The Clinton Administration and Nuclear Stockpile Stewardship: Erosion by Design

Floyd D. Spence
Chairman
House National Security Committee

October 30, 1996

The Clinton Administration and Nuclear Stockpile Stewardship: Erosion by Design

The Clinton Administration has shifted U.S. nuclear policy on maintaining the nuclear weapons infrastructure and defense industrial base in a direction that IS already atrophying the nation's capability to develop, produce and sustain a safe and credible nuclear deterrent.

The end of the Cold War has shifted attention away from the role of nuclear forces in U.S. military and national security policy. The development and production of new types of U.S. nuclear weapons has ended, underground tests have been discontinued indefinitely, and the size and activity of the Department of Energy's (DOE) nuclear weapons complex has been scaled back significantly. Decisions have been made to retain already-deployed nuclear weapons in the active stockpile for years, probably decades, beyond their design life, yet no data exist about their safety and reliability under these conditions. Furthermore, without testing there can be no certainty that computer simulations and non-nuclear experiments will suffice to ensure confidence in the continuing safety and reliability of the U.S. nuclear stockpile. In at least one instance, DOE has canceled or delayed important stockpile stewardship-related experiments, apparently for political reasons.

The Administration has failed to take the steps necessary to maintain a safe and reliable U.S. nuclear stockpile.

These decisions portend serious mid- and long-range problems that could reduce the safety and reliability of the U.S. nuclear stockpile, diminish the credibility of U.S. nuclear guarantees and deterrence, and ultimately render U.S. nuclear weapons inoperative.

At the broadest level, the following report concludes that the Clinton Administration has failed to provide focused management attention and resources to the challenges inherent in maintaining an effective, efficient, and capable nuclear weapons complex and, ultimately, a viable nuclear deterrent. More specifically, the report notes that:

- ***The international security environment remains risky and uncertain as serious threats still challenge the United States and its interests***. Growing concerns over the command and control of Russia's nuclear forces, the technical ability of renegade Russian military elements to launch a missile attack independent of the political leadership, an increasingly revanchist attitude in Moscow, and a new military doctrine that places greater emphasis on nuclear weapons highlight the importance of maintaining a robust and reliable U.S. nuclear deterrent. Likewise, China's ambitious program of nuclear modernization and the growing proliferation of strategic weapons technologies and capabilities around the world pose a serious threat to the United States;

- ***The Clinton Administration's Stockpile Stewardship and Management Program (SSMP) entails significant technological risks and uncertainties***. Certification that U.S. nuclear weapons are safe and reliable — in the context of a Comprehensive Test Ban Treaty (CTBT) — depends upon developing highly advanced scientific diagnostic tools that do not yet exist and may not work as advertised. Funding

shortfalls, legal challenges, and other problems are almost certain to continue to impede progress in achieving the program's ambitious goals, and raise serious doubts about the ability of the program to serve as an effective substitute for nuclear testing. The Administration's commitment to implementing the SSMP and, more broadly, to maintaining the U.S. nuclear stockpile is called into question by DOE's failure to adequately fund the SSMP and to conduct important experiments;

- ***The Administration has failed to perform standard non-nuclear flight tests, non-nuclear system tests, and laboratory tests of nuclear and non-nuclear components that are necessary to assure weapons safety and reliability***. Moreover, the Department of Defense (DOD) and DOE are significantly behind schedule in carrying out certain activities to help detect and diagnose weapons aging-related problems. According to the U.S. General Accounting Office (GAO), shortfalls in testing of nuclear weapons are a direct result of the Administration's restructuring of the U.S. nuclear weapons complex;

- ***Unprecedented reductions and disruptive reorganizations in the nuclear weapons scientific and industrial base have compromised the ability to maintain a safe and reliable nuclear stockpile***. The cessation of nuclear-related production and manufacturing activities has resulted in the loss of thousands of jobs and critical capabilities. Essential recapitalization has been deferred. DOE still lacks concrete plans for resuming the production of tritium, a critical element not only for new nuclear warheads, but also for replenishment of the active inventory. Unlike Russia or China, the United States no longer retains the capacity for large-scale plutonium "pit" production and DOE's plans to reconstitute such a capacity may be inadequate;

- ***The downsizing of DOE facilities and associated personnel reductions have created a serious deficiency in the nuclear work force***. The sacrificing of uniquely talented people is perhaps the most injurious consequence of the Administration's stockpile stewardship policies;

- ***The Administration has given higher priority to concluding a CTBT than to maintaining the nuclear testing regime that ensured the safety and reliability of the U.S. nuclear stockpile over the past fifty years.*** As North Korea, Pakistan, Israel, and South Africa have demonstrated by developing nuclear weapons without testing, the CTBT will not inhibit nuclear proliferation and cannot be effectively verified. Moreover, although the President formally conditioned U.S. acceptance of a CTBT on a series of safeguards, the Administration has failed to act when faced with events that should have triggered those safeguards.

