FAQs

Chapter 1: Nuclear Matters History and Policy

Q1 What is the U.S. nuclear deterrent?

The U.S. nuclear deterrent is the totality of the United States' nuclear stockpile (warheads and bombs); the launch platforms and delivery systems that convey the warheads and bombs to their intended targets; the infrastructure and human resources necessary to support the weapons; the command, control, communications, and intelligence that informs the nuclear forces; the policy and guidance structure that directs the nuclear forces; and the legislative and executive branch entities that govern nuclear-related policies. An essential part of the U.S. nuclear deterrent is the level of confidence in and the credibility of U.S. nuclear weapons—the belief that they will work if and when the United States needs them.

Q2 How does the nuclear deterrent fit in with the rest of U.S. defense strategy?

The U.S. nuclear deterrent remains an important element of the overall U.S. national security strategy. The 2010 Nuclear Posture Review (NPR) affirmed the need to continue to reduce the role of nuclear weapons in U.S. national security and U.S. military strategy while maintaining a safe, secure, and effective deterrent as long as those weapons exist. To that end, the United States has committed to continuing to strengthen its conventional capabilities with the objective of making the deterrence of a nuclear attack on the United States or its allies and partners the sole purpose of U.S. nuclear weapons.

Q3 Who is in charge of nuclear weapons? Is there one person who has overall oversight?

Only the president can make the decision to use U.S. nuclear weapons. Nuclear weapons in the current stockpile and a small number of weapons that are retired awaiting

dismantlement are generally under the control of the Department of Defense (DoD), in the custody of the Military Services (today only the Navy and the Air Force have custody of nuclear weapons). Weapons that are being repaired, monitored for quality assurance, or in the dismantlement process are generally in the custody of the Department of Energy (DOE).

Q4 What is the Nuclear Posture Review?

The Nuclear Posture Review is a legislatively mandated review that establishes U.S. nuclear policy, strategy, capabilities, and force posture for the next five to ten years. The most recent NPR was completed in 2010; prior to that review, NPRs were completed in 1994 and 2001.

Q5 What are the main conclusions of the 2010 NPR?

The 2010 NPR outlines the U.S. approach to implementing the president's agenda for reducing nuclear dangers and pursuing the long-term goal of a world without nuclear weapons. Because this goal will not be reached quickly, the report explains how the United States will sustain a safe, secure, and effective nuclear deterrent as long as nuclear weapons exist. The findings and recommendations of the 2010 NPR support five key objectives:

1. Preventing nuclear proliferation and nuclear terrorism;
2. Reducing the role of nuclear weapons;
3. Maintaining strategic deterrence and stability at reduced nuclear force levels;
4. Strengthening regional deterrence and reassurance of U.S. allies and partners; and
5. Sustaining a safe, secure, and effective nuclear arsenal.

Q6 What steps is the United States taking to pursue a goal of a world without nuclear weapons?

In pursuit of its commitment the United States has concluded a verifiable New Strategic Arms Reduction Treaty (START) with Russia that limits both nations' nuclear forces to levels well below those provided for in previous treaties. Moving forward with these efforts, the United States is:

- pursuing entry into force of the Comprehensive Nuclear-Test-Ban Treaty (CTBT);
- seeking negotiations on a verifiable Fissile Material Cutoff Treaty (FMCT) to halt the production of fissile material for use in nuclear weapons; and
- working to secure all vulnerable nuclear materials worldwide.

Q7 What is nuclear proliferation?

Nuclear proliferation is the spread of nuclear weapons, fissile material, and weapons-applicable nuclear technology and information anywhere in the world.

Q8 What is the U.S. nuclear umbrella and who is under it?

The U.S. nuclear umbrella is the nuclear protection that the United States extends to its partners and allies such as the nations of the North Atlantic Treaty Organization (NATO), Japan, and the Republic of Korea, among others. This means that the United States guarantees the same kind of national response to an attack on its partners and allies as it would make to an attack on the United States.

Q9 What is nuclear nonproliferation?

Nuclear nonproliferation refers to the strategies and activities undertaken to detect, dissuade, curb, and prevent state and non-state actor acquisition of nuclear materials, technologies, or nuclear devices. The United States is a global leader in nuclear nonproliferation activities and, along with 189 other countries, is a signatory of the Nuclear Nonproliferation Treaty (NPT). It is U.S. belief that, through the continued reduction of the role and numbers of U.S. nuclear weapons, the nation can put itself in a much stronger position to persuade its NPT partners to join in adopting the measures needed to reinvigorate the nonproliferation regime and secure nuclear materials worldwide.

Chapter 2: Stockpile Management, Processes, and Organizations

Q10 Is the United States planning to develop new nuclear warheads?

No, it is not U.S. policy to develop new nuclear warheads. A new nuclear warhead is defined as a weapon intended to support new military missions, provide new military capabilities, or use nuclear component designs not based on previously tested designs. It may be necessary, however, for the United States to develop new delivery systems to sustain elements of the nuclear deterrent in the future.

