S. research and development efforts and the industrial base that supports modernization of delivery systems are an important part of this indicator.

Maintaining a safe, secure, effective, and reliable nuclear stockpile requires modern facilities, technical expertise, and tools to repair any malfunctions quickly, safely, and securely and to produce new nuclear weapons if required. The existing nuclear weapons complex is not fully functional. The U.S. cannot produce more than a few new warheads per year. There are limits on the ability to conduct life extension programs. Dr. John Foster has reported that the U.S. no longer can “serially produce many crucial components of our nuclear weapons.”\textsuperscript{337}

If the facilities are not properly funded, the U.S. will gradually lose the ability to conduct high-quality experiments. Obsolete facilities and poor working environments make maintaining a safe, secure, reliable, and militarily effective nuclear stockpile exceedingly difficult, in addition to demoralizing the workforce and hampering further recruitment. According to the Obama Administration’s Section 1251 Report to Congress, recapitalization of the nuclear weapons program would cost $8.7 billion in FY 2015.\textsuperscript{338} In reality, the National Nuclear Security Administration received about $8.2 billion for this recapitalization.

Since 1993, the DOE has not had a facility dedicated to production of plutonium pits, one of the main components of America’s nuclear weapons. The U.S. currently keeps about 5,000 plutonium pits in strategic reserve. There are significant disagreements as to the effect of aging on pits and whether the U.S. will be able to maintain them indefinitely without nuclear weapons testing. Currently, the U.S. can produce about 20 plutonium pits a year at the Los Alamos PF-4 facility. Russia, the closest competitor and potential adversary, can produce around 2,000 pits a year.\textsuperscript{339}

Manufacturing non-nuclear components can be extremely challenging either because some materials may no longer exist or because manufacturing processes have been forgotten and must be retrieved. There is a certain element of art to the process of building a nuclear weapon, and such a skill can be acquired and maintained only through actual hands-on experience.

**Grade:** On one hand, the U.S. maintains some of the most advanced nuclear facilities in the world. On the other, their focus is not solely on the nuclear mission. Some parts of the complex—most importantly, parts of the plutonium and highly enriched uranium component manufacturing infrastructure—have not been modernized since the 1950s, and plans for long-term infrastructure recapitalization remain uncertain. Thus, the infrastructure receives a grade of “weak.”

**Quality of People Working in the National Nuclear Laboratories Score:** Marginal

Combined with nuclear facilities, U.S. nuclear weapons scientists and engineers are critical to the health of the complex and the stockpile. The 2010 NPR emphasizes that:

[A] highly skilled workforce [is] needed to ensure the long-term safety, security, and effectiveness of our nuclear arsenal and to support the full range of nuclear security work to include non-proliferation, nuclear forensics, nuclear, counter-terrorism, emergency management, intelligence analysis and treaty verification.\textsuperscript{340}

The U.S.’s ability to maintain and attract a high-quality workforce is critical to assuring the future of the American nuclear deterrent. While today’s weapons designers and engineers are first-rate, they also are aging and retiring. It is essential that their knowledge be passed on to the next generation that will take on this mission. The weapons labs understand this problem and are taking steps, despite significant challenges, to mentor the next generation.

The U.S. currently relies on non-yield-producing laboratory experiments, flight tests, and the judgment of experienced nuclear scientists and engineers to ensure continued confidence in the safety, security, effectiveness, and reliability of its nuclear deterrent. Without their experience, the nuclear weapons complex could not function. A basic problem is that few scientists or engineers at the NNSA have either nuclear weapons design or testing experience. It is essential that the complex attract and retain the best and brightest. Between 2013 and 2014, the NNSA lost 94 people of a total of 2,446 employed
as of March 2014. The average age of the workforce increased to 47.7 years.

**Grade:** Despite employing world-class experts, the NNSA complex continues to face serious challenges in attracting and retaining talent. Because many scientists and engineers with a practical nuclear weapon design and testing experience are retired, nuclear warhead certifications will rely on the judgments of people who have never tested or designed a nuclear weapon. The NNSA's management challenges and a lack of focus on the nuclear weapon mission contribute to the lowering of morale in the NNSA complex. Because these issues have to do more with policy than with the quality of people per se, the complex earns a score of “marginal.”

**Readiness of Forces Score: Marginal**

The readiness of forces is a vital component of America's strategic forces. It is essential that the military personnel operating the three legs of the nuclear triad are properly trained and equipped. It is also essential that these systems be maintained in a high state of readiness.

