

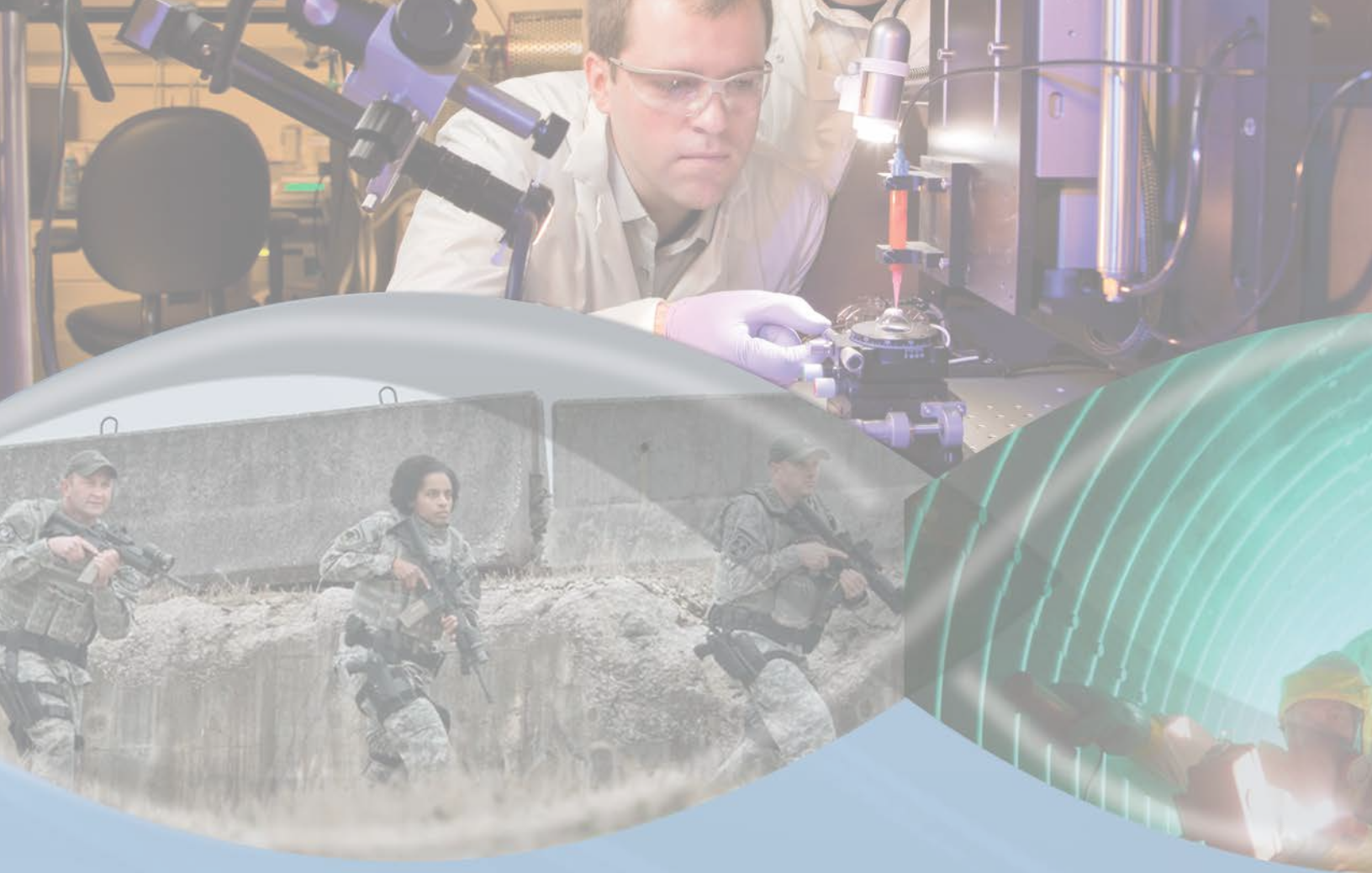
**U.S. Department of Energy**

**National Nuclear Security Administration**

# **Enterprise Strategic Vision**

August 2015

**Mission First/People Always**



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# Message from the Administrator

**“Mission First, People Always”** speaks to the enduring and essential nature of the U.S. Department of Energy’s National Nuclear Security Administration (DOE/NNSA) mission and to fostering a highly capable workforce committed to national security.

Our core mission pillars are to maintain a safe, secure, and effective nuclear deterrent; to prevent, counter, and respond to the threats of nuclear proliferation and terrorism worldwide; and to provide naval nuclear propulsion. To accomplish this mission, we must maintain crosscutting capabilities that enable each mission pillar, including advancing world-class science, technology, and engineering (ST&E); supporting our people and modernizing our infrastructure; and developing a management culture that operates a safe and secure enterprise in an efficient manner.

Following the *Department of Energy Strategic Plan for 2014–2018*, the *DOE/NNSA Enterprise Strategic Vision* (July 2015) provides a framework for integrating our missions and a future direction in pursuit of DOE’s strategic goals. This vision may also serve as a resource to inform external stakeholders of our mission and priorities. It was developed with input from across the Federal and management and operating (M&O) workforces.

The following pages summarize our global strategic environment and how today’s challenges and opportunities inform our missions and the broader national security capabilities of the nuclear security enterprise. We describe the core mission pillars and the critical crosscutting capabilities

that enable successful program execution. These are integrated by DOE/NNSA’s application of science and technology to address national security challenges.

Our mission pillars and crosscuts are realized within the nuclear security enterprise, including the national security laboratories, the production facilities and sites, and the larger DOE laboratory system. Together they provide unique technical solutions to solve the challenges of today and the future. We must continue to provide strong and abiding support for these capabilities and strategically partner with other national security organizations to sustain these national assets into the future.

Beyond this *DOE/NNSA Enterprise Strategic Vision*, in March 2015, DOE/NNSA released further detailed strategy and planning documents: the *FY 2016 Stockpile Stewardship and Management Plan* and the first integrated DOE/NNSA nuclear threat reduction plan entitled, *Prevent, Counter, and Respond: A Strategic Plan to Reduce Global Nuclear Threats (FY 2016–2020)*. These documents, along with additional implementation and governance-related guidance, inform our planning and program activities.

With the release of this strategic vision, we must remain mindful of our obligation to continually improve. The future is challenging and dynamic, but DOE/NNSA is fully committed to ensuring that our mission will be strategically and effectively executed today and into the future.

DOE/NNSA is comprised of talented people who do important work each and every day. We are extraordinarily proud of their service on behalf of our Nation.

Frank G. Klotz  
Under Secretary for Nuclear Security and  
Administrator, NNSA





In April 2009, President Obama delivered a speech in Prague, Czech Republic, stating America's commitment to seek the peace and security of a world without nuclear weapons.

“No threat poses as grave a danger to our security and well-being as the potential use of nuclear weapons and materials by irresponsible states or terrorists. We therefore seek the peace and security of a world without nuclear weapons. As long as nuclear weapons exist, the United States must invest the resources necessary to maintain—without testing—a safe, secure, and effective nuclear deterrent that preserves strategic stability. However, reducing the threat requires us to constantly reinforce the basic bargain of the Nuclear Non-Proliferation Treaty, which commits nuclear weapons states to reduce their stockpiles while non-nuclear weapons states remain committed to using nuclear energy only for peaceful purposes.”

*National Security Strategy*  
(February 2015)

## Policy Direction

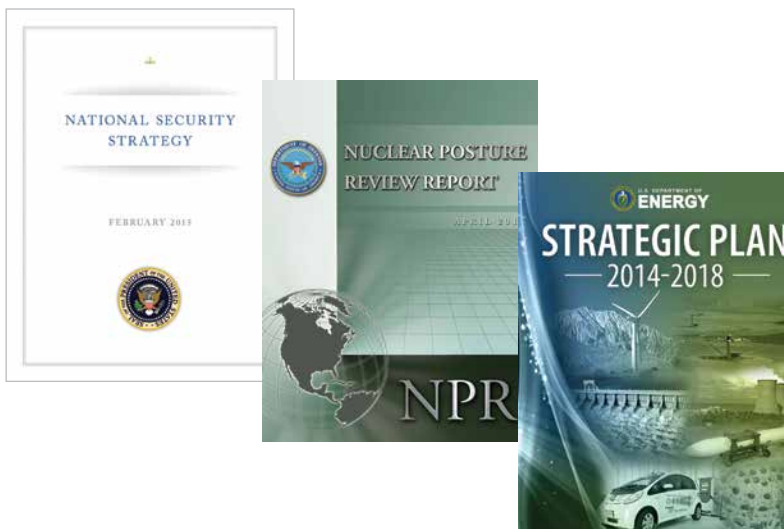
DOE/NNSA, whose heritage can be traced back to the Manhattan Project in World War II, is tasked with carrying out DOE's national security responsibilities. DOE/NNSA draws its mission and authorities from the Atomic Energy Act (42 *United States Code* [U.S.C.] § 2011 *et seq.*), and, more specifically, the NNSA Act (50 U.S.C. 2401, *et seq.*). The latter directs DOE/NNSA:

- To enhance United States national security through the military application of nuclear energy.
- To maintain and enhance the safety, reliability, and performance of the United States nuclear weapons stockpile, including the ability to design, produce, and test, in order to meet national security requirements.
- To provide the U.S. Navy with safe, militarily effective nuclear propulsion plants and to ensure the safe and reliable operation of those plants.
- To promote international nuclear safety and nonproliferation.
- To reduce global danger from weapons of mass destruction.
- To support United States leadership in science and technology.