Q11 Are other countries producing new weapons?

Yes, most other nations that possess nuclear weapons are in the process of modernizing their stockpiles or producing new weapons.

Q12 Why does the United States need to spend money on nuclear weapons once they are built?

The United States spends money on nuclear weapons for the same reason that an individual spends money to service a car: to have the confidence that it will work when it is needed given that parts degrade over time. Similarly, the United States spends money on maintaining its nuclear stockpile; it is not enough to put nuclear weapons on a shelf, forget about them, and hope that they will work when and if the time comes. The United States must monitor its weapons and make sure they are kept in good working order to ensure they remain safe, secure, and reliable. The United States also needs to invest in the infrastructure that supports the maintenance of its weapons. That includes the buildings, the equipment, and the people who ensure that the nuclear stockpile remains safe, secure, reliable, survivable, and effective. In recent years, the United States has benefited from a "peace dividend" reduction in spending for our nuclear forces. The current level of spending on nuclear weapons is only a small fraction of what it was during the Cold War.

Q13 What is a nuclear warhead "life extension program"?

Life extension programs consist of planning for the systematic replacement of components prior to degradation in their performance (like replacing older tires on a car before they have a blow-out), producing the required components, and replacing them to refurbish the warhead for extended "shelf-life" and continued service in the stockpile. It involves testing, evaluating, and analyzing component aging for each specific warhead-type and making the necessary alterations and modifications to ensure continued warhead viability.

Q14 How will the United States sustain its nuclear stockpile without developing new warheads?

Life extension decisions about how to sustain specific warheads will be made on a case-by-case basis. In each case, the technical community will study all options for life extension to ensure reliability, safety, and security. Technical life extension options will span the following:

1. Refurbishment: the use of nuclear component designs previously produced for the warhead-type undergoing life extension.
2. Reuse: the use of nuclear component designs currently or previously in the stockpile but from different warhead-types.
3. Replacement: the use of nuclear component designs that have not been in the stockpile but that are based on previously tested designs.

Technical study results will be reported to the Nuclear Weapons Council (NWC), and the NWC will make recommendations on life extension to the secretaries of defense and energy. These recommendations will give preference to the refurbishment and reuse options. Based on these reports, the secretaries of defense and energy will advise the president on a recommended way forward. In those cases where the secretaries recommend a replacement plan, the president will conduct a special review of the plan in order to make a specific authorization. Congress will review and assess all plans to determine whether the recommended pathway forward is consistent with the national interest and national strategy as promulgated by the administration.

Q15 How does the DoD work with the DOE-NNSA on nuclear weapons issues?

The Department of Defense and the Department of Energy, through the National Nuclear Security Administration (NNSA), share joint responsibility for U.S. nuclear weapons. The responsibilities for nuclear weapons stockpile management were originally established in the Atomic Energy Act of 1946, which was later amended in 1954. The act reflected congressional desire for civilian control over the uses of nuclear energy, including nuclear weapons. Generally, the NNSA has primary responsibility for design, evaluation, production, quality assurance, repair, modification, refurbishment, dismantlement, disposal, and security for any warheads or components in DOE custody. At any given moment, the majority of the U.S. warheads are in the custody of the DoD, which has primary responsibility for establishing military requirements for nuclear weapons; developing, fielding, and maintaining the launch platforms and delivery vehicles; and performing certain activities for warheads in their custody, including providing security, performing limited-life component exchange maintenance, and performing launch operations if ever directed by the president.

Q16 What is the Nuclear Weapons Council?

The Nuclear Weapons Council is a joint Department of Defense and Department of Energy organization responsible for facilitating cooperation and coordination between the two departments as they fulfill their dual-agency responsibilities for U.S. nuclear weapons stockpile management.

Q17 What is the Nuclear Weapons Stockpile Plan?

The Nuclear Weapons Stockpile Plan (NWSP) authorizes the production, conversion, or elimination of specific types and quantities of nuclear weapons by specifying authorized weapons quantities to be in the stockpile at the end of each fiscal year. The NWSP is

accompanied by a Presidential Directive; when the directive is signed, the NWSP goes into effect. The annual NWSP directive from the president is a major part of the centralized management and control of the overall U.S. nuclear stockpile.

Q18 What is a nuclear weapons-related component?

A nuclear weapons-related component is any part, component, instrument, or piece of equipment that is associated with a nuclear warhead or bomb and/or with the delivery system that goes with it. This includes items such as nuclear fissile material components and sophisticated components like radar fuzes, special tools, and equipment.

Q19 What is a limited life component?

A limited life component (LLC) is a nuclear weapons-related component that has a predictable, limited shelf life. LLCs may include power sources (most batteries have a limited shelf life), neutron generators, and tritium components. Because the designed lifespan of limited-life components is known, the United States is able to replace them before they fail and affect overall weapon performance—similar to the way one replaces the brakes on a car before they fail and cause an accident. The United States follows a strict schedule of replacing LLCs for each operational warhead, usually every few years, or more frequently if required.