In sum, the Administration has failed to take the steps necessary to maintain a safe and reliable U.S. nuclear stockpile, and its oft-repeated assurances that "things will get better" remain unconvincing given its record to date.

The Clinton Administration and Nuclear Stockpile Stewardship: Erosion by Design

In September 1993, Ranking Member Floyd Spence of the then-House Armed Services Committee issued a staff report entitled: "The Clinton Administration and Nuclear Weapons Policy: Benign Neglect or Erosion By Design?" Beyond its conclusion that a Comprehensive Test Ban Treaty (CTBT) was not in America's national security interests, the 1993 report noted that the Clinton Administration was mothballing critical elements of the nuclear weapons production complex even as the Department of Energy (DOE) struggled to define a long-term strategy for the nation's nuclear infrastructure.

This report highlights decisions made by the Administration which have contributed to the continued erosion of the nation's nuclear capabilities.

This report updates the 1993 product in its identification and discussion of a number of vital issues with respect to the Clinton Administration's approach to maintenance of a safe and reliable U.S. nuclear stockpile and a viable nuclear weapons complex. It highlights decisions made — and deferred — by the Administration which have contributed to the continued erosion of the nation's nuclear weapons development, production, and sustainment capabilities, and the continued loss of personnel possessing critical skills required to maintain the stockpile in an era of reduced, or no, nuclear explosive testing.

This paper is organized according to the following sections:

- ***The Evolving International Security Environment:*** This section describes the still risky international security environment, including the threat posed by Russia's and the People's Republic of China's (PRC) nuclear forces and the proliferation of missiles and nuclear, chemical, and biological weapons—the essential context in which Administration decisions affecting the U.S. nuclear weapons complex have been and are being made;

- ***The Administration's Science-Based Stockpile Stewardship and Management Program (SSMP):*** This section describes the "Science-Based Stockpile Stewardship and Management Program" established by DOE in response to the President's August 1995 decision to support a zero yield CTBT, and notes some of the many risks, uncertainties, and problems associated with this fundamentally new approach to maintaining the safety and reliability of the U.S. nuclear stockpile. It also addresses the Clinton Administration's delay of important stewardship-related tests;

- ***Surveillance and Testing of the Current Nuclear Stockpile:*** This section highlights potential difficulties associated with retaining weapons in the stockpile well beyond their expected design lifetimes, and cites disturbing evidence in a recent General Accounting Office (GAO) study regarding DOE's failure to carry out an effective stockpile surveillance and non-nuclear test program;

- ***Nuclear Production/Manufacturing Infrastructure Issues:*** This section discusses DOE's failure to provide adequate resources to facilitate the "recapitalization" of the infrastructure at the nation's four remaining nuclear weapons

production plants (Savannah River Site, South Carolina; Kansas City Plant, Missouri; Oak Ridge Reservation, Tennessee; and Pantex Plant, Texas). It also points out some of the problems with the Administration's strategy for re-establishing a capability to produce tritium (a radioactive gas in all U.S. nuclear weapons) and criticizes DOE's plan for manufacturing plutonium "pits";

- ***Workforce/Personnel Issues:*** This section notes current difficulties in retaining and recruiting skilled workers at the U.S. nuclear weapons laboratories (Los Alamos National Laboratory, New Mexico; Sandia National Laboratories, New Mexico and California; and Lawrence Livermore National Laboratory, California) and the production plants;

- ***Compelling Arguments Against the CTBT***: This section lists some of the compelling arguments against the CTBT. It also describes the package of "safeguards" promulgated by the White House as part of its decision to seek a CTBT, and assesses the Administration's track record in carrying out these safeguards.

The Evolving International Security Environment

The international security environment remains risky and uncertain as serious threats still challenge the United States and its interests.

Russia's Nuclear Capabilities

John B. Stewart, former Director of the Office of Foreign Intelligence at DOE and recipient of the National Intelligence Distinguished Service Medal in 1994, recently presented a sobering analysis of Russia in his 1996 monograph, "Rethinking the Unthinkable: Russia's Evolving Nuclear Weapons Threat."[1] Stewart argues that, current cooperation with Russia notwithstanding, nuclear war is indeed thinkable because of ongoing political turbulence and instability in Russia, a new Russian defense doctrine that relies more heavily on nuclear weapons, Russian political humiliation and revanchist attitudes, wars in Chechnya and elsewhere, Russian threats to reintegrate the old Soviet empire, an obsolete and incomplete missile early warning system that could lead to false warnings and misinterpretation of missile events, reduced safeguards for nuclear weapons and nuclear materials, and underpaid and undernourished soldiers who are willing targets of black marketers and Mafiosi seeking nuclear materials and information.

The international security environment remains risky and uncertain as serious threats still challenge the United States and its interests.