Presidential and DOE strategy documents also provide policy direction for DOE/NNSA's mission. These documents draw from the vision outlined in President Obama's April 2009 speech in Prague, Czech Republic, and reaffirmed in the recently updated *National Security Strategy* (February 2015). This vision recognizes the global threat posed by nuclear proliferation and terrorism and the goal of the United States to “seek the peace and security of a world without nuclear weapons.” Equally important, this guidance makes clear that, as long as nuclear weapons exist, they must remain safe, secure, and effective. Therefore, the United States must invest the resources necessary to maintain its deterrent forces, even while pursuing agreements to reduce stockpiles and prevent proliferation.



Further guidance is outlined in the *Nuclear Posture Review Report* (April 2010) and the *Nuclear Weapons Employment Strategy of the United States* (June 2013), ensuring the United States' nuclear posture is aligned to address the rapidly evolving 21st century security environment. Implementing these objectives will reduce the risk of nuclear proliferation and terrorism, maintain strategic stability, strengthen regional deterrence, and assure U.S. allies and partners, while laying the groundwork for reducing stockpiles and living up to U.S. commitments under the Nuclear Non-Proliferation Treaty. A strong nuclear deterrent has a clear link to U.S. nonproliferation goals. North American Treaty Organization and Asian allies must be sufficiently assured by the strength of the U.S. deterrent to forgo any consideration of developing their own capabilities. Additionally, several Presidential Policy Directives, as well as the *National Strategy for Counterterrorism* (June 2011), provide DOE/NNSA with specific policy direction on combating weapons of mass destruction, responding to incidents of nuclear terrorism, and pursuing nuclear weapons safety and security.



In addition, Executive Order 12344 and various statutes require the DOE/NNSA Office of Naval Reactors to be responsible for all aspects of the U.S. Navy's nuclear propulsion program, including research, design, construction, testing, operation, maintenance, and ultimate disposition.

At the international level, President Obama established, and DOE/NNSA supports, the Nuclear Security Summit process, which facilitates direct engagement with other governments and heads of state on urgent matters related to nuclear security. The consensus of participants at the 2010, 2012, and 2014 summits was expressed through summit communiqués, providing a valuable indication of political will and reinforcing international commitments to nuclear security.

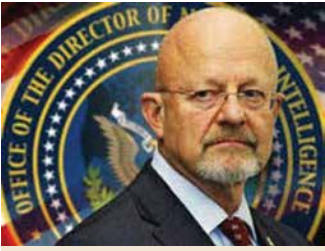
In alignment with the above-mentioned statutes and policy directives, the *U.S. Department of Energy Strategic Plan 2014-2018* (April 2014) provides the following strategic objectives for DOE/NNSA:

- Maintain the safety, security, and effectiveness of the Nation's nuclear deterrent without underground nuclear explosive testing;
- Strengthen key ST&E capabilities and modernize the national security infrastructure;
- Reduce global nuclear security threats; and
- Provide safe and effective integrated nuclear propulsion systems for the U.S. Navy.



"...the National Nuclear Security Administration's nuclear security enterprise, plays a central role in sustaining a safe, secure, and effective nuclear deterrent and combating proliferation and nuclear terrorism. The science, technology, engineering and manufacturing capabilities resident in the nuclear security enterprise underpin our ability to conduct stockpile stewardship and solve the technical challenges of verifying treaty compliance, combating nuclear terrorism and proliferation, and guarding against the threat posed by nuclear technological surprise. For example, the unique knowledge gained in nuclear weapons design developed to support the U.S. stockpile plays a critical role in the Nation's ability to understand strategic threats worldwide. DOE is responsible for providing the design, development and operational support required to provide militarily effective naval nuclear propulsion plants and ensure their safe, reliable and long-lived operations."

*Department of Energy  
Strategic Plan for 2014-2018*



“In my almost 50 years in intelligence, I do not recall a period in which we confront a more diverse array of threats, crises, and challenges around the world... This year’s threat assessment illustrates how dramatically the world and our threat environment are changing. Threats are growing more interconnected and viral. Events that, at first, seem local and irrelevant can quickly set off transnational disruptions that affect U.S. national interests. It’s a world in which our definition of “war” now includes a “soft” version. We can add cyber and financial to the list of weapons being used against us. And, such attacks can be deniable and non-attributable.”

James Clapper, Director of National Intelligence, Senate Testimony, March 2013



Distinguishing neutrons and gamma rays is the key to differentiating benign radioactive sources from nuclear substances such as uranium and plutonium.

DOE/NNSA, in coordination with its interagency partners and standing bodies such as the Nuclear Weapons Council, contributes directly to implementing the President’s vision through its unique capabilities, expertise, and the resources of the nuclear security enterprise and the broader DOE technical complex. DOE/NNSA’s work in support of these objectives is carried out in alignment with the DOE strategic plan’s further emphasis on the importance of scientific discoveries and tools; the safe, secure, and efficient operations of the DOE enterprise; workforce recruitment and retention; sustainable infrastructure management; and effective project and contract management.

DOE/NNSA’s mission, vision, values, and priorities remain consistent with and flow directly from the entire framework of policy direction, guidance, and international agreements described in this section and align with DOE’s responsibility to meet these national strategic objectives.

## Nuclear Security Strategic Environment

The nuclear security strategic environment has changed dramatically over the course of the past two decades and since the end of the Cold War. While the threat of a global nuclear exchange has receded, the global security environment in relation to nuclear weapons and materials is complex. Emerging geopolitical and technological trends signal new challenges. Globalization enables the proliferation of technology that continues to enhance the abilities of both state and non-state actors. Accordingly, countries with geopolitical, military, and economic power or reach are becoming more diverse, thus necessitating greater effort to work with key allies and partners to promote stability and peace.

Given the dynamic nature of the security environment, ensuring a safe, secure, and effective deterrent, as well as capabilities to address global nuclear dangers, is an enduring and evolving mission.

### TRENDS AND CHALLENGES

**Nuclear Weapons and Material Proliferation.** Unresolved regional tensions and imbalances in conventional military forces could tempt states to pursue new nuclear weapons capabilities. Regional tensions may heighten the sensitivity of U.S. allies, making a strong, credible deterrent necessary for their assurance and extended deterrence. Outside the United States, Russia, the United Kingdom, France, and China (the five nuclear weapons states recognized under the Nuclear Non-Proliferation Treaty), several states have demonstrated growing and more-diverse nuclear weapons capabilities and continue to produce fissile material. The potential for regional use of nuclear weapons is one of the gravest risks arising from this trend. Furthermore, the global expansion of civil nuclear power production and the associated spread of civil nuclear materials will challenge national and international capabilities to manage and secure them. The potential for misuse of uranium enrichment and reprocessing capabilities, in particular, threatens U.S. national security, as these technologies are potential acquisition pathways to weapons-usable nuclear materials. In addition, virtually all countries use radiological sources for industrial and medical pursuits, creating the attendant risk of a loss of control over these materials.

**Non-State Actors and Networks.** The United States and its allies will continue to face the risk of nuclear or radiological attack by a variety of terrorist groups. Acquisition of materials and expertise is a key step toward developing radiological dispersion devices or improvised nuclear devices. To obtain this material, lone-wolf operations, including criminals and homegrown violent extremists, may target nuclear or radiological facilities for theft or diversion. Expanding global trade and the increasing sophistication of illicit trafficking networks may also enhance opportunities for state and non-state actors to acquire nuclear and radiological materials, equipment, and technology. Weak governance, corruption, blurring of borders within regions, the nexus of criminal and terrorist networks, and the use of common network facilitators (e.g., transportation) further complicate the security landscape and pose major challenges for the United States and its allies and partners.

**Advanced Technology Proliferation.** The applications of new technologies, such as additive manufacturing, could potentially revolutionize the means for producing capabilities related to warfare. The diffuse and decentralized nature of science and technology development, coupled with greater information connectivity, will increase the availability of sensitive information and the means to use it. This may create new and worrisome pathways to nuclear weapons and will lower the obstacles to and detectability of covert nuclear weapons development programs. Access to both technology and information could well compromise traditional approaches to nonproliferation, presenting the need to more effectively anticipate technological surprise and rapidly develop new tools and policies to disrupt and respond to the impacts of these emerging technologies.

**Asymmetric Threats.** As technology offers new tools for state and non-state adversaries to pursue asymmetric approaches, some countries will seek new strategies to counter U.S. strengths and advantages by employing anti-access/area-denial, cyber, and space control capabilities. The wider availability and increased capabilities of cyber-attack tools in the hands of malevolent insiders or state and non-state actors may make radiological and nuclear facilities potential targets. In addition, the proliferation of the tactics and techniques associated with constructing improvised explosive devices will present new security challenges. The insider threat, including collusion with outsiders, will remain a major risk with respect to nuclear or radiological material, technology, and expertise.

## INNOVATIVE APPROACHES

Regional and global trends, coupled with continuing fiscal realities, will make it imperative for DOE/NNSA to adapt more quickly and pursue more-innovative approaches and partnerships in response to these challenges. As DOE/NNSA modernizes the nuclear security enterprise and downsizes the Nation's nuclear weapons stockpile, U.S. nuclear weapons will continue to play a role in deterring conflict and assuring allies. DOE/NNSA will also engage foreign partners to develop and improve their capacities to prevent, counter, and respond to regional or local nuclear dangers. DOE/NNSA will continue to steward and sustain ST&E capabilities, its workforce, and the infrastructure systems resident in the nuclear security enterprise to overcome these threats, vulnerabilities, and challenges.



Mounted security patrol the vast 1,360-square-mile Nevada National Security Site. Security Police Officers provide a critical role in assuring the site's national security mission work is achieved in both a safe and secure manner.

“Now, at this pivotal moment, we continue to face serious challenges to our national security, even as we are working to shape the opportunities of tomorrow. Violent extremism and an evolving terrorist threat raise a persistent risk of attacks on America and our allies. Escalating challenges to cybersecurity, aggression by Russia, the accelerating impacts of climate change, and the outbreak of infectious diseases all give rise to anxieties about global security. We must be clear-eyed about these and other challenges and recognize the United States has a unique capability to mobilize and lead the international community to meet them.”