Chapter 3: U.S. Nuclear Forces

Q20 What is the difference between strategic and non-strategic nuclear weapons?

Strategic nuclear weapons are nuclear weapons on nuclear-capable heavy bombers, intercontinental ballistic missiles (ICBMs), and submarine-launched ballistic missiles (SLBMs). All other nuclear weapons are non-strategic. These may include nuclear bombs for dual-capable (conventional and nuclear) aircraft, cruise missiles launched from submarines, surface ships, or land-based launchers, warheads for shorter-range systems (e.g., short-range missiles, cannon artillery) for nuclear air defense systems, and man-portable or vehicle-transported nuclear demolition devices. Some refer to non-strategic systems as “theater” or “tactical” weapons, although this terminology is no longer officially used by the U.S. Government. Currently, the United States has only two types of non-strategic nuclear weapons: bombs for dual-capable aircraft and warheads for sea-launched cruise missiles.

Q21 How many nuclear weapons does the United States have?

As of September 30, 2009, the U.S. nuclear weapons stockpile consisted of 5,113 warheads. This number represents an 84 percent reduction from the stockpile's maximum (31,255) at the end of fiscal year 1967.

Q22 What is the difference between the active and inactive stockpiles?

To minimize the cost of retaining and maintaining the nuclear stockpile, the United States divides it into two categories. The first category of active stockpile weapons consists of weapons that must be maintained in an operational status (fully capable of performing their design function) to fulfill the requirements of U.S. national deterrence policy when authorized by the president. This category also includes a small number of logistics warheads (used at operational bases for immediate replacement of warheads selected for quality assurance non-nuclear testing) to ensure the nation can always meet operational requirements. The second category, the inactive stockpile, consists of those warheads that are not immediately ready for use and whose function permits them to be retained in a non-operational status. This includes warheads to replace those eliminated for quality assurance testing and reliability replacement warheads (retained because of the U.S. policy of no nuclear testing and the extremely limited U.S. capacity to produce nuclear components). Because of their inactive status and the reduced maintenance costs this status entails, this category of weapons saves the United States a significant amount of money each year.

Q23 How does a nuclear weapon get to the target?

Nuclear weapons get to their intended targets via nuclear delivery vehicles. Typically, a nuclear delivery vehicle is a manned aircraft (for gravity bombs or cruise missiles) or a ballistic missile.

Q24 What kinds of nuclear weapons do we have?

Currently, the U.S. nuclear stockpile is composed of nuclear weapons designed to be delivered by strategic intercontinental ballistic missiles, strategic submarine-launched ballistic missiles, strategic and non-strategic cruise missiles, and strategic and non-strategic gravity bombs.

Q25 What's the difference between the different parts of the nuclear triad?

As the name implies, there are three different parts to the nuclear triad: the strategic bomber force, intercontinental ballistic missiles, and submarine-launched ballistic missiles. Each element of the nuclear triad provides a different aspect of deterrence, and the whole is greater than the sum of its parts. Bombers are highly visible for signaling purposes and can be called back should the situation warrant. ICBMs are always ready to respond. The nuclear submarine force—or "boomers"—are deployed at sea on a continuous basis with great dependability and stealth; they are the most survivable element of the nuclear triad.

Q26 Which U.S. Military Services have custody of nuclear weapons?

Only the Navy and the Air Force have custody of nuclear weapons. The Army and Marine Corps used to have nuclear weapons, but the United States does not currently have any nuclear warheads associated with Army and Marine Corps weapon systems.

Q27 Where are U.S. weapons located?

The exact locations of U.S. nuclear weapons are classified. Nuclear weapons are located within the continental United States, at sea on strategic submarines, and in foreign host nations with whom the United States has special agreements.

Q28 Does the United States move its nuclear weapons? How? Where?

Yes, the United States does move its weapons. U.S. nuclear weapons need to be monitored, repaired, relocated for logistical or operational reasons, modified, altered, retired, and dismantled. This requires that they be transported. Within the United States, nuclear weapons are moved via specially equipped trucks (the Department of Energy's Safeguards Transports). Outside the United States, nuclear weapons are transported via specifically equipped aircraft.

Chapter 4: Nuclear Command, Control, and Communications System

Q29 What is the nuclear command, control, and communications system?

The U.S. nuclear command, control, and communications (C3) system refers to the collection of DoD activities, processes, and procedures performed by appropriate military commanders and support personnel who—through the chain of command—allow for

senior-level decisions to be made based on relevant information and subsequently allow those decisions to be communicated to forces for execution. The nuclear C3 system is an essential element to ensure crisis stability, deter attack against the United States and its allies, and maintain the safety, security, and effectiveness of the U.S. nuclear deterrent. The purpose of the nuclear C3 system is to provide the president with the means to authorize the use of nuclear weapons in a crisis and to prevent unauthorized or accidental use.

Q30 What is nuclear command and control?