Richard Starr, a noted scholar of Russian affairs, painted a similarly distressing picture in a *Wall Street Journal* article on June 12, 1996.[2] Starr reports that a group of President Yeltsin's security advisors have authored a defense strategy blueprint based on the premise that the U.S. and NATO have been steadily encroaching on Moscow's interests and exploiting its current "time of troubles."[3] This Russian blueprint advocates developing a broad system of military alliances with other Slavic former Soviet republics, stationing tactical nuclear weapons along its borders, selling nuclear and missile technologies to radical Islamic states, and increasing military spending. According to Starr, Russia has been positioning itself to accomplish many of these objectives with a 240 percent increase last year in its military budget for research and development, increased availability of strategic resources to the military production complex, continued construction of a huge underground nuclear bunker in the Ural Mountains, and continued modernization of tactical and strategic nuclear weapons.

Consistent with Stewart's and Starr's warnings about a still serious nuclear threat, then-Russian Security Council chief Aleksandr Lebed during an October 4, 1996, visit to NATO headquarters declared, "We have missiles, which are rusty but still effective." In fact, the day before Lebed offered his remarks, Russian Prime Minister Viktor Chernomyrdin and Defense Minister Igor Rodionov personally participated in a major nuclear forces exercise that involved intercontinental and cruise missile strikes by all three of Russia's strategic services: the Strategic Rocket Forces (SRF), the Navy, and Long Range Aviation. The training scenario featured use of the "nuclear briefcase," designed to authorize a nuclear strike under conditions of surprise attack. Exercises of this type and magnitude are rare and almost never publicized. The only other such exercise announced publicly was in June 1994, amidst a crisis over NATO bombings in the Balkans and Russian threats that NATO intervention in Bosnia could spark a world war. Russia's simulated nuclear missile attack against the United States during that exercise occurred only a few months after President Yeltsin and President Clinton concluded a widely publicized "detargeting agreement" that supposedly removed coordinates for targets in the U.S. and Russia from missile guidance systems.

Russian and U.S. experts confirm that Russia's compliance with the missile detargeting agreement is not verifiable, nor is the agreement militarily consequential, because target coordinates would be stored locally and retargeting of missiles can be accomplished rapidly — in a few minutes or less. Anton Surikov, director of the Institute for Defense Studies and a senior advisor to the Russian Ministry of Defense, acknowledged as much in a March 1995 interview when he stated, "When it was decided to detarget missiles, the decision was mostly of a political, propaganda

character."[4] Likewise, the commander-in-chief of Russia's SRF, Colonel-General Igor Sergeyev, while being interviewed in his underground command post, told CBS Television's *60 Minutes* that SRF missiles can be "retargeted and launched from this war room… in a matter of minutes." Nonetheless, since January 1994 and as recently as the October 6, 1996, debate with Republican presidential candidate Bob Dole, President Clinton has told the American people on more than eighty occasions[5] that "not a single Russian missile is pointed at the children of America."

The Central Intelligence Agency (CIA) recently highlighted growing concerns about the command and control of Russia's nuclear forces and the technical ability of renegade Russian military elements to launch a nuclear missile attack against the United States without approval by political leaders in Moscow. According to an October 22, 1996, the *Washington Times* article, a CIA report titled "Prospects for Unsanctioned Use of Russian Nuclear Weapons," noted that "The Russian nuclear command and control system is being subjected to stresses it was not designed to withstand as a result of wrenching social change, economic hardship, and malaise within the armed forces… A severe political crisis… could exacerbate existing dissension and factionalization in the military, possibly heightening tensions between Russian political and military leaders and even splitting the general staff or nuclear commands."

According to the *Washington Times* article, the CIA report confirmed long-held suspicions that command posts of the SRF, the service in charge of intercontinental ballistic missiles (ICBMs), and other units below the level of the General Staff "have the technical ability to launch [those missiles] without authorization of political leaders or the General Staff…" In addition, the *Washington Times* reported that, "Some submarine crews probably have autonomous launch capability for tactical nuclear weapons and might have the ability to employ SLBMs [submarine-launched ballistic missiles] as well… [and] Political authorities probably could neither execute a nuclear strike — even from a command post — without the cooperation of the general staff nor prevent the general staff (or perhaps some other national level command post) from launching on its own." The report also warns of "conspiracies within nuclear armed units" to commit nuclear blackmail, and reportedly states that blocking devices on all Russian strategic and many tactical nuclear weapons can be defeated: "all technical [security] measures can be circumvented — probably within weeks or days depending on the weapons involved."

The People's Republic of China's (PRC) Nuclear Force Modernization Program

The PRC continues to pursue an ambitious program of nuclear force modernization. Beijing today possesses strategic nuclear missile forces that are targeted on American cities, and is developing at least one new ICBM, including a version capable of carrying multiple warheads that is prohibited to the United States and Russia under the terms of the second Strategic Arms Reduction Treaty (START II), as well as new short- and medium-range missiles equipped to carry nuclear or conventional warheads. Over the past several years, the PRC has conducted nuclear tests to develop new nuclear warheads, to most likely include warheads with multiple-independently targetable reentry vehicles (MIRVs).