*National Security Strategy*  
(February 2015)



A DOE/NNSA Security Police Officer participates in a live fire exercise. Protective force members are trained to defend national security assets in a variety of field and urban environments.





(top) Final preparations for a B61-12 impact test using Sandia National Laboratories' Davis gun at New Mexico Tech in Socorro.

(bottom) A DOE/NNSA inspection of a weapons-of-mass-destruction-related, dual-use, commodity shipment.

“We also will advance the President’s vision for reducing the levels of nuclear weapons in the world, strengthen nonproliferation efforts, and combat nuclear terrorism. DOE must maintain a safe, secure, and effective nuclear weapons stockpile in the absence of nuclear testing and manage the infrastructure for the research, development, and production activities needed to meet national security requirements. We will carry out our responsibilities for safety and security, in accordance with the Administration’s Stockpile Stewardship and Management Plan, which lays out a comprehensive modernization plan to ensure that our nuclear arsenal remains an effective deterrent.”

*Department of Energy Strategic Plan for 2014-2018*



The Aerial Measuring System (AMS) provides nationwide emergency response services using both helicopter and fixed-wing aircraft. This AMS helicopter is conducting a mission on behalf of the U.S. Department of Homeland Security’s Domestic Nuclear Detection Office.

DOE/NNSA is working with its interagency partners to address the following:

- **U.S. Strategic Deterrence.** As long as nuclear weapons exist, the United States must maintain resilience against emerging threats and ensure an effective, survivable nuclear deterrent in coming decades.
- **Extended Deterrence and Regional Conflict.** Continuing success in extended deterrence necessitates development of strategies to address the growing complexities of regional conflict, including cross-domain attacks and a lower threshold for adversary use of nuclear weapons.
- **Nuclear Proliferation and Terrorism.** This trend underscores the importance of efforts to deter, detect, and monitor both horizontal and vertical nuclear proliferation. It also requires capabilities to prevent, counter, and respond to nuclear and radiological dangers domestically and to improve capacity abroad, including partnering with third-party states where bilateral access is not an option.
- **The National and Nuclear Security Nexus.** The natural and increasingly significant synergy between the nuclear weapons mission and the broader global security missions is essential for the United States to ensure the preeminence of its nuclear weapons and nuclear threat reduction programs and capabilities to enable multidisciplinary technical solutions to other complex and high-risk national security challenges. Leveraging and maintaining capabilities that will provide the agility required to meet emerging national security challenges will be critical.

## DOE/NNSA Mission and the 21<sup>st</sup> Century Nuclear Security Enterprise

### CORE VALUES

Focused, United, Scientific, Innovative, Open, National (FUSION). These are the six core values that drive DOE/NNSA’s purpose and reflect its deeply held beliefs.

<b>F</b> ocused	– on the mission first, people always
<b>U</b> nited	– as a team with integrity and inclusiveness
<b>S</b> cientific	– solutions for the Nation
<b>I</b> nnovative	– ideas to lead and improve
<b>O</b> pen	– communication with transparency and trust
<b>N</b> ational	– service, safely and securely

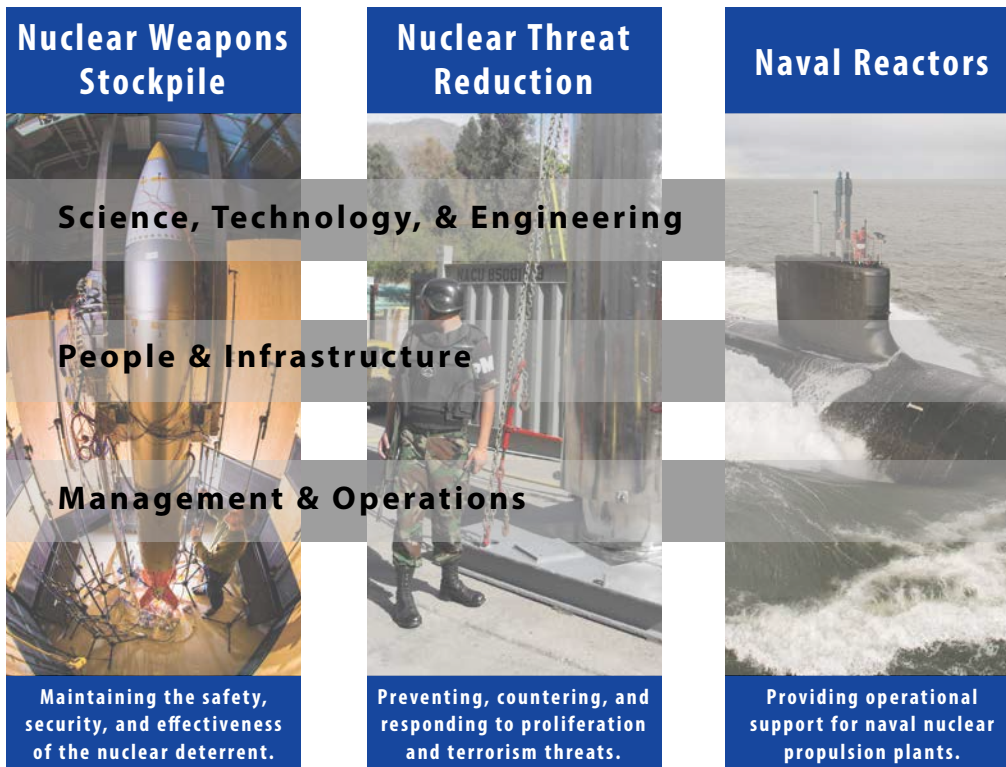


DOE/NNSA's mission is implemented by a focused and united workforce that operates with integrity, the highest ethical standards, and respect for each other. Science and innovation are key to this mission. DOE/NNSA works with its laboratory, production facility, and site partners to maintain and grow the core scientific, technical, and engineering capabilities. Its values are executed by a team of Federal and contractor employees who openly communicate with trust and transparency. DOE/NNSA owes it to the Nation to always do the right thing, with safety and security at the forefront. FUSION defines DOE/NNSA's organizational ideals and identity and is its guiding principle for the future.

## MISSION PILLARS AND CROSSCUTS

DOE/NNSA's core missions and the capabilities and resources that enable mission delivery are represented as pillars and crosscuts. The three mission pillars are: the Nuclear Weapons Stockpile, Nuclear Threat Reduction, and Naval Reactors. These pillars are supported by three crosscutting capabilities: ST&E; People and Infrastructure; and Management and Operations. Each pillar and crosscut is integrated through the application of science and technology to national security challenges.

## APPLYING TECHNICAL CAPABILITIES TO NATIONAL SECURITY CHALLENGES



### Pillar 1: Nuclear Weapons Stockpile

DOE/NNSA is charged with supporting the Nation's strategic deterrent by maintaining a safe, secure, and effective nuclear weapons stockpile that will deter any adversary and guarantee the defense of the Nation and its allies. This is done in accordance with policy guidance to not produce new nuclear weapons, support new

## MISSION STATEMENT

"To ensure nuclear security by maintaining the nuclear weapons stockpile, reducing global nuclear dangers, and providing for naval nuclear propulsion."



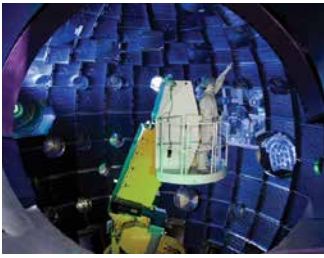
"Meeting our mission can only be accomplished with a superb technical base. This base must include resources for basic science to drive technical solutions to security challenges – both today and for decades to come.

That is why it is vitally important for us to assign the highest priority to maintaining the core scientific, technical, and engineering capabilities of the Nation's nuclear enterprise."

Frank G. Klotz  
Under Secretary for  
Nuclear Security and  
Administrator, NNSA

## VISION STATEMENT

"Through world-class science and technology solutions, we will advance global nuclear security. We are a workforce committed to ensuring national security and to delivering effective management and operational excellence across an integrated enterprise."



The National Ignition Facility (NIF) is the world's largest and highest-energy laser system. Its 192 beams can deliver 1.8 million joules of laser energy to a target about twice the size of a pencil eraser in less than a billionth of a second. In doing so, NIF can create conditions in the laboratory similar to those in stars and nuclear weapons, which allows DOE/NNSA to understand the stockpile without nuclear explosive testing.



DOE/NNSA's strategy to develop an exceptional workforce includes its Graduate Fellowship (NGFP) Program and its Minority Serving Institution Intern Program (MSIIP). The NGFP provides a year-long immersion in the DOE/NNSA workforce to selective fellows from exceptional academic institutions across the Nation. Over 80 percent of program alumni have been hired for Federal positions at DOE/NNSA Headquarters and sites, as well as other Federal agencies. The MSIIP affords underserved populations with opportunities in practical work experience within DOE/NNSA.

military missions, provide for new military capabilities, or conduct underground nuclear explosive tests. Sustaining the nuclear weapons currently in the stockpile, while extending the life of a reduced number of weapons anticipated for the future, demands a carefully balanced and executed Stockpile Stewardship and Management Program. This program consists of surveillance and assessment activities; maintenance; sustainment efforts such as life extension programs (LEPs), alterations (Alts), and modifications (Mods); dismantlement and disposition; and enabling base capabilities and materials development.

### Pillar 2: Nuclear Threat Reduction

A core mission of DOE/NNSA continues to be reducing global nuclear dangers. This is done by engaging countries and advancing capabilities to prevent, counter, and respond to nuclear and radiological proliferation and terrorism threats and incidents worldwide. DOE/NNSA plays a central role in this mission, in coordination with its interagency partners. In a complex and dynamic nuclear security environment, DOE/NNSA applies its nuclear nonproliferation, counterterrorism, counterproliferation, and emergency response capabilities across the entire nuclear threat spectrum, from intent through crisis response.