Nuclear command and control (C2) is the presidential exercise of authority and direction over nuclear weapons operations through established command lines. Nuclear C2 is provided through a survivable "thin line" of communications and warning systems that ensure dedicated connectivity from the president to all nuclear-capable forces. The fundamental requirements of nuclear C2 are that it must be assured, timely, secure, survivable, and enduring in providing the information and communications for the president to make and communicate critical decisions without being constrained by limitations in the systems, the people, or the procedures.

Chapter 5: Nuclear Safety and Security

Q31 What is the CoP?

As defined in National Security Presidential Directive 28 (NSPD-28), the Nuclear Command and Control System (NCCS) is the combination of facilities, equipment, communications, procedures, and personnel essential for planning, directing, and controlling nuclear weapons, weapon systems, and associated operations. In order to facilitate Interagency coordination to maintain a robust NCCS, NSPD-28 called for the creation of an NCCS Committee of Principals (CoP) composed of official representatives from each of ten NCCS Departments and Agencies.

Q32 Are U.S. nuclear weapons safe?

Yes. U.S. nuclear weapons are very safe. The Quality Assurance & Reliability Testing (QART) program provides assurance that in a normal environment, there is less than one chance in a billion that any given warhead would produce an accidental nuclear detonation. It also provides assurance that there is less than one chance in a million of a nuclear detonation even if the warhead were in an aircraft accident or struck by a bullet or lightning bolt.

Q33 Are U.S. nuclear weapons secure?

Yes. U.S. weapons are among the most secure items in the world. Physical security—knowing that U.S. weapons are safe from theft and unauthorized use—is a very high priority for the United States. Nuclear weapons security is composed of gates, guards, and guns as well as processes and procedures that ensure U.S. nuclear weapons will not fall into the wrong hands. Some of the rules and procedures, such as the Department of Defense Personnel Reliability Program, ensure that all personnel who handle or have control of any nuclear weapons are physically, mentally, and emotionally fit to be near them. Security also includes special components imbedded in some warheads that act like electronic locks and prevent unauthorized use by requiring the user to enter a special code to "unlock" the warhead for use.

Q34 How does the United States know where its weapons are at all times?

U.S. weapons in DoD custody are accounted for via an extremely thorough inventory and accounting system called *DIAMONDS*, run by the Defense Threat Reduction Agency, which tracks the maintenance status and location of each individual warhead by serial number. Organizations that have custody of nuclear weapons report any change in status or location to the database. Periodically, there are inventories taken as a double-check. When the NNSA has custody of a weapon, it is tracked using a database called the *Weapons Information System*.

Q35 Do terrorists have access to nuclear weapons?

No. To the best of our knowledge, there are no terrorist organizations that have access to any significant amount of fissile material or to nuclear devices. However, several known terrorist organizations have stated that they are attempting to acquire the materials and knowledge needed to assemble a nuclear threat device.

Q36 If a U.S. nuclear weapon was stolen, could a terrorist use it?

It is highly unlikely that a group of terrorists could steal, much less use, a U.S. nuclear weapon to produce a nuclear detonation. To function, U.S. warheads require unique electrical signals to be input through unique electrical circuits. If terrorists did not have the required equipment or lacked the technical knowledge about the specific electrical signals required, they would not be able to get the warhead to function. If they took the weapon apart without the required unique tools and technical knowledge, it is likely that

they would destroy key weapon components, making the weapon unusable. If terrorists used explosives in an attempt to produce a nuclear detonation, they would most likely not produce one, but they might scatter the weapon's nuclear materials, causing a radioactive hazard to several acres in the immediate area and downwind. While this type of event might cause casualties, it would be thousands of times less significant than a nuclear detonation.

Q37 Can U.S. nuclear weapons detonate if touched?

No. Nuclear weapons are difficult to detonate, and U.S. nuclear weapons are designed to remain safe even if hit by a bullet, struck by lightning, or involved in an aircraft accident. In fact, all U.S. nuclear weapons are designed to be "one point" safe, meaning that if a weapon was to sustain a blow at any single point it would not produce a nuclear detonation.

Q38 What is use control?

Use control consists of the positive measures that allow for the authorized use and prevent or delay the unauthorized use of nuclear weapons. Use control is accomplished through a combination of weapon system design features, operational procedures, and security activities. Use control helps ensure both that U.S. operators cannot use a weapon in an unauthorized manner and that if terrorists were to gain possession of a U.S nuclear weapon, they could not use it.

Chapter 6: Countering Nuclear Threats

Q39 What is "countering nuclear threats"?

Countering nuclear threats (CNT) describes the efforts to prevent a nuclear attack against the United States, it allies, partners, and interests, or, in the event of an attack, to respond effectively, avoid additional attacks, and bring the perpetrators to justice. CNT efforts are diverse, and the broad scope of activities and tasks composing these efforts requires the involvement of many agencies within the federal government. Most CNT issues are national in scope and have implications for international security.

Q40 What is a nuclear threat device?

A nuclear threat device (NTD) refers to an improvised nuclear or radiological device, a foreign nuclear weapon of proliferation concern, or any nuclear device that may have fallen outside a foreign nuclear weapon state's custody.