In another worrisome development, the PRC flexed its "nuclear muscles" by firing nuclear-capable CSS-6 missiles at targets near Taiwan during a military exercise in March 1996 intended to intimidate Taiwan on the eve of democratic elections. Moreover, according to Charles Freeman, the former U.S. ambassador to Beijing, a senior People's Liberation Army officer sought to discourage U.S. "interference" with Beijing's goals in Taiwan by leveling a thinly veiled nuclear threat at Los Angeles.[6]

The Growing Threat From Proliferation of Missiles and Weapons of Mass Destruction

The Clinton Administration has acknowledged that the proliferation of nuclear, chemical, and biological weapons and missiles to various regional actors and "rogue regimes" is a serious threat to the United States. For example, in his preface to an April 1996 Office of the Secretary of Defense publication, "Proliferation: Threat and Response," Secretary of Defense William Perry stated: "We received a wake-up call from Saddam Hussein's use of SCUD missiles during Operation Desert Storm and new information on his ambitious nuclear, biological, and chemical weapons programs. The proliferation of these horrific weapons presents a grave and urgent risk to the United States and our citizens, allies, and troops." In addition, a February 1996 White House report, entitled "A National Security Strategy of Engagement and Enlargement," stated that, "Weapons of mass destruction — nuclear, biological, and chemical — along with their associated delivery systems, pose a major threat to our security and that of other friendly nations."

An unclassified March 1995 CIA study, "The Weapons Proliferation Threat," concludes that, "At least 20 countries — nearly half of them in the Middle East and South Asia — already have or may be developing weapons of mass destruction and ballistic missile delivery systems." Nuclear weapon designs, such as those from the Manhattan Project, have been declassified and are readily available. Dual-use technologies and selected components for nuclear weapons are available on international markets. If a country's scientists can acquire the requisite nuclear materials, such as enriched uranium or plutonium, then they can — with little or no strategic warning — achieve a nuclear weapon capability.

Defense experts agree that deterring the use of weapons of mass destruction against the United States, its forces, or its allies will be increasingly difficult in the coming decades, especially given the proliferation of nuclear, chemical, and biological weapons together with missiles and other delivery means. This fact, in turn, makes maintenance of a broad range of superior U.S. military capabilities, including an effective and overwhelming U.S. nuclear deterrent, all the more important. Indeed, national-level guidance on nuclear weapons policy, along with various recent Department of Defense (DOD) and independent studies such as the "Nuclear Posture Review" and the "Nuclear Fail-Safe and Risk Reduction Review," have consistently stated that nuclear weapons will remain critical elements in the U.S. arsenal and will continue to play an important role in assuring the security of the U.S. and its allies, and that the highest standards of nuclear weapons safety, security, control, reliability, and readiness must be maintained. These studies and policy pronouncements serve as the foundation upon which U.S. plans and programs for maintaining a safe and reliable U.S. nuclear stockpile must be built.

Conclusion

The international security environment remains risky and uncertain as serious threats still challenge the United States and its interests**.** Growing concerns over the command and control of Russia's nuclear forces, the technical ability of renegade Russian military elements to launch a missile attack independent of the political leadership, an increasingly revanchist attitude, and a new military doctrine that places greater emphasis on nuclear weapons highlight the importance of maintaining a robust and reliable U.S. nuclear deterrent. Likewise, China's ambitious program of nuclear modernization and the growing proliferation of nuclear weapons technologies and capabilities pose a serious threat to the United States.

It is within this context that decisions taken by the Clinton Administration to promote a zero yield comprehensive nuclear test ban while simultaneously scaling back the nation's nuclear weapons infrastructure and, as a consequence, weakening our ability to assure a viable nuclear deterrent, must be considered.

The Administration's Science-Based Stockpile Stewardship and Management Program (SSMP)

On August 11, 1995, President Clinton issued a major pronouncement regarding U.S. nuclear weapons policy. The President stated: "One of my Administration's highest priorities is to negotiate a Comprehensive Test Ban Treaty (CTBT) to reduce the danger posed by nuclear weapons proliferation. To advance that goal and secure the strongest possible treaty, I am announcing today my decision to seek a zero yield CTBT. A zero yield CTBT would ban any nuclear weapon test explosion or any other nuclear explosion immediately upon entry into force."

With these words, the President overturned decades of U.S. nuclear weapons policy and practice. His decision represented a rejection of the only proven approach to ensuring the safety and reliability of the U.S. nuclear stockpile — nuclear testing — and instead mandated reliance on new technologies, processes, and procedures, many of which have not yet even been developed.