### Pillar 3: Naval Reactors

DOE/NNSA provides the design and development support required to equip U.S. Navy vessels with militarily effective nuclear propulsion plants and to ensure their safe, reliable, and long-lived operation. DOE/NNSA is responsible for reactor plant design and development for the next-generation ballistic missile submarines, attack submarines, and aircraft carriers; providing constant operational support to resolve any problems that arise with the nuclear-powered fleet while at sea; and providing the infrastructure needed to train nuclear-qualified sailors.

### Crosscut 1: Science, Technology and Engineering

DOE/NNSA conducts world-class specialized research, development, testing, and evaluation activities using unique diagnostic tools, experimental platforms, and modeling and simulation architectures. From some of the world's fastest supercomputers to high-energy-density lasers and experimental test beds, the nuclear security enterprise delivers innovative and transformative scientific and technical solutions to the global challenges of the 21st century.

Beyond direct mission support, these capabilities deliver solutions for broader national security challenges. DOE/NNSA works in partnership across the U.S. Government, academia, and industry to advance its platforms and capabilities and to be better prepared for future technological surprise.

### Crosscut 2: People and Physical Infrastructure

The people and physical infrastructure that make up the nuclear security enterprise are fundamental to executing DOE/NNSA's mission.

**People.** Success in the nuclear security enterprise depends on a highly capable workforce with specialized skills in a broad array of technical fields. The workforce is comprised of experienced executives and mid-career professionals, as well as entry-level talent.



DOE/NNSA is keenly aware that it must invest in a qualified, responsible, and committed workforce to fulfill its mission. Recruiting, retaining, and training today and tomorrow's workforce in essential areas of expertise are critical to mission delivery. DOE/NNSA, with its M&O partners and its non-M&O contracting partners, will devote extensive efforts to developing its Federal and contractor workforce to support the mission.

**Physical Infrastructure.** To meet current and future demands, DOE/NNSA requires specialized programmatic and general-purpose infrastructure. DOE/NNSA is modernizing and rightsizing its infrastructure by maintaining and repurposing existing facilities; dispositioning excess facilities in a timely manner; and building new facilities when necessary. Specialized facilities and equipment for commodities (such as uranium, plutonium, tritium, lithium, high explosives, and microelectronics) and the general-purpose infrastructure to enable safe, secure, and reliable operations are required to meet the mission. DOE/NNSA is deploying new enterprise-wide risk management tools to prioritize efforts to arrest the declining state of its infrastructure.

### Crosscut 3: Management and Operations

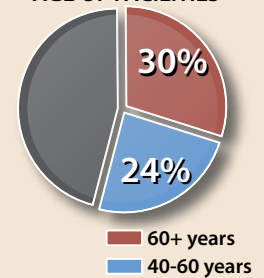
In order for DOE/NNSA to deliver products that meet its mission priorities, attention to clear, accountable, effective management and safe, secure, efficient operations is critical at all levels. DOE/NNSA is committed to ensuring safety and security, delivering quality projects on schedule and on budget, and providing timely best-value acquisition solutions.

To ensure safe, secure, and efficient operations, DOE/NNSA deploys layers of physical security, safeguards and security personnel, and sophisticated cyber security systems to protect the workforce, materials, infrastructure, and sensitive information essential to ensuring mission success. To meet its responsibility for protecting the most-sensitive weapons, materials, and information on Earth, DOE/NNSA will maintain graded physical and cyber security programs consistent with current threats and potential consequences. DOE/NNSA will ensure a robust Defense Nuclear Security Program with clear and consistent lines of responsibility and accountability. New and emerging threats, including increasing and more-sophisticated cyber-attacks, will require ongoing vigilance and state-of-the-art security systems. Safety operations include supporting safe, efficient material operations, as well as packaging and transport of sensitive materials. This includes compliance with environmental, safety, health, and quality requirements and improving the physical infrastructure.

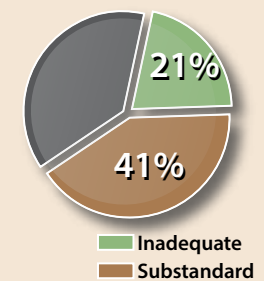
DOE/NNSA will work to continuously improve its project management across the nuclear security enterprise, in partnership with the leadership at its contractor-operated sites. DOE/NNSA is focused on building a culture of accountability and delivering results to meet its mission goals while providing best value to the taxpayer. DOE/NNSA will continue systematically strengthening its cost estimating capabilities and project management and acquisition systems. Fully establishing DOE/NNSA's budgeting and program evaluation capabilities will be critical for both mission success and proper stewardship of taxpayer dollars. Additionally, DOE/NNSA will ensure contract structures and incentives are cost-effective and will hold its contractors accountable to the terms and conditions of its contracts.

### THE CHALLENGE: AGE AND DECLINING INFRASTRUCTURE

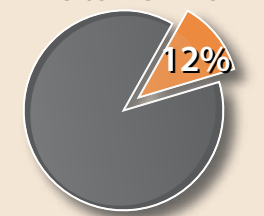
#### AGE OF FACILITIES



#### CONDITION OF FACILITIES



#### EXCESS FACILITIES



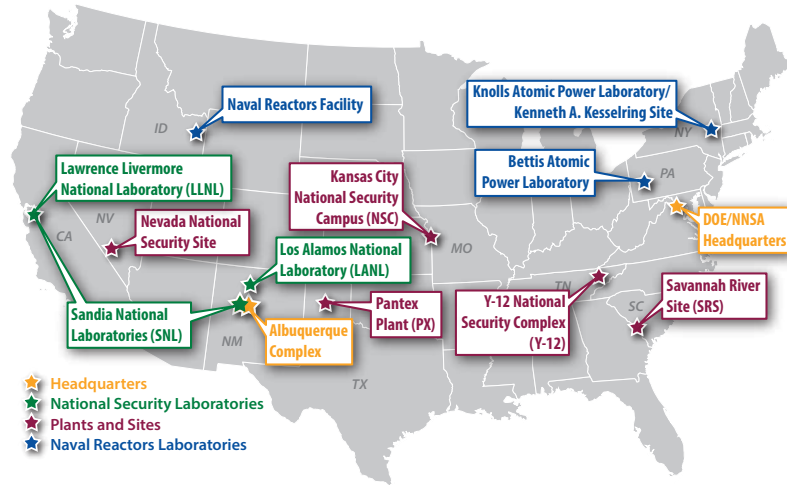
Notable infrastructure accomplishments include:

*(top)* The recent relocation of non-nuclear manufacturing operations from the Bannister Federal Complex site in Kansas City to the new Kansas City National Security Campus.

*(bottom)* The construction of the Radiological Laboratory Utility Office Building at Los Alamos National Laboratory.

Both projects were completed on time and under budget.

DOE/NNSA is responsible for developing and implementing security programs including protection, control, and accounting of materials, as well as physical and cyber security for all DOE/NNSA facilities. The security mission is an integral and enabling component of the nuclear security enterprise that is designed to be flexible, efficient, innovative, and collaborative to effectively meet the challenges of rapidly evolving national security threats.



The Nuclear Security Enterprise

**ENTERPRISE ROLES AND RESPONSIBILITIES**

**Headquarters Operations.** DOE/NNSA manages its mission from its Headquarters in Washington, DC; Germantown, Maryland; and the Albuquerque Complex, which is collocated with Kirtland Air Force Base, in New Mexico. Federal Field Offices at each DOE/NNSA site provide tailored contract management, oversight, and collaboration with M&O partners. DOE/NNSA Headquarters is responsible for planning, managing, and overseeing the entire nuclear security enterprise.

**National Security Laboratories.** The core responsibility of the three national security laboratories remains to ensure the safety, security, and effectiveness of the Nation’s nuclear deterrent. This is accomplished through basic and applied scientific research, systems engineering, experiments, assessments, and validation activities. Lawrence Livermore National Laboratory and Los Alamos National Laboratory serve as the nuclear weapons design agencies for the nuclear explosives package and have specific production missions as well. Sandia National Laboratories is responsible for development, testing, and production of specialized non-nuclear components and systems engineering for the entire nuclear stockpile. The science and engineering capabilities of each laboratory are being applied to achieve breakthroughs in areas beyond stockpile stewardship, including counterterrorism and nonproliferation, defense and intelligence, energy, and environmental security.

DOE/NNSA also conducts significant global security work at DOE laboratories, several of which have historic roles in nuclear fuel cycle issues, including Pacific Northwest National Laboratory, Oak Ridge National Laboratory, Argonne National Laboratory, Idaho National Laboratory, Brookhaven National Laboratory, and Savannah River National Laboratory.