Q41 Why is it important to maintain a scientific and technical understanding of the nuclear threat?

An in-depth understanding of the potential range of nuclear threat device designs informs all aspects of CNT activities, including material security, detection, interdiction, render safe/unusable activities, post-event consequence management, and forensics and attribution efforts. The uncertainty associated with potential nuclear threat device designs includes questions about the composition and configuration of a device, how it will work, and how to safely and effectively disable it. Therefore, a scientific and technical understanding of the full range of the potential NTD design space is necessary and critical.

Q42 What is counterproliferation?

Counterproliferation refers to the strategies and activities employed after state or non-state actors have, or are presumed to have, obtained nuclear materials, technologies, or nuclear devices.

Q43 What is nuclear forensics, and why is it important?

Technical nuclear forensics (TNF) is the characterization and analysis of radiological and nuclear material and devices. TNF provides information on the source or origin of nuclear materials, device design, and the pathway of the materials or device to the incident site. This information contributes to attribution, which identifies who designed, constructed, supplied, transported, and used the material or device. If a nuclear or radiological event were to occur on U.S. soil, attribution would be essential for the president to respond appropriately to the event and to prevent subsequent similar incidents.

Q44 What constitutes a nuclear weapon accident? What is a "Broken Arrow"?

A nuclear weapons accident is an unexpected event involving nuclear weapons or nuclear components that could result in the burning of a nuclear weapon or nuclear component; radioactive contamination; a public hazard, actual or perceived; or a nuclear detonation. If an accident involving a nuclear weapon occurs, there are a series of code words used in internal Department of Defense communications to describe the nature of the accident. One of the more well-known of these is the term "Broken Arrow," which is a chairman of the Joint Chiefs of Staff term to identify and report an accident involving a nuclear weapon or warhead or nuclear component that results in a nuclear detonation or the release of radioactive materials.

Q45 Has there ever been an accidental U.S. nuclear detonation?

No. In the entire history of the U.S. nuclear weapons program, the United States has never had an accidental nuclear detonation.

Q46 Has the United States ever had a nuclear weapons accident?

Yes. The United States has had several nuclear weapons accidents, the most recent of which was in 1982 near Damascus, Arkansas. On a few occasions, accidents involving U.S. nuclear weapons have resulted in plutonium dispersal, which was subsequently cleaned up. No nuclear weapon accident has ever resulted in a nuclear detonation.

Q47 What happens if a nuclear weapon explodes accidentally?

Many U.S. warhead-types use insensitive high explosive to minimize the probability of an explosion; however, if an accident caused the high explosive component in a nuclear weapon to explode, it would most likely scatter the nuclear material, possibly over several acres. An accidental explosion would not likely cause a nuclear detonation resulting in nuclear yield. In the event of a nuclear weapon explosion, there would be a prompt and effective national emergency response and subsequent consequence management efforts to manage the damage done by the high explosive and any resulting nuclear contamination.

Q48 Why is the issue of a country having a nuclear reactor important in terms of nuclear weapons?

All of the known current-design nuclear power reactors in the world produce electrical power as a primary output, and they also produce fissile material as a part of the radioactive waste stream. Most power reactors use either natural uranium or low-enriched uranium (LEU) as fuel. As these reactors operate, some of the uranium is converted to plutonium, which can be used as the fissile material in a nuclear weapon. If nations owning and operating power reactors agree to special inspection programs, it significantly reduces the probability that the plutonium produced as a by-product could be used in a nuclear weapon. The United States supports inspection efforts by the International Atomic Energy Agency (IAEA), which was created to address this and other potential problems as a part of the international effort to control nuclear weapons proliferation.

Q49 Why is the issue of a country having an enrichment process important in terms of nuclear weapons?

Enrichment is a process used to increase the percentage of fissile atoms in uranium by eliminating the non-fissile atoms. Most of the world's nuclear power reactors (which do

not include breeder reactors or ship-board propulsion reactors) use either natural low-enriched uranium. Natural uranium requires no enrichment. LEU production for power reactors usually requires a few hundred enrichment steps (called stages) in a modern industrial enrichment process. If the enriching nation uses thousands of steps or stages, the uranium can be enriched well beyond the level required for power reactors and can become highly enriched uranium (HEU). If the HEU continues in the enrichment process long enough, it will become weapons-grade HEU, which can be used as the fissile material in a nuclear weapon. If nations owning and operating enrichment processes agree to special inspection programs, the probability that the enrichment process will produce weapons-grade HEU for potential use in a nuclear weapon or a nuclear threat device is significantly reduced.

Q50 What is the "non-stockpile mission" as compared to the "stockpile mission"?

The "non-stockpile" mission refers to the collection of activities and ongoing efforts that relate to the nuclear security mission but do not pertain to the weapons of the U.S. nuclear deterrent. Thus, countering nuclear threat activities, including nuclear counterterrorism and nonproliferation work, fall under the rubric of the "non-stockpile" mission. This nomenclature reflects the fact that for almost its entire history, the nuclear security community in the United States has been focused on nuclear weapons and weapons-related activities. Since the end of the Cold War, however, the mission has expanded and evolved beyond the weapons, to include nuclear threat reduction work and other non-stockpile issues.