The President's decision to embrace a zero yield CTBT necessitated establishment of the SSMP – a fundamentally new effort to ensure that the nation's nuclear weapons stockpile remains credible. The goals of the SSMP, as described in DOE's, "Draft Programmatic Environmental Impact Statement for Stockpile Stewardship and Management," are to[7]:

- ensure the capabilities for the maintenance, assessment, and certification of the stockpile, including sources of nuclear weapon expertise to provide independent, critical reviews;

- ensure the capability to address the full range of stockpile problems that may arise;

- minimize the risks involved in maintaining the U.S. nuclear stockpile under the constraints of no nuclear testing and no new-design weapons production;

- preserve the essential technical expertise unique to nuclear weapons;

- provide a supply of tritium to replenish the reduction in inventory caused by radioactive decay of tritium in existing weapons;

- support U.S. nonproliferation, arms control, and nuclear weapon-related intelligence efforts;

- provide the ability to reconstitute U.S. nuclear weapon testing and weapon production capacities, should national security so demand in the future.

Risks and Uncertainties

DOE officials acknowledge, however, that the Administration's overall strategy, and the SSMP in particular, entail serious risks and uncertainties. For instance, George Miller, associate director for National Security at Lawrence Livermore National Laboratory, has written that "We should not underestimate the risks involved"[8] in science-based stewardship. According to DOE[9], "There can be no guarantee of complete success in the development of enhanced experimental and computational capabilities" necessary to certify that U.S. nuclear weapons are safe and reliable without

nuclear testing. The basis for these comments and similar expressions of concern voiced by other experts is a recognition that the Administration's SSMP entails unprecedented departures from past practices, the long-term consequences of which are unknown. For instance, the SSMP involves significant downsizing and reorganization of personnel and facilities within the nuclear weapons complex; retaining nuclear weapons in the stockpile well beyond their design life; and relying on new diagnostic and surveillance technologies and processes that have not yet been proven, or in many cases even invented, to certify the safety and reliability of nuclear weapons.

Administration officials readily admit that, in the absence of nuclear testing, current diagnostic technologies and laboratory testing techniques are not good enough to certify the safety and reliability of U.S. nuclear weapons: "In the past, nuclear testing filled the gaps in basic understanding of the complex physics phenomenon; it provided high confidence in the certification of nuclear safety and performance... The existing tools were used in conjunction with nuclear testing and are inadequate if used alone."[10]

Thus, the Clinton Administration's SSMP plan will require the invention of new, sophisticated diagnostic technologies, methods and procedures. The magnitude of these challenges gives a sense of the risks for the U.S. nuclear stockpile under the Administration's plan should scientists fail to develop the required capabilities. For example:

- DOE's "Statement for Stockpile Stewardship and Management" acknowledges that, "Few methods are currently available to study the physics of nuclear weapon secondaries... Without improvements to these capabilities... DOE would lack the ability to evaluate some significant reliability issues, which could adversely affect confidence in the nation's nuclear deterrent";

- the Director of Sandia National Laboratories, C. Paul Robinson, testified before the House National Security Committee on March 12, 1996, that, "the commercially available and laboratory technologies of today are inadequate for the stockpile stewardship tasks we will face in the future. Another hundred-to-thousand-fold increase in capability from hardware and software combined will be required." Furthermore, "Some aspects of nuclear explosive design are still not understood at the level of physical principles," he stated. This statement alone raises questions about whether it is even possible to simulate these particular phenomenon through computer models. Yet, effective computer simulation depends upon a mathematically precise understanding of the physical principles governing the phenomenon being simulated;

- the Director of Los Alamos National Laboratory, Siegfried Hecker, testified on March 12, 1996, that, "In general, future stockpile assessments will require three-dimensional calculations, which in turn need 1,000 times the computing memory and would take 100 years to perform on current machines." Hecker said that implementing the Clinton plan requires developing "computers and their supporting software a ten-thousand-fold more powerful than the largest machines readily available today." The program to develop such capabilities, known as the Accelerated Strategic Computing Initiative (ASCI), must "be accomplished in less than one decade rather than the three decades which would normally be required."[11]

Aside from the issue of whether the complex new technologies and tools required under the SSMP can be developed in time to support critical decisions on the U.S. nuclear stockpile — or whether they can be developed at all — there is the concern, privately voiced by some scientists, that the data to be generated through the SSMP may be unable to identify and fix any problems in the stockpile that may arise. In other words, SSMP-related technologies might not generate the right kind of data and, therefore, these sophisticated physics tools and models perhaps should not be relied upon without empirical results (achievable only through nuclear tests) against which to measure and validate such data. To date DOE has failed to provide a compelling response to these concerns.

Funding Shortfalls, Legal Challenges, and Other Problems

Some of the Clinton Administration's actions are inconsistent with its own SSMP. Although the success of the Administration's plan depends upon adequate, stable funding over the next decade (senior DOE officials have testified that it will cost a minimum of $4 billion per year over the next decade to develop, acquire, maintain, and operate the facilities and tools needed to fulfill SSMP objectives)[12], the DOE budget for SSMP is woefully inadequate. This point was confirmed most recently in DOE's August 26, 1996**,** "Report to Congress on an Integrated Weapons Manufacturing Plan," which describes a $4.5 billion shortfall between fiscal years 1997 and 2002 that DOE acknowledges will preclude it from meeting its programmatic commitments. Secretary of Energy Hazel O'Leary's assurance in the report that additional funding sources "will come from potential savings within the Department of Energy, possible additional user fees, and potential adjustments to discretionary programs in other areas" rings hollow in light of the Administration's track record on such budgetary matters.