**Nuclear Weapons Production Facilities.** Four nuclear weapons production facilities contribute to the mission of the nuclear security enterprise. The Y-12 National Security Complex manufactures, evaluates, and tests uranium and lithium for nuclear weapons components; dismantles, stores, dispositions, and down-blends highly enriched uranium (HEU); supports nonproliferation and counterterrorism activities; and provides enriched uranium for the U.S. Navy and for research reactors. The Pantex Plant assembles and dismantles nuclear weapons; manages high-explosive components; provides interim storage and surveillance of plutonium components; and



Lawrence Livermore National Laboratory



Los Alamos National Laboratory



Sandia National Laboratories



Y-12 National Security Complex



Pantex Plant



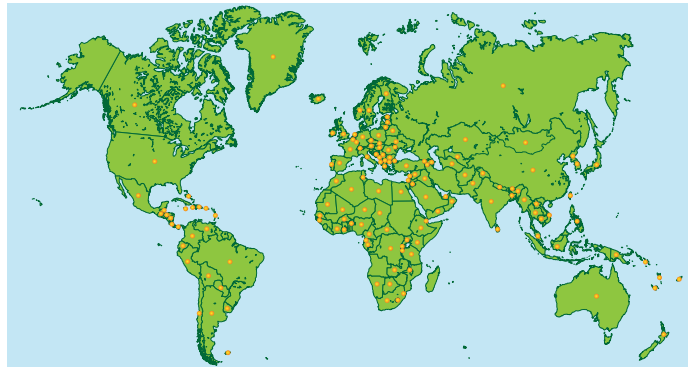
provides hardware and expertise for broader national security challenges. The Kansas City National Security Campus is responsible for manufacturing and procuring non-nuclear weapon components, including electronic, mechanical, and engineered material. The Savannah River Site processes uranium and plutonium to meet DOE/NNSA's nonproliferation goals and produces tritium for the nuclear stockpile.

**National Security Site.** The Nevada National Security Site supports high-hazard operations, testing, and training across DOE/NNSA's missions. This site also provides diagnostics and instrumentation, data analysis, and materials storage; conducts criticality experiments; provides research test beds for nuclear nonproliferation and counterterrorism activities; and supports low-level radioactive waste material disposition.

**Naval Reactors Laboratories.** The Bettis and Knolls Atomic Power Laboratories conduct research and design work that ensures the safe, reliable, and long-lived operation of nuclear propulsion plants. The Kenneth A. Kesselring Site operates two prototype nuclear reactors for the operational testing of new designs and new technologies and provides vital hands-on training for naval reactor plant operators. The Naval Reactors Facility at Idaho National Laboratory prepares, examines, and processes all naval nuclear spent fuel into dry storage for shipment and supports refueling and defueling of nuclear-powered U.S. Navy vessels.

**International Engagements.** Nuclear security is a global issue that requires international partnership on safety, security, and technical and policy issues.

DOE/NNSA is engaged in over 130 countries around the world to collaborate and build the capacity of foreign partners to prevent, counter, and respond to nuclear dangers. DOE/NNSA has personnel stationed in China; France; Japan; Kazakhstan; Pakistan; Russia; Ukraine; the U.S. Mission to the International Organizations



DOE/NNSA engagements worldwide

in Vienna, Austria; the Organization for Economic Cooperation and Development in Paris, France; and a Regional Office in Bulgaria.

## BROAD NATIONAL SECURITY IMPACT

DOE/NNSA is committed to strategically managing and facilitating strategic partnerships that strengthen the synergies between its core capabilities and broader national security needs. These strategic partnerships attract and retain outstanding people and are necessary to sustain critical tools and facilities. DOE's science and energy programs, as well as Strategic Partnership Projects with the U.S. Department of Defense (DOD), U.S. Department of Homeland Security, and other national security agencies in areas such as cyber security, weapons of mass destruction, and advanced conventional weapons, leverage DOE/NNSA's national assets and represent a more efficient use of Government resources. Interactions with the private sector allow for commercialization and deployment of DOE/NNSA-developed technologies that meet DOE's technology transfer mission and contribute to U.S. competitiveness and economic goals.



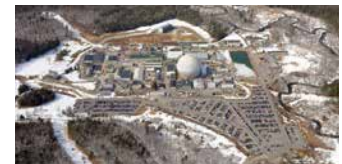
Kansas City National Security Campus



Savannah River Site



Nevada National Security Site



Kenneth A. Kesselring Site



Knolls Atomic Power Laboratory



Bettis Atomic Power Laboratory



Naval Reactors Facility

**NUCLEAR WEAPONS STOCKPILE GOALS**

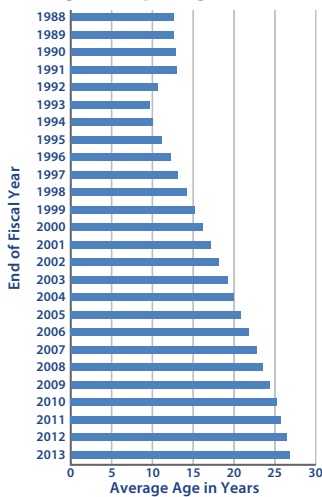
- Complete W76-1 production by 2019.
- Complete B61-12 first production unit by 2020.
- Complete W88 Alt 370 with a refreshed conventional high explosive first production unit by 2020.
- Complete W80-4 first production unit by 2025.
- Accelerate the dismantlement of weapons retired prior to FY 2009.
- Cease programmatic operations at the Chemistry and Metallurgy Research facility at Los Alamos National Laboratory by 2019.
- Cease enriched uranium programmatic operations in Building 9212 at the Y-12 National Security Complex by 2025.
- Ensure capability to produce 50 to 80 pits per year by 2030.
- Provide experimental and computational capabilities to support stockpile certification.

**Strategic Priorities and the Way Ahead**

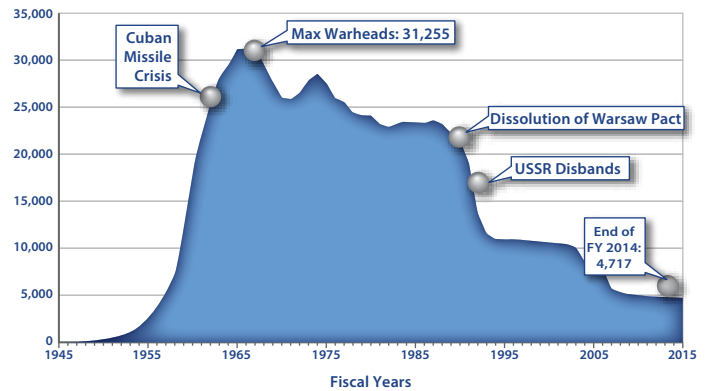
**NUCLEAR WEAPONS STOCKPILE**

Maintaining a safe, secure, and reliable nuclear weapons stockpile, without underground nuclear explosive testing, is the highest priority for the Nuclear Weapons Stockpile mission pillar. DOE/NNSA has successfully sustained the deterrent since the unilateral moratorium on nuclear explosive testing in 1992 and will continue to do so through the Stockpile Stewardship and Management Program. This has been accomplished through the capabilities, vision, and determination of DOE/NNSA's world-class scientists, technicians, and engineers, as well as significant investment in scientific tools, facilities, and people. Sustaining the nuclear weapons stockpile includes a range of priority activities that are interdependent.

Average Stockpile Age, 1988 – 2013



U.S. Nuclear Stockpile, 1945 – 2014  
(Includes active and inactive warheads. Several thousand additional nuclear warheads are retired and awaiting dismantlement)

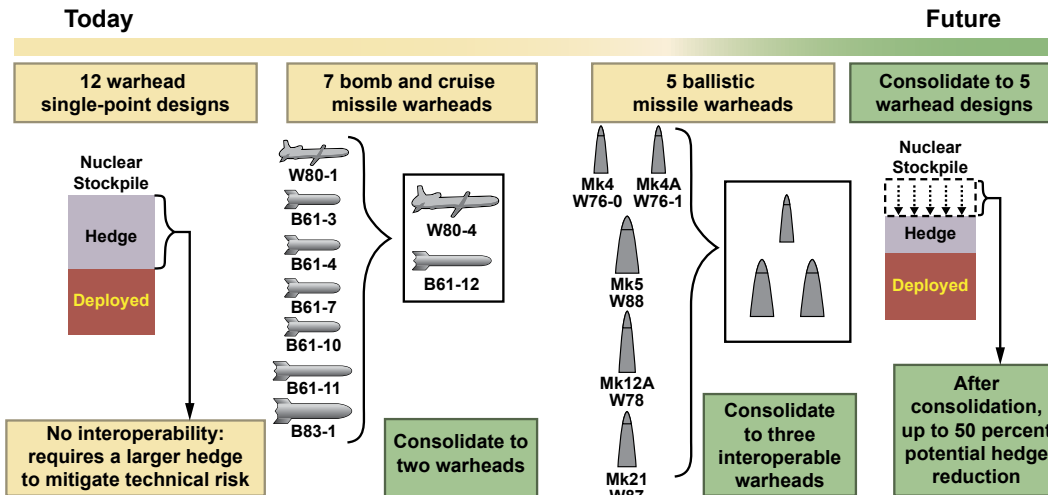


**Surveillance and Assessment.** Surveillance is the process whereby individual weapons undergo inspections and tests to ensure they meet safety, security, and reliability requirements. To meet future surveillance and assessment requirements, DOE/NNSA will improve aging models, deploy improved diagnostics, and use advanced evaluation techniques.

**Maintenance.** This process includes limited-life component exchanges, *i.e.*, planned periodic exchanges of components as they reach the end of their lives, to sustain system functionality. DOE/NNSA will work with DOD to jointly manage delivery and installation of replacements before warhead performance or personnel safety is adversely affected.

**Sustainment.** As weapons systems age, life extension, alteration, and modification programs are addressing aging and performance issues, enhancing safety features, and improving security. DOE/NNSA will meet strategic deterrence requirements with a reduced stockpile size while retaining reliability. To meet national policy for a safe, secure, and effective stockpile as long as nuclear weapons exist, sustainment is necessary to maintain the operational capability. The “3+2” Strategy is the program of record that guides DOE/NNSA’s sustainment efforts, which will eventually downsize the stockpile through the sustainment process.





The “3+2” Strategy is what guides DOE/NNSA’s sustainment efforts.