Chapter 7: U.S. Nuclear Infrastructure

Q51 What is the "Nuclear Security Enterprise"?

"Nuclear Security Enterprise" is a term used within the NNSA to refer to the totality of the NNSA infrastructure, including the human and capital resources that are required to support the U.S. nuclear deterrent and the activities that sustain the United States' ability to counter nuclear threats.

Q52 How are U.S. nuclear weapons produced?

The United States is not currently producing nuclear weapons. The United States has a very limited capability to produce nuclear components. As recognized by the Nuclear Posture Review, establishing a pit production capability (including plutonium processing)

and a modern secondary production facility are important steps for the NNSA to achieve a modernized and responsive capacity to produce nuclear components for stockpile life extension. When this capability is achieved (and there are plans in place to reconstitute U.S. nuclear component production), it will mark the beginning of a new stockpile support paradigm whereby the NNSA can meet stockpile requirements through its production infrastructure, rather than through the retention of a large inactive stockpile.

Q53 Is there a problem recruiting new scientists and engineers to the nuclear field?

Yes. While there are some very well-qualified people entering the U.S. nuclear community as scientists and engineers, recruiting new technical personnel has become much more difficult since the end of the Cold War. The number of qualified technical people joining the national laboratories and entering key technical positions at other agencies each year is far less than it was years ago. The reduced numbers entering the field as scientists and engineers and the fact that many of the individuals with the greatest expertise have retired or are approaching retirement all contribute to a general reduction in the experience and knowledge base of the U.S. Nuclear Security Enterprise. To off-set this erosion of expertise, organizations within the nuclear community are making a greater effort to recruit and train the newest generation of scientists and engineers and to document and pass on the extensive amount of technical knowledge and data resulting from over six decades of sophisticated development and testing programs.

Q54 Without nuclear testing, how do we know that U.S. nuclear weapons will work?

The United States relies on non-nuclear laboratory and flight tests and the judgment of experienced nuclear scientists and engineers to ensure continued confidence in the safety, security, and effectiveness of the U.S. nuclear deterrent.

Q55 What does the United States do when problems are found with nuclear weapons?

If a problem is identified, the issue is thoroughly investigated to determine if the problem impacts the weapon's safety, reliability, or performance. If there are, the problem is corrected, and/or the DoD is informed of the necessary changes to procedures or employment to offset any functional impact.

Chapter 8: International Nuclear Cooperation

Q56 Do U.S. allies have nuclear weapons?

Yes, some NATO allies *do* have nuclear weapons, including the United Kingdom and France. Most U.S. allies have agreed to forego a nuclear weapons capability in exchange for the protection of the U.S. nuclear umbrella, which provides extended deterrence. Thus, U.S. nuclear weapons protect both the United States and its partners and allies.

Q57 Does the United States share nuclear information with allies? How? Why?

Yes, the United States shares nuclear information with allies through Programs of Cooperation—legal frameworks for international information exchange. The United States participates in Programs of Cooperation with a number of international partners, including the United Kingdom, France, and the North Atlantic Treaty Organization. The United States uses these frameworks to share information with its partners about nuclear weapons-related matters, as well as about issues surrounding nuclear terrorism and nuclear proliferation. Additionally, the United States works closely with certain allies to ensure the common use of best practices and to enjoy the benefits of independent peer review.

Appendix B: International Nuclear Treaties and Agreements

Q58 What are nuclear weapon-free zones?

A nuclear weapon-free zone (NWFZ) is a specified region in which countries commit themselves not to manufacture, acquire, test, or possess nuclear weapons. Five such zones exist today. Countries in Latin America (the 1967 Treaty of Tlatelolco), the South Pacific (the 1985 Treaty of Rarotonga), Southeast Asia (the 1995 Treaty of Bangkok), Africa (1996 Treaty of Pelindaba), and Central Asia (the 2006 Treaty for the Central Asia Nuclear Weapon-Free Zone) have all foresworn nuclear weapons.

Q59 What is the Nuclear Nonproliferation Treaty?

The Treaty on the Nonproliferation of Nuclear Weapons, also known as the Nuclear Nonproliferation Treaty, was opened for signature in 1968 and entered into force in 1970. The NPT forms the cornerstone of the international nuclear nonproliferation regime. 189 nations are parties to the treaty. The NPT recognizes the five nuclear powers that existed in 1968: the United States, Russia, the United Kingdom, France, and China, and it prohibits all other signatory states from pursuing or acquiring a nuclear weapon capability. India, Israel,

North Korea, and Pakistan are not parties to the NPT. In exchange for forgoing a nuclear weapons capability, the non-nuclear weapons states party to the NPT are guaranteed assistance with their civilian nuclear power programs by the five nuclear powers; this guarantee is known as the "Grand Bargain." The NPT was extended indefinitely in 1995.

