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The Safety and Security of Nuclear Weapons

Nuclear weapons are essential to the nation's deterrent. Should the U.S. ever decide to use a nuclear weapon, it must be certain that it will perform reliably, providing design yield at the target, and credible deterrence requires that potential adversaries believe likewise. However, nuclear weapons also pose a great risk. The consequences of a detonation, either by accident or unauthorized use, would be catastrophic. Therefore, the nation must be certain that weapons will respond safely even in accidents and that unauthorized personnel cannot obtain or detonate a weapon. The safety, security, and reliability of our nuclear weapons (known in the weapons community as "surety") are of paramount importance to the nation.

Current State of Nuclear Weapon Safety and Security

Of course, the safety and security of our nuclear weapons, while assuring reliable performance, has been central to the development of the nuclear weapons stockpile. The current stockpile is characterized as safe and secure.

Safety principles have been established to preclude energy from reaching the nuclear components through the use of barriers, unique energy requirements, and assured failure of components under accident conditions. Design implementation of these principles assures predictable, safe response of the weapon in all accident conditions.

Weapon security relies upon denying any adversary access to the weapon and features within the weapon to ensure that nuclear detonation cannot be readily achieved. Formidable physical security systems provided by the military and the National Nuclear Security Administration (NNSA) deter the adversary and are designed to deny access and defeat the adversary before they could ever reach a weapon. In addition, unique features within the weapon further impede an adversary achieving an unauthorized nuclear detonation.

Thus, the safety and security of our current stockpile is very high. This has been accomplished while meeting reliability requirements.

The Need to Improve Nuclear Weapon Safety, Security, and Reliability

Although the current stockpile is characterized as safe and secure, there are many factors that call for continued improvements.

First, the current stockpile is old, with some of the designs and components from the 1960s and none employing technologies more recent than those of the 1980s. As a result, degradation in weapon components is taking place. Simple replacement of these components is not possible—the technologies no longer exist—and refurbishment is essential.

To meet all military requirements, within the constraints of our delivery systems, stringent limitations (on mass, volume, etc.) were placed on weapon designs and tradeoffs were required that precluded perfect implementation of the safety and security principles. As a result, improve-

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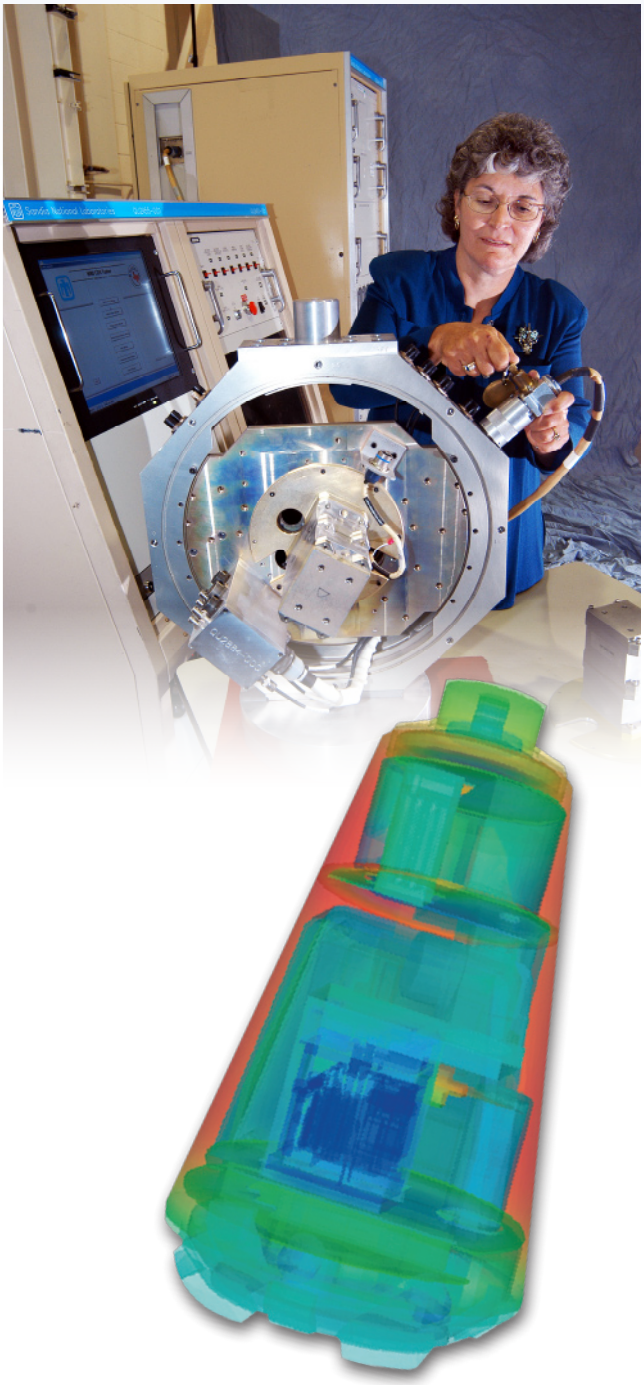
ments are needed in both safety and security of our systems to more fully meet the intent of the principles.

Moreover, the security threat to our weapons has changed. The 9/11 attacks caused us to reevaluate the threat, acknowledging both the possibility of a more severe form of attack and the possibility of a wider array of intents. Furthermore, knowledge and capabilities have been enhanced through the information age. Improvements in, and greater integration between, the physical security systems and the weapon protective features will be required to meet these new challenges.

Finally, technology advancements in security systems; information management and control; materials, sensors, microsystems, and simulation promise major enhancements in weapon security and safety, while satisfying all design constraints. Incorporation of such features should be an integral element of all weapon refurbishments so that we achieve our expectations of assured safety and security against ever-evolving threats, while continuing to meet the reliability requirements set by the military.



An Opportunity for International Leadership

Accidental or unauthorized use of a nuclear weapon anywhere in the world would have repercussions throughout the world's weapons states, no matter where the material or weapon originates. The U.S. safety and security principles form a basis for leadership dialogue with other states to ensure that all nuclear weapons are safe and secure.

Over many years, the U.S. has shared these principles and associated technology with its allies, and recently, safety and security dialogue has broadened with Russia. The opportunity exists for leadership in engaging other nuclear states, while protecting our secrets and respecting the interests of others.

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