Furthermore, the future of some costly SSMP-related construction projects is highly uncertain. For instance, the Administration believes that an important tool in SSMP is the National Ignition Facility (NIF) at Lawrence Livermore National Laboratory. NIF will house a laser to simulate conditions of pressure, temperature, and energy density close to those that occur during a nuclear explosion. This facility

alone will cost over $1 billion and take a decade to construct. Although NIF so far has managed to survive the budget ax, it likely will remain a prime target for cancellation by some in Congress and the Administration.

The Administration also mistakenly assumes DOE will encounter no significant legal challenges or delays in implementing the SSMP — that is, little or no "lag time" has been built into program schedules to take into account possible legal hurdles. However, legal action has already delayed construction of at least one facility that is critical to the SSMP. According to DOE, the Dual Axis Radiographic Hydrodynamic Test (DARHT) facility at Los Alamos National Laboratory is integral to the Administration's plan for maintaining the stockpile. When complete, DAHRT will obtain diagnostic information on the behavior of nuclear weapon primaries and evaluate the effects of aging on nuclear weapons. Yet, construction of this crucial facility was delayed for well over a year by a federal court order because of environmental documentation concerns raised by anti-nuclear activists. Although work on DAHRT has now resumed, the project is significantly behind schedule, thus calling into question its ability to provide data in time to support critical decisions on the safety and reliability of the U.S. nuclear stockpile. It is reasonable to expect that anti-nuclear activists will continue to issue legal challenges to various aspects of the Administration's SSMP, resulting in further programmatic delays.

Failure to Conduct Important Stewardship-Related Experiments

DOE has canceled or delayed important stockpile stewardship-related experiments, apparently for political reasons. An example is Secretary O'Leary's September 10, 1996, decision to postpone important, "subcritical" nuclear weapons explosive tests at the Nevada Test Site due to alleged "environmental concerns." Subcritical experiments are useful in validating the hydrodynamic properties of weapons materials such as plutonium that may have to be produced through different manufacturing processes in the future, compared to the manner in which they have been produced for the existing stockpile (for example, the historical wrought versus the new cast plutonium process for fabrication of the weapon primary — the "pit"). Such experiments are important in the process of verifying the safety and reliability of remanufactured or aging nuclear weapons.

This marks the second time in recent months that such tests were delayed by DOE. On June 17, 1996, DOE postponed a subcritical experiment involving scientists from Lawrence Livermore National Laboratory at the Nevada Test Site. On the same day, DOE announced plans to eliminate 600 jobs at Lawrence Livermore, the second major layoff in two years from one of the laboratories that is responsible for implementing the Administration's SSMP. Bruce Hall, who manages Greenpeace's anti-nuclear campaign, remarked that the decision to cancel the test "shows that Clinton is serious about getting this test ban and that he puts the Comprehensive Test Ban Treaty as a priority above the priorities of the nuclear weapons scientists."[13] According to a DOE official quoted in a September 10, 1996, *Dow Jones News-Service* report, the decision to postpone these experiments was based on Secretary O'Leary's desire not to "violate the 'spirit' of the just-endorsed Comprehensive Test Ban Treaty." The Secretary's apparent belief that sustaining the diplomatic atmospherics surrounding the CTBT is more important than taking tangible steps to preserve and protect America's nuclear deterrent speaks volumes about the Clinton Administration's priorities.

Conclusion

The SSMP entails significant technological risks and uncertainties. Funding shortfalls, legal challenges, political considerations and other problems are almost certain to continue to impede progress in achieving the SSMP's ambitious goals and raise serious doubts about the ability of the SSMP to serve as an effective substitute for nuclear testing. They also raise serious doubts about the Clinton Administration's commitment to implementing the SSMP and, more broadly, to maintaining a safe, reliable, and effective nuclear deterrent.

Surveillance and Testing of the Current Nuclear Stockpile

For deterrence to work, America's potential adversaries must perceive U.S. nuclear forces as credible. And to be credible, U.S. nuclear weapons must be shown to be safe and reliable. Yet, the Clinton Administration has been seriously negligent in maintaining the current nuclear stockpile—it has failed to perform standard non-nuclear flight tests, non-nuclear systems tests, and laboratory tests of nuclear and non-nuclear components that are necessary to assure weapons safety and reliability. Failure to perform such routine tests raises further questions concerning the Administration's commitment to effectively managing the U.S. nuclear stockpile.

The Clinton Administration has been seriously negligent in maintaining the current nuclear stockpile.