Ongoing sustainment efforts include the following highlights. Production of the W76-1 LEP will enable reduction of W76 warheads by a factor of two. The B61-12 LEP will consolidate four families of the B61 bomb into one and improve both the safety and security of the oldest weapon system in the U.S. arsenal. Once B61-12 production is complete (by FY 2025) and confidence is achieved, the B83—the last megaton-class weapon in America’s arsenal—will be retired. As agreed upon by the Nuclear Weapons Council, DOE/NNSA will remain focused on delivering the W80-4 warhead LEP for the cruise missile; the W88 Alt 370, including refreshment of the conventional high-explosive main charge; and the first interoperable warhead with a common nuclear explosive package and common or adaptable non-nuclear components to allow for further stockpile reductions.

**Dismantlement and Disposition.** Weapons are retired as a result of changes to military requirements or as a result of surveillance evaluations. The dismantlement and disposition process includes disassembling the weapons and storing, recycling, disposing of, or reusing their major components. DOE/NNSA will continue to meet its commitment to dismantle, by FY 2022, weapons systems retired prior to FY 2009. As announced at the 2015 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, the United States will seek to accelerate the dismantlement of retired warheads by 20 percent. DOE/NNSA will work to balance workload requirements between LEP and dismantlement activities.

**Base Capabilities and Materials.** DOE/NNSA identifies and pursues the research and advanced development necessary to achieve advances in modern weapon safety and security, production, qualification, surveillance, and dismantlement. This work enables agility and positions DOE/NNSA to respond to technological surprise.

These interdependent priority activities are accomplished only through reliance on DOE/NNSA’s three unique crosscutting capabilities for supporting and maintaining a safe, secure, and reliable nuclear weapons stockpile.

**ST&E Supporting the Stockpile.** Since the cessation of U.S. nuclear weapons testing in 1992, DOE/NNSA has maintained the nuclear stockpile through the science-based Stockpile Stewardship Program. DOE/NNSA will continue to use and reinvest in its suite of innovative experimental platforms, diagnostic equipment, and

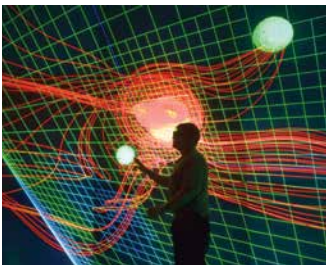


The Annual Assessment Process is the method used by DOE/NNSA and DOD to evaluate the safety, reliability, performance, and military effectiveness of the nuclear weapons stockpile. The Directors of the three DOE/NNSA national security laboratories are required to complete Annual Assessments, and the Commander of U.S. Strategic Command provides an assessment of the military effectiveness of the stockpile. The Secretaries of Energy and Defense are required to submit these reports unaltered to the President, along with any conclusions the Secretaries consider appropriate.



An engineer at Sandia National Laboratories prepares for an acoustic test on a B61-12 system. The unit is surrounded by banks of speakers that expose it to an acoustic field. The sound pressure reaches 131 decibels, similar to a jet engine.

Sustainment programs are classified into three categories: An alteration (Alt) is a limited scope change that typically affects the assembly, testing, maintenance, and/or storage of weapons. An Alt may address identified defects and component obsolescence, but does not change a weapon's operational capabilities. A modification (Mod) is a more-comprehensive modernization program that changes the operational capabilities of the weapon. A Mod may enhance weapons' margins against failure, increase safety, improve security, extend limited-life component life cycles, and/or address identified defects and component obsolescence. A life extension program (LEP) is a modification that refurbishes warheads by replacing aged components to extend the service life of the weapon. LEPs can extend the life of a warhead 20 to 30 years, while increasing safety, improving security, and addressing defects.



Advanced simulation and computing codes address physical regimes that cannot be tested to address anomalous situations.

computational capabilities to ensure stockpile safety, security, and reliability. DOE/NNSA will also continue to prioritize ST&E activities and capabilities to address today's concerns regarding the aging stockpile; ensure future technical and predictive capabilities are available, including concepts for sustainment options such as component reuse; and explore and apply new additive manufacturing processes to perform mission support activities.

Additionally, new experimental facilities are under consideration to improve the understanding of materials in nuclear weapons. As long as the nuclear stockpile exists, DOE/NNSA will strengthen the ST&E base needed to sustain the nuclear deterrent and modernize safety and security features.

**People and Infrastructure Supporting the Stockpile.** Stockpile stewardship and management activities would not be possible without the recruitment, retention, and training of a highly skilled, technically focused, and disciplined workforce. DOE/NNSA will continue to support the Laboratory and Plant Directed Research and Development activities to continue challenging its existing workforce and attracting the next generation of talent.

In addition, DOE/NNSA is working to rightsize and modernize its aging infrastructure in a coordinated fashion and has formulated strategies for recapitalizing key capabilities within the complex. For example, DOE/NNSA is implementing a disciplined, modular approach for the Plutonium and Uranium Strategies to ensure continuation of the Nation's plutonium and uranium capabilities in pit production and uranium manufacturing. This will allow DOE/NNSA to leverage its existing infrastructure by tailoring safety basis changes and repurposing existing facilities while ensuring new construction is appropriately scaled to the necessary program and safety requirements.

**Management and Operations Supporting the Stockpile.** DOE/NNSA is implementing the Defense Programs Cost Improvement Initiative, consistent with industry and Government Accounting Office best practices, along with infrastructure program management tools to align resource allocations with priorities and improve decision-making. This effort is aimed at improving the efficiency and cost-effectiveness of weapon programs. DOE/NNSA will remain mindful of the critical need for effective and efficient physical and cyber security to ensure the protection, control, and accountability of nuclear materials, as well as the protection of classified and sensitive information.



DOE/NNSA applies its engineering and manufacturing expertise to make arming, fuzing, and firing systems less expensive and more reliable.



## NUCLEAR THREAT REDUCTION

No threat poses as grave a danger to the Nation's security and well-being as the potential use of nuclear weapons and materials by irresponsible states or terrorists. Preventing and countering nuclear proliferation while protecting national interests around the globe against the threat of nuclear and radiological terrorism are key U.S. national security strategic objectives that require constant vigilance. DOE/NNSA applies its nuclear nonproliferation, counterterrorism, counterproliferation, and emergency response capabilities across the entire threat spectrum by following three general philosophies: Prevent, Counter, and Respond to global nuclear dangers.

DOE/NNSA prevents the illicit acquisition and/or development by state and non-state actors of weapons-usable nuclear or radiological materials, equipment, technology, and expertise. This is executed through the following strategic activities.

**Material Management and Minimization.** DOE/NNSA seeks to achieve permanent threat reduction by minimizing and, when possible, eliminating excess weapons-usable nuclear materials around the world, as well as by ensuring sound material management principles are applied in the peaceful use of remaining nuclear materials. This is accomplished by converting reactor and isotope production facilities to non-weapons-usable nuclear materials both domestically and abroad; removing or confirming the disposition of excess weapons-usable material at civilian facilities across the globe and consolidating those that remain; and disposing and managing weapons-usable nuclear material, from both domestic stockpiles and material returned from abroad, and implementing the Plutonium Management Disposition Agreement with Russia.

**Global Material Security.** Where elimination is not possible, DOE/NNSA ensures that remaining nuclear and radiological materials worldwide are secured, protected, and kept under control and accounted for in accordance with internationally accepted recommendations. This includes replacing vulnerable radiological sources used in the private sector, where feasible, and removing disused sources from civilian sites, thus



Radiation portal monitors along a rail line scan a train for the illicit trafficking of radioactive and special nuclear material.

## NUCLEAR THREAT REDUCTION GOALS

- Remove and dispose of an additional 1,553 kilograms of vulnerable nuclear materials by 2020.
- Convert or verify the shutdown of 26 additional research reactors and isotope production facilities by 2020.
- Provide protection upgrades of approximately 2,600 radiological material buildings by 2020.
- Improve export control systems in 40 countries by 2020.
- Demonstrate advanced capabilities to detect special nuclear materials and continuously monitor nuclear weapons by 2018.
- Complete the experimental validation of the national predictive modeling capability by 2020.
- Maintain the emergency operations readiness index at 91 or higher.
- Dispose of 34 metric tons of plutonium under the Plutonium Disposition Management Agreement.



The Nuclear Security Summit series, initiated in 2010 and held every two years, brings together heads of state to raise awareness about nuclear security issues. At the 2014 Summit held in The Hague, the United States and Japan pledged to remove and dispose of all highly enriched uranium (HEU) and separated plutonium from Japan's Fast Critical Assembly facility—an initiative that DOE/NNSA will be executing. The next Summit will be held in the United States in 2016.



In July 2013, DOE/NNSA's Office of Defense Nuclear Nonproliferation completed the removal of 11 kilograms of HEU from the Dalat Nuclear Research Institute. Special casks containing the last of Vietnam's HEU are loaded onto an An-124 for transport to Russia.

reducing the long-term need for sustainable security at sites with radioactive sources. Additionally, DOE/NNSA trains and equips countries around the world to detect and deter illicit movement of nuclear weapons, proliferation-sensitive materials, and radiological sources.

**Nonproliferation Policy and Arms Control.** To complement its efforts to strengthen the nuclear security regime, DOE/NNSA also seeks to strengthen the implementation and effectiveness of the global nonproliferation and arms control regimes and bodies that govern that global effort, including the Nuclear Non-Proliferation Treaty, the International Atomic Energy Agency (IAEA), and the Nuclear Suppliers Group. DOE/NNSA's programs in this area aim to prevent the diversion or proliferation of sensitive and/or dual-use materials, equipment, technology, and expertise by improving nuclear safeguards and export controls around the world and the monitoring, transparency, and verification of nonproliferation and arms control treaties and agreements.

**Nonproliferation Research and Development.** To enable all of these efforts, DOE/NNSA leads advanced research and development initiatives that seek to create effective technologies to detect nuclear detonations and discover foreign nuclear weapons development activities. DOE/NNSA works to advance technologies to strengthen monitoring and verification of foreign commitments to nonproliferation and arms control treaties and agreements. DOE/NNSA also conducts fundamental research in support of counterterrorism and emergency response missions to improve nuclear forensics and material detection capabilities.