Q60 Does the NPT require the United States to disarm?

According to Article VI of the NPT, the United States is committed to undertake efforts "to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a Treaty on general and complete disarmament under strict and effective international control." The United States is in full compliance with the terms of Article VI.

Q61 What are key points of New START?

The New Strategic Arms Reduction Treaty (START) requires significant reductions in the permitted number of deployed strategic warheads in the United States and Russia—to 1,550 per side. The treaty also provides for significantly lower limits on the number of deployed strategic delivery vehicles (deployed ICBMs, deployed SLBMs, and deployed nuclear-capable heavy bombers) and limits the total number of deployed and non-deployed ICBM and SLBM launchers and heavy bombers equipped for nuclear armaments. New START will enhance predictability regarding the strategic forces of both parties. The treaty includes provisions for data exchanges and notification regarding strategic offensive systems and facilities; it also includes provisions for on-site inspections and exhibitions for verification. Additionally, New START provides for continued use of and non-interference with national technical means of verification (NTM—also known as satellites). New START includes explicit provisions that prohibit interference with NTM and the use of concealment measures that may impede monitoring by NTM.

Appendix C: Basic Nuclear Physics

Q62 How do nuclear weapons work?

At the most basic level, nuclear weapons work when nuclei of special nuclear material (typically fissile weapons-grade plutonium or weapons-grade uranium) are split apart (fission events), releasing a very large amount of energy (thousands of times more than in a conventional explosion) in a very short period of time (approximately one millionth of a second). The total energy released may be increased by forcing the nuclei of very light

atoms together in fusion events which produce high-energy neutrons that can produce additional fission events.

Q63 What makes a weapon "nuclear"?

A nuclear weapon is designed to release energy through nuclear processes (nuclear fission, nuclear fusion, or both) when detonated. A nuclear detonation produces a measurable amount of nuclear radiation and other effects, including blast, shock, thermal radiation, and electromagnetic pulse.

Q64 What is the difference between an atomic weapon, a thermonuclear weapon, and a nuclear weapon?

The term "nuclear weapon" encompasses all of these terms. The term "atomic bomb" was originally coined during World War II when the news media described the new weapon as "splitting atoms." Nuclear weapons actually work by "splitting" the nuclei of fissile atoms in a process called fission. Thus, the term "nuclear" is much more accurate than "atomic." A thermonuclear weapon is one that uses fusion in addition to fission to increase yield.

Appendix D: U.S. Nuclear Weapons Life-Cycle

Q65 What is the nuclear weapons life-cycle?

The nuclear weapons life-cycle is the cradle-to-grave process through which all U.S. nuclear weapons proceed from conception to dismantlement. The life-cycle process is divided into "phases" that progress from concept and feasibility evaluation through design, production, maintenance, quality assurance testing, modification, retirement, and dismantlement.

Q66 What does the United States do with nuclear weapons when it doesn't need or want them any more?

The United States retires its weapons, dismantles them, and disposes of the piece parts in a safe and secure manner. Retired weapons are securely stored until they are removed from military custody and are dismantled and disposed of properly. Weapons are transported to the DOE Pantex Plant in Amarillo, Texas for dismantlement. Plutonium and uranium parts are transported to and stored at two secure NNSA facilities. If it is practical, non-nuclear components are reused in other warheads or for testing. If not, they are disposed of in accordance with environmental restrictions and NNSA policy.

Q67 How does the United States dispose of nuclear material?

Currently, nuclear materials are stored in two secure NNSA locations until the United States decides on their final disposition. Some of the fissile material may be reused in future weapons, some may be converted and used in nuclear power reactors, and the remainder may be put in some permanent storage configuration.

Appendix E: Nuclear and Non-Nuclear Testing

Q68 Why did the United States ever conduct nuclear testing?

Between 1945 and 1992, the United States conducted nuclear testing for several reasons: to learn more about nuclear physics and how fissile materials compress, to learn about the effects of nuclear weapons and the distances the effects would extend from the detonation, to refine the designs of specific warheads while they were in engineering development, to test fielded warheads to determine if there were problems with detonation safety or yield and fix those problems if they existed, and to determine the nuclear vulnerability of U.S. deterrent systems so that the systems could be made more survivable. Since 1992, the United States has observed a voluntary moratorium on nuclear testing.

Q69 What was involved with an underground nuclear test?

In a typical underground nuclear test, a team of scientists and engineers built a nuclear test device and placed it in a deep vertical shaft (like a very deep well) with highly sophisticated sensing and transmitting instruments and then back-filled the shaft to prevent radioactive gases from escaping. When the detonation occurred, the instruments transmitted large amounts of scientific technical data (just before they were consumed by the detonation's fireball) through wires to receivers located some distance from the shaft. Afterward, the earth directly above the large cavity (produced by the fireball) collapsed downward, producing a "subsidence" crater on the surface.

Appendix F: The Effects of Nuclear Weapons

Q70 What are the major effects of a nuclear detonation?