Under the SSMP, maintaining nuclear weapons in the stockpile beyond their planned service life will be necessary because the Administration has decided that no new-design

nuclear warhead production will occur. According to DOE's "Statement for Stockpile Stewardship and Management":

> Until recently there has been no reason to expect that weapons would remain in the stockpile longer than they have in the past. Continuous modernization to improve safety and reliability kept the stockpile young as new weapon types replaced old ones. Now, with no new weapons being produced, the United States will have a steadily aging stockpile. The average age of the stockpile has never approached the typical lifetime specified in the weapon requirements (approximately 20 years for the most modern U.S. nuclear weapons). The average age of the stockpile is currently about 13 years...and will reach the 20-year mark by 2005, at which time the oldest weapons will be about 35 years old.

DOE's "Statement for Stockpile Stewardship and Management" acknowledges that "complex problems...are likely to occur in an aging stockpile," and "the planned stockpile contains different materials than the stockpile of the past, and the aging characteristics of some of these materials are not well understood." Robinson has testified to Congress that "Unfortunately, we do not possess sufficient data on how reliability declines as systems get older than about 20 years." Ensuring "that systems remain reliable and safe for decades beyond their designed service lives," is, according to the Sandia Director, "a daunting task."

"The smaller, less diverse U.S. stockpile will be more vulnerable to single-component and common-cause failures," according to DOE's "Statement for Stockpile Stewardship and Management." And, as noted in an August 1996 article in the journal *Science and Technology* published by Lawrence Livermore National Laboratory, "It seems likely that problems will arise over the next few years. Of the nuclear weapon systems introduced into the U.S. stockpile since 1970, nearly half have required post-development nuclear testing to verify whether a problem existed, or to resolve or fix ones relating to safety or reliability."

Given these concerns, one might reasonably expect the Administration to increase efforts to monitor and test weapons in the current stockpile to determine whether or how aging problems have impacted the safety and reliability of those weapons. In fact, however DOD and DOE are significantly behind schedule in carrying out certain activities to help detect and diagnose weapons aging-related problems. For example, DOD has reduced the pace and scale of strategic missile (ICBM and SLBM) flight testing. The importance to the reliability of the stockpile of a rigorous flight test program was underscored in testimony by Robinson before the House National Security Committee on March 12, 1996:

> From a study of historical warhead data we find that approximately 22 percent of the defects discovered in tests are flight-unique; that is, if we don't do flight tests we will likely not see that portion of defects within the system... The credibility of reliability testing diminishes as the number of flight tests decreases. Erosion of credibility in our reliability testing program is serious, and would directly undercut maintenance of confidence in the stockpile.

A March 13, 1996, GAO study, "Nuclear Weapons: Status of DOE's Nuclear Stockpile Surveillance Program," concludes that "DOE has not conducted all the tests it believes are necessary to ensure the reliability of the nuclear weapons in the stockpile. For some types of weapons, the tests are far behind schedule and DOE's confidence in the reliability of those weapons is diminished... Although DOE plans to get some tests back on schedule within a few years, other tests will not be back on schedule for the foreseeable future."[14] Other key findings in the GAO report include:

- "As of February 29, 1996, three of the nine types of weapons that were scheduled to be tested were more than 33 percent below the number of flight tests considered necessary to meet DOE's standard. These weapons are considered 'red-flagged'... when a weapon is red-flagged, it means that DOE is concerned with the accuracy of the reliability level assigned to that weapon type...";

- red-flagged weapons include those for the Trident II SLBM and the Minuteman III ICBM, weapons that are mainstays of the U.S. nuclear deterrent today and on which the U.S. will become even more dependent under START II: "The W62, a warhead used by the Air Force on the Minuteman III missile, has been flight tested only six times over the past 4 years. The W78, also used on the Minuteman III missile, is also below the red-flag limit. Only seven W78s have been flight tested during the past 4 years. The third weapon below the red-flag limit is the W88. The W88 is a warhead used by the Navy on the Trident II missile. Only three W88 stockpile flight tests have been conducted over the past four years";

- "One of the nine weapon types is considered to be below the red-flag limit for systems laboratory tests. Three other weapons types did not have all scheduled systems laboratory tests performed, but were above the red-flag limit. The W88 is the red-flagged weapon type";

- nuclear component laboratory tests have been delayed: "...the five key components tested are the pit, the secondary, the detonator assembly, the high explosives, and the gas transfer system... Testing of four of these nuclear package components has been behind schedule in recent years. Only testing of high explosives has been conducted on schedule";

- "Responsibility for testing detonator assemblies was moved to DOE's Los Alamos and Lawrence Livermore laboratories. Both laboratories are scheduled to begin testing

detonator assemblies later this year. In the meantime, a 12-year backlog of detonator assemblies exists."

Particularly disturbing is GAO's finding that the most neglected weapon is the W88 — red-flagged for both insufficient flight tests and laboratory tests — which is arguably the most important weapons in the reduced U.S. nuclear stockpile. The W88 is one of the warheads on the Trident II SLBM, which is expected to be the backbone of the future U.S. nuclear deterrent under START II.