During FY 2015, the services continue to align resources in order to preserve strategic capabilities in the short term, but the long-term impacts continue to be uncertain. Continued decline in U.S. general purpose forces could eventually affect nuclear forces, especially the bomber leg of the nuclear triad. Changes prompted by the Navy and Air Force cheating scandals have begun to address some of the morale issues.

**Grade:** Uncertainty regarding the further potential impacts of sequestration earns this indicator a grade of “marginal.”

**Allied Assurance Score: Marginal**

The number of weapons that U.S. allies keep is an important element when speaking about the credibility of America's extended deterrence. Allies that already have nuclear weapons can coordinate action with other powers or act independently. During the Cold War, the U.S. and the U.K. cooperated to the point where joint targeting was included. France maintains its own independent nuclear arsenal, largely as a hedge against uncertainty of American credibility. The U.S. also deploys nuclear gravity bombs in Europe as a visible manifestation of its commitment to its NATO allies.

The U.S., however, must concern itself not just with NATO, but with Asian allies as well. The United States provides nuclear assurances to Japan and South Korea, both of which are technologically advanced industrial economies facing nuclear-armed adversaries and potential adversaries. If they do not perceive U.S. assurances as credible, they have the capability and know-how to build their own nuclear weapons. That would be a major setback for U.S. nonproliferation policies. In addition, the Iranian nuclear program is threatening U.S. nonproliferation goals in the Middle East.

**Grade:** At this time, most U.S. allies are not seriously considering developing their own nuclear weapons. European members of NATO continue to express their commitment to and appreciation for NATO as a nuclear alliance. Doubts about the modernization of dual-capable aircraft and even about the weapons themselves, as well as NATO’s lack of attention to the nuclear mission and its intellectual underpinning, preclude assigning a score of “very strong.” Additionally, America's seeming acceptance of Iran developing nuclear capabilities is contributing toward other countries in the Middle East region considering whether to seek similar capabilities. Thus, allied assurance declines this year to a grade of “marginal.”

**Nuclear Test Readiness Score: Weak**

Testing is one of the key elements of maintaining a safe, secure, effective, and reliable nuclear deterrent. While the U.S. is currently under a self-imposed nuclear testing moratorium, it maintains a low level of nuclear test readiness at the Nevada National Security Site (formerly Nevada Test Site). This is critical in case the U.S. discovers a flaw in one or more types of its nuclear weapons and when fixing the flaw requires a yield-producing experiment. The U.S. might need to test to develop a weapon with new characteristics that can be validated only by testing and to verify render-safe procedures. Yield-producing experiments can also play an important role if the U.S. needs to react strongly to other nations’ nuclear weapons tests and communicate its resolve or to understand their new nuclear weapons.

For these reasons, it is required that the U.S. be prepared to conduct a nuclear weapons test within a maximum of 36 months after a presidential decision to do so. The current state of test readiness is between 24 and 36 months, although both the NNSA and Congress required the NNSA to be ready within 18 months in the past. The U.S. could meet this
requirement only if certain domestic regulations, agreements, and laws were to be waived.\textsuperscript{345}

Test readiness refers to a single test or a very short series of tests, not a sustained nuclear testing program. The NNSA has been unable to achieve this goal because of a shortage of resources. The test readiness program is supported by experimental programs at the Nevada Test Site, nuclear laboratory experiments, and advanced diagnostics development.\textsuperscript{346}

**Grade:** As noted, the U.S. can meet the readiness requirement mandated by the law only if certain domestic regulations, agreements, and laws are waived. In addition, the U.S. is not prepared to sustain testing activities beyond a few limited experiments, which certain scenarios might require. Thus, testing readiness earns a grade of “weak.”

**Overall U.S. Nuclear Weapons Capability Score: Marginal**

Though modernization programs for warheads and delivery systems are quite deficient, the infrastructure supporting nuclear programs is aged, and nuclear test readiness has revealed troubling problems within the forces, those weak spots are offset by strong delivery platform reliability and allies who remain confident in the U.S. nuclear umbrella. Averaging the subscores across the nuclear enterprise therefore results in an overall score of “marginal.”

### U.S. Military Power: Nuclear

<table>
<thead>
<tr>
<th></th>
<th>VERY WEAK</th>
<th>WEAK</th>
<th>MARGINAL</th>
<th>STRONG</th>
<th>VERY STRONG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warhead Surety</td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Delivery Platform Reliability</td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Warhead Modernization</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery Systems Modernization</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuclear Weapons Complex</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Labs Talent</td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Force Readiness</td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allied Assurance</td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuclear Test Readiness</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OVERALL</strong></td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
<td>✔</td>
</tr>
</tbody>
</table>