The major effects of a nuclear detonation include: the instantaneous production of a very large, very hot fireball; the generation of an electromagnetic pulse (EMP) that can destroy or disrupt electronics; the spread of energy in the form of heat and light that can possibly produce burns or ignite fires; the emission of highly penetrating, prompt nuclear radiation; and the creation of air blast waves and shock waves.

Q71 What would happen if a nuclear threat device detonated in a major U.S. city?

The impact of a nuclear detonation would depend of a number of factors, including the yield of the device, the construction of the structures surrounding ground zero, and prevailing weather conditions. In all circumstances the impact at ground zero would be completely devastating.

Q72 What is EMP?

Electromagnetic pulse is a very short duration pulse of low-frequency (long-wavelength) electromagnetic radiation (EMR). It is produced when a nuclear detonation occurs at high altitudes (which can affect a large region of the Earth's surface hundreds of miles across for higher-yield detonations). EMP can damage unprotected electronics found in computers, phones, and vehicles. EMP is especially destructive to equipment using modern low voltage, solid-state components, which can be overloaded with a voltage beyond its designed capacity. Low levels of EMP can cause a disruption of processing or a loss of data. At increased EMP levels, certain electronic components and much of the nation's electrical grid can be destroyed. EMP will not produce structural damage and is not a direct hazard to humans; however, the indirect effects of long-term power failures and electronics failing instantaneously in vehicles, aircraft, and life-sustaining equipment in hospitals could cause injuries or fatalities.

Q73 Is the United States vulnerable to a terrorist EMP attack?

The United States is taking extraordinary measures to ensure that if a terrorist group gains possession of a nuclear device and attempts to move it into the United States, the country will have a high probability of detecting and intercepting it. Currently, terrorists do not have access to modern military or space program missiles to launch a weapon to a high altitude. If terrorists successfully transport a nuclear device to the United States and detonate it on the ground or above ground at altitudes that commercial aircraft fly, the EMP would not extend great distances from the detonation. If a nuclear device was detonated near the ground, the primary effects (thermal radiation, nuclear radiation, and air blast) would be so devastating that the effects of EMP would be insignificant. The significant resources dedicated to detecting and intercepting a nuclear device have a very high priority because of the primary effects of a possible terrorist nuclear detonation, not because of a concern about EMP.

Appendix G: Nuclear Survivability

Q74 What is nuclear survivability?

Nuclear survivability involves the ability to withstand a nuclear detonation. There are two different kinds of nuclear survivability, *nuclear weapons effects survivability* and *nuclear weapons systems survivability*. Nuclear weapons effects survivability refers to the ability of personnel and equipment to withstand the blast, thermal radiation, nuclear radiation, and electromagnetic pulse effects of a nuclear detonation. Nuclear weapons systems survivability refers to the ability of nuclear deterrent forces to survive against the entire threat spectrum that includes, but is not limited to, nuclear weapons effects and still be able to carry out their primary mission.

Appendix H: Classification

Q75 What are the various classification categories and levels?

There are two categories of classified information: national security information and atomic energy (nuclear) information. National security information is governed by presidential Executive Orders that prescribe a uniform system for classifying, safeguarding, and declassifying information related to national security. National security or atomic energy information may be classified at 3 levels, "Top Secret," "Secret," or "Confidential." Atomic energy information is governed by the Atomic Energy Act of 1954, as amended. The Atomic Energy Act characterizes classified nuclear information as "Restricted Data" and "Formerly Restricted Data," which is protected over and above national security information. There are additional caveats that can be added to classified information that further restrict dissemination, including the many caveats of "Sensitive Compartmented Information," which, as its name suggests, is information that is compartmented separately from other classified information for the purpose of protecting particularly sensitive information.

Q76 Who decides what is classified and what is not?

The authority to classify information originally may only be exercised by the president and the vice president, agency heads and officials designated by the president in the Federal Register, and U.S. government officials specifically delegated this authority by the president through an Executive Order. According to Executive Order 13526, those individuals who only reproduce, extract, or summarize classified information are not required to possess original classification authority, but they must respect the original markings in their derivative markings. All documents must have a declassification date or event entered

into a "declassify on" line. The original classifying authority determines the "declassify on" date. Documents containing atomic energy or nuclear information do not have a declassification date or event.

Q77 Can the public ever see classified information?

There are two basic requirements to access classified information: appropriate clearance and "need-to-know." Even if an individual has the appropriate clearance, he or she cannot peruse classified information just out of curiosity. The uncleared public does not have access to classified information; however, members of the public, including activist groups and the press, can petition the government through the Freedom of Information Act to obtain access to previously classified documents.

Appendix I: Programming, Planning, and Budgeting

Q78 How are nuclear weapons-related items funded?

Only Congress has the authority to fund nuclear weapons-related items, which are appropriated through both the Department of Defense and the Department of Energy budgets. Department of Defense funding comes through the Defense subcommittees of the Congressional Appropriations Committees. Department of Energy funding comes through the Energy and Water Development subcommittees of the Congressional Appropriations Committees.