**Counterterrorism.** DOE/NNSA uses its technical expertise and enterprise capabilities to counter the efforts of both state and non-state actors to steal, acquire, develop, disseminate, transport, or deliver the materials, expertise, or components necessary for a nuclear or radiological threat device, or the weapons themselves. These nuclear counterterrorism and counterproliferation activities develop the scientific and technical understanding required to characterize, detect, and defeat the range of nuclear devices that are potentially available to a non-state actor. In addition, DOE/NNSA strengthens nuclear counterproliferation strategies that would be employed after state actors have (or are presumed to have) obtained nuclear materials, technologies, or devices. DOE/NNSA also sustains international leadership through cooperative efforts with other nations to improve technical understanding and countermeasures to nuclear and radiological terrorism threats and vulnerabilities. Based on this work, the teams that ultimately respond to an incident can confidently assess and render safe these threat devices.

**Emergency Response.** At the end of the nuclear threat reduction spectrum, DOE/NNSA's Emergency Response



Nearly 200,000 first responders from across the United States have trained in realistic settings at the Nevada National Security Site. Hands-on experience in using equipment, understanding radiation protection, and public safety are taught so these responders are better suited to protect the communities in which they work and live.



technical and operational capabilities are fully prepared to respond if a nuclear or radiological accident or incident were to occur anywhere in the world. DOE/NNSA maintains a wide range of capabilities in the core areas of crisis operations, consequence management, and emergency management to search, assess, render safe, and/or manage and contain the consequences of an accident or incident. DOE/NNSA's deployable assets, emergency management operations, and national-level and interagency integrated counterterrorism capabilities leverage both DOE's and DOE/NNSA's scientific and technical operational support capabilities to save lives, protect property and the environment, and meet basic human needs.

All of these important global threat reduction programs rely on the key crosscutting capabilities that make DOE/NNSA a unique and effective organization to address global nuclear security issues.

**ST&E Supporting Nuclear Threat Reduction.** The ST&E capabilities that reside across the nuclear security enterprise and the greater DOE complex are leveraged to perform the research and development required to address the challenges and potential consequences of nuclear and radiological proliferation and terrorism. This research and development advances U.S. capabilities to detect proliferation, monitor detonations, verify treaties, and interdict smuggled nuclear materials in support of the nuclear threat reduction pillar. The deep technical knowledge of DOE/NNSA laboratories and sites regarding how weapons and materials work underpins research and development related to characterization and forensics abilities and prepares the United States to respond to nuclear or radiological accidents or incidents anywhere in the world. Information gained from decades of nuclear weapon research is combined with newer experimental data to model improvised nuclear device designs and improve confidence in global monitoring of low-yield underground explosions.

**People and Infrastructure Supporting Nuclear Threat Reduction.** Through DOE/NNSA's policy and technical expertise, it conducts global nuclear security engagement and capacity-building training activities with its more than 130 partners around the world. Through multilateral forums, including the International IAEA, international summits, and the Nuclear Security Summit process, DOE/NNSA's workforce is at the forefront of raising awareness of threats and building technical and policy capabilities to prevent, counter, and respond through a suite of global security engagement programs and cooperative activities. This effort includes leveraging DOE/NNSA's unique production facility infrastructure to minimize the use of HEU in civilian applications. DOE/NNSA facilities support the conversion of research reactors to the use of non-weapons-usable materials; temporary storage of high-risk repatriated material; and, ultimately, down-blending and disposition of nuclear materials to achieve permanent threat reduction.

**Management and Operations Supporting Nuclear Threat Reduction.** This mission activity would not be possible without the application of safe, secure, and efficient management and operation principles to DOE/NNSA's global engagement efforts and project execution. Through independent validation of its disposition options, DOE/NNSA is working to more efficiently manage the disposition of surplus plutonium. DOE/NNSA is sharing its best physical security practices with other states that may be developing civil or military nuclear infrastructure now or in the future.



From 2009 to 2013, President Obama launched an accelerated effort to secure and eliminate vulnerable nuclear materials around the globe. Working with the IAEA, Russia, and other partners from April 2009 to December 2013, DOE/NNSA removed or confirmed the disposition of over 3,000 kilograms of U.S.- and Russian-origin HEU and separated plutonium from locations around the world. Over the life of these DOE/NNSA activities, HEU and separated plutonium have been removed or confirmed disposed from 40 countries plus Taiwan, with all HEU removed from 26 of those countries and Taiwan.



A robotic parting lathe, part of the Advanced Recovery and Integrated Extraction System (ARIES) at Los Alamos National Laboratory, disassembles plutonium pits from dismantled nuclear weapons before conversion of the nuclear material from metal to oxide form.

## NAVAL REACTORS GOALS

- Begin refueling and overhaul of the S8G land-based prototype by 2018.
- Provide the U.S. Navy with the M-290 shipping container unloading capability by 2024.
- Provide the U.S. Navy with an S1B reactor plant design that satisfies the stealth and power requirements of the next-generation ballistic missile submarine by 2027.

## NAVAL NUCLEAR PROPULSION

Supporting the U.S. Navy’s ability to protect and defend American interests across the globe remains a critical mission priority for DOE/NNSA. To remain at the forefront of technological developments in nuclear propulsion, DOE/NNSA’s Office of Naval Reactors (Naval Reactors) advances new technologies and improvements in performance and reliability to ensure a commanding edge in warfighting capabilities. Going forward, Naval Reactors will provide the U.S. Navy with an S1B reactor plant design that satisfies the stealth and power requirements of the next-generation ballistic missile submarine (the OHIO-Class replacement) by 2027. This reactor will be a life-of-the-ship core, which will eliminate costly mid-life refueling, increase operational availability, and enable the U.S. Navy to accomplish the sea-based leg of the strategic deterrent mission with 12 ballistic missile submarine platforms versus the 14 currently in inventory.



DOE/NNSA is responsible for the reactor plant design and development for the Ohio-Class ballistic missile submarine replacement.



In 2014, Naval Reactors packaged its 100th Spent Fuel Canister, representing over 50 percent of all Naval Reactors spent fuel placed in dry storage. The packaging method prepares fuel for transfer without further processing.

Naval Reactors also possesses the unique expertise and facilities to maintain “cradle to grave” responsibility for naval nuclear propulsion—from propulsion plant design to ultimate disposition. The 55-year-old Expended Core Facility, located at the Naval Reactors Facility at Idaho National Laboratory, is the only facility with the capability to receive naval spent nuclear fuel shipping containers and process naval spent nuclear fuel.

By 2024, the Spent Fuel Handling Recapitalization Project will provide initial M-290 shipping container unloading capability to support nuclear-powered aircraft carrier refueling and defueling schedules, thus maximizing the operational availability of the nuclear-powered fleet and minimizing steps required to prepare fuel for interim dry storage. This will ensure the fleet’s longer-term ability to meet mission needs and maintain national security around the globe.





USS *George H.W. Bush* (CVN-77) conducts flight operations.

plant. By 2018, Naval Reactors will begin to refuel and overhaul the S8G land-based prototype, which will preserve a critical research and development asset that provides a cost-effective test and evaluation platform for new technologies, materials, and components before introduction into the fleet. These research capabilities and high training standards have contributed to exemplary safety and performance records for the U.S. Navy.

DOE/NNSA provides the U.S. Navy with safe, militarily effective, and reliable nuclear propulsion plants by relying on its three unique crosscutting capabilities for supporting Naval Reactors.

**ST&E Supporting Naval Reactors.** Since the inception of nuclear powered warships, Naval Reactors has made continuous advancements in warfighting capabilities such as endurance, stealth, and power through ST&E expertise and capabilities. Concerted ST&E investments are a key cornerstone of Naval Reactors' mission, helping to fully integrate the design, construction, operation, life-cycle support, and disposition functions that are necessary to deliver an enduring naval nuclear propulsion capability. Technology developed by Naval Reactors enables minimized life-cycle maintenance costs, prolonged operating life, and reduced manning requirements. Naval Reactors' use of high-performance computing platforms to improve predictive modeling capabilities to better anticipate and prevent emergent propulsion plant issues, as well as to prove future propulsion plant designs, will be critical into the future. Naval Reactors will prioritize the ST&E necessary to sustain the sea-based leg of the nuclear strategic deterrent and maintain nuclear assurance for the Nation and its allies by addressing today's concerns and looking into the future to ensure technical and predictive capabilities are available within the nuclear security enterprise.

**People and Infrastructure Supporting Naval Reactors.** The Naval Reactors mission is accomplished by a lean network of dedicated research laboratories, nuclear-capable shipyards, equipment contractors and suppliers, and training facilities that are coordinated by a Headquarters staff of nuclear technology experts who provide oversight and direction for all program elements.

Finally, Naval Reactors' unique training requirements are met by special-purpose facilities staffed by highly qualified instructors. These facilities include land-based prototypes that provide hands-on training and ensure that, before their first sea tour, all operators are qualified on an operating naval nuclear propulsion

The Bettis and Knolls Atomic Power Laboratories are research and engineering facilities devoted solely to naval nuclear propulsion work. With combined staffs of over 6,100 engineers, scientists, technicians, and support personnel, their mission is to develop the most advanced naval nuclear propulsion technology and to provide technical support for the continued safe, reliable operation of all existing naval reactors. Both of these laboratories also offer postgraduate research opportunities through the Naval Nuclear Propulsion Fellowship Program.



Since 1955, U.S. Navy nuclear-powered warships have steamed over 155 million nautical miles and amassed over 6,700 reactor-years of operating experience without a reactor accident or any release of radioactivity that has had an adverse effect on human health or the quality of the environment.



A technician at the Knolls Atomic Power Laboratory performs water hardness titration to monitor process cooling water for steam plants.

About 45 percent of the Navy's major combatants are nuclear-powered:

- 14 ballistic missile submarines
- 4 cruise missile submarines
- 54 fast attack submarines
- 10 aircraft carriers



The USS *Gerald R. Ford* (CVN-78) next-generation aircraft carrier is outfitted with a new reactor plant that provides more generating capability and requires fewer reactor department sailors.

**Management and Operations Supporting Naval Reactors.** Through demanding technical excellence in research, operations, safety, and health, Naval Reactors continues to achieve operational efficiency in supporting the U.S. Navy, while maintaining the highest standards in the performance and safety of DOE/NNSA's personnel, all of which contributes to continued excellence in achieving DOE/NNSA's mission.

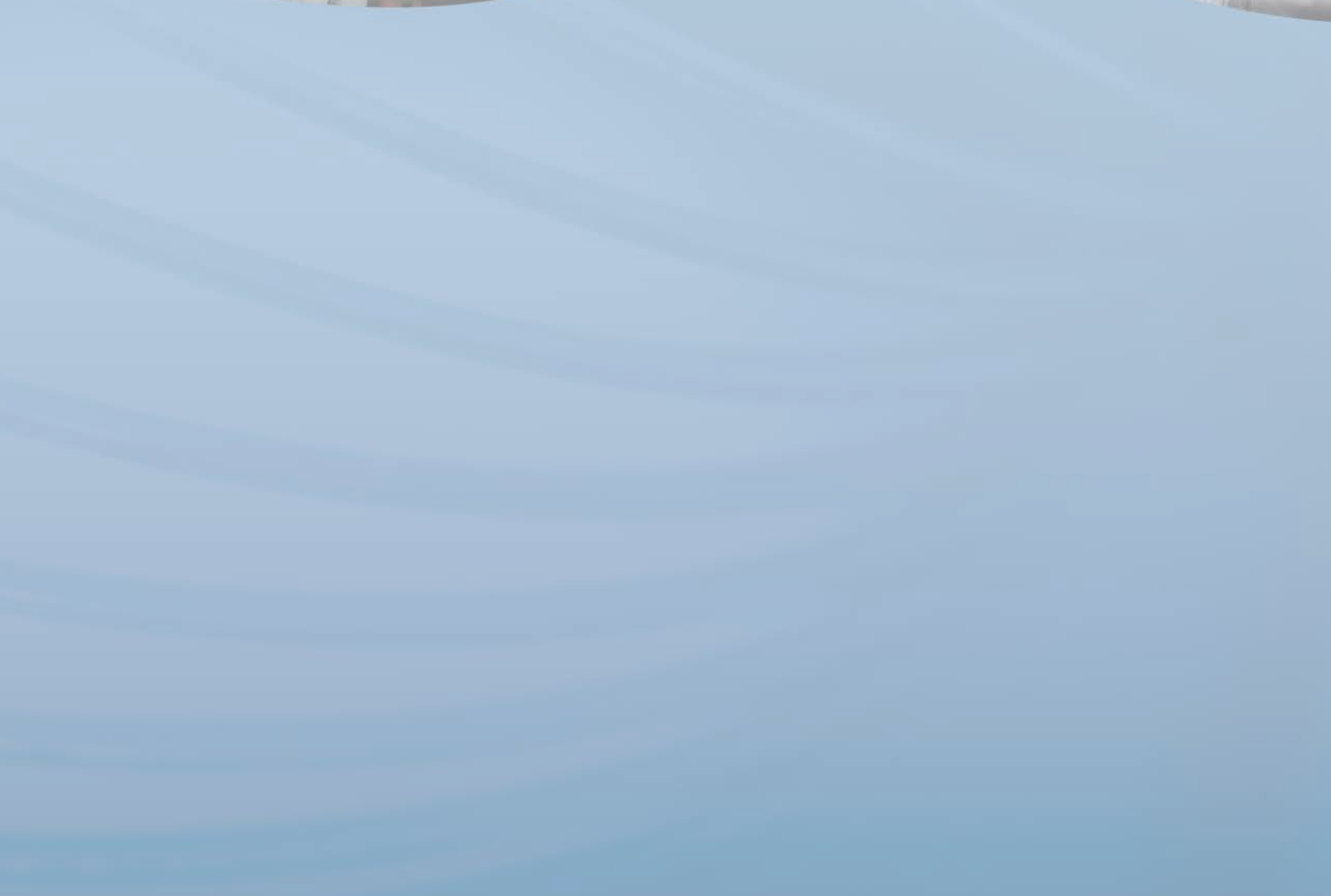
Naval Reactors also prioritizes the continued safety of operations and the health of its workforce, placing additional emphasis on reducing radiation exposure associated with naval nuclear propulsion plants to the lowest level reasonably achievable. In carrying out this policy, Naval Reactors has consistently maintained more-stringent exposure standards than those in the civilian nuclear power industry or in other Government nuclear programs. The program maintains the same rigorous attitude toward the control of radioactivity and protection of the environment as it does toward reactor design, testing, operation, and servicing. As a result, the program has a well-documented record showing the absence of any adverse environmental effect from the operation of U.S. nuclear-powered warships.

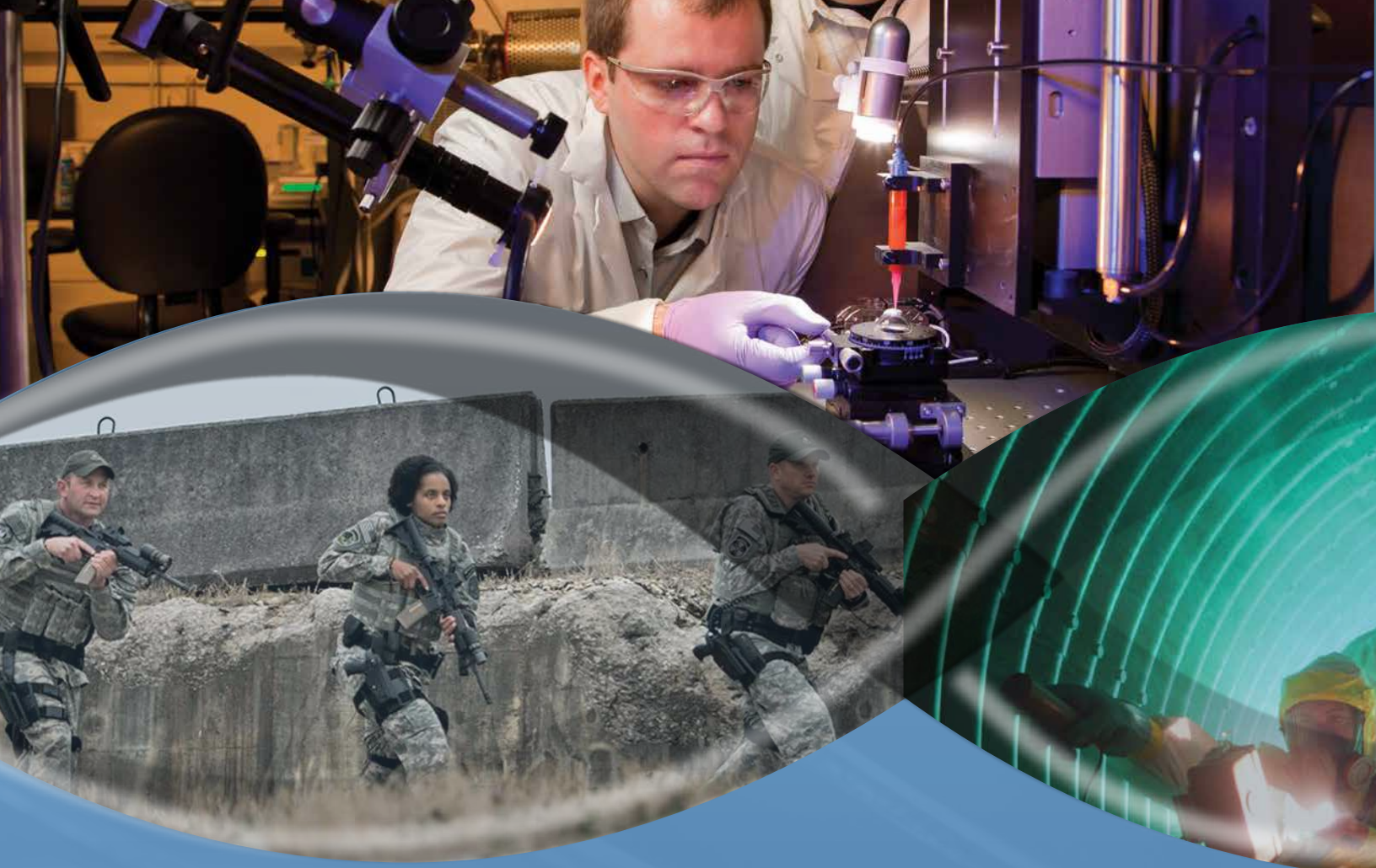
## CONCLUSION

DOE/NNSA ensures U.S. and global nuclear security every day by maintaining the nuclear weapons stockpile, reducing global nuclear dangers, and providing for naval nuclear propulsion through the application of world-class capabilities by its highly skilled workforce. To continue accomplishing its mission, DOE/NNSA must maintain its ST&E capabilities, support and sustain its people, modernize its physical infrastructure, and develop a management culture that is committed to continuous improvement in operating a safe, secure, and efficient nuclear security enterprise.

As DOE/NNSA follows this *2015 DOE/NNSA Enterprise Strategic Vision*, it will focus on meeting the challenges of today and a dynamic future. Regional and global trends, coupled with continuing fiscal realities, will make it imperative for DOE/NNSA to adapt more quickly and pursue more-innovative approaches and partnerships in response to these challenges.







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