GAO also concluded that shortfalls in laboratory testing of nuclear weapons are a direct result of the Clinton Administration's restructuring of the U.S. nuclear weapons complex. In several cases, the receiving sites have been unprepared to perform their new testing functions.

During fiscal year 1997, DOE plans to initiate an Enhanced Surveillance Program to evaluate the effects of aging on nuclear weapons components by developing predictive models for the reliability of aged systems. This program, DOE believes, is a necessary precursor to demonstrating the capability to refurbish the stockpile as components reach the end of their useful service life. However, as with many other elements of the Administration's SSMP, the Enhanced Surveillance Program is not expected to yield results for several years.

Conclusion

Negligence in performing traditional, non-nuclear tests (including strategic missile flight tests) that have been long established as indispensable means for assessing the safety and reliability of the stockpile raises further serious doubts about the Clinton Administration's commitment to maintaining a credible nuclear stockpile.

Nuclear Production/Manufacturing Infrastructure Issues

To date, the Clinton Administration's record of nuclear stockpile stewardship has entailed unprecedented reductions and disruptive reorganizations in the scientific and industrial base that has developed and maintained the U.S. nuclear deterrent over the past fifty years. Radical downsizing and reorganization of personnel and facilities has not occurred selectively or been isolated to plants scheduled for closure, but instead has occurred almost across the board. In particular, these cuts have adversely affected the nuclear weapons production sites and associated manufacturing infrastructure that must, by definition, play a vital role in implementing the Administration's SSMP.

Closures and downsizing of plants has sacrificed much of the industrial means that sustained the U.S. nuclear deterrent through the Cold War.

Critical manufacturing capabilities needed to maintain a safe and reliable nuclear weapons stockpile include:

- the processing and production of nuclear materials used in the weapons, such as tritium and plutonium;
- fabrication of certain non-nuclear components;
- the assembly and disassembly of weapons;
- testing weapons and components.

These capabilities currently reside primarily at the four remaining DOE nuclear production/manufacturing plants: the Savannah River Site, South Carolina; the Pantex Plant, Texas; the Oak Ridge Reservation, Tennessee; and the Kansas City Plant, Missouri.

Downsizing the Complex

DOE recently ceased nuclear-related production and manufacturing activities at three facilities — Rocky Flats, Colorado; Mound, Ohio; and Pinellas, Florida — and eliminated several thousand jobs in the process. Having ceased operations in 1989 and officially closed in 1992, Rocky Flats had produced trigger systems, reservoirs, procured specialty metals for the weapons complex, and monitored the safety and reliability of stockpile triggers since 1953. Since 1948, the Mound Plant had made detonators and specialty subsystems until these activities were halted in 1994. From 1957 until 1994, Pinellas had produced neutron generators, thermal batteries, and other related components. These facilities were closed before other facilities were prepared to assume their workload. The result has been "the chaotic transference of missions and processes," in the words of a senior scientist at one nuclear weapons laboratory. This confused transfer of missions has affected both production of replacement maintenance parts and stockpile surveillance testing. Some of the sites that took over these missions are still struggling to re-establish these "lost" capabilities.

A smaller stockpile and reduced production activities should permit some consolidation of facilities and assets. However, the manner by which DOE is executing this downsizing has created risks such as:

- many of the stockpile surveillance tests, described earlier and found wanting in GAO's "Nuclear Weapons: Status of DOE's Nuclear Stockpile Surveillance Program", have not been performed because the receiver plants do not yet have appropriate and/or operational facilities;

- closure of plants and downsizing of personnel has forced many of the most experienced and knowledgeable employees to retire, meaning that they will not be available to mentor the next generation of nuclear scientists, engineers, and technicians;

- moving production operations to the laboratories could weaken the laboratories' historical emphasis on scientific research and development as production discipline and culture may prove incompatible with laboratory culture;

- insufficient funding for production plant recapitalization and for retaining and recruiting expertise at the plants could increase costs, pose safety concerns, and delay schedules.

The Clinton Administration's stated reason for dramatically downsizing the nation's nuclear complex is to consolidate nuclear weapons production and surveillance at fewer sites. But some DOE officials appear to have taken consolidation efforts to dangerous extremes. One consolidation option proposed by DOE is to relocate most or all nuclear weapons production and certification functions from the production plants to the nuclear weapons laboratories and the Nevada Test Site.[15] Although DOE officials assert that this option is no longer favored, DOE has yet to issue a formal Record of Decision (ROD) for the SSMP Environmental Impact Statement, which will reflect the final decision made by the Administration on which facilities are to assume particular missions. Until the ROD is released, the Administration's long-term plans for the production sites and manufacturing infrastructure remain a mystery. This uncertainty, in turn, has led to unnecessary and counterproductive tension between the plants and the laboratories, when in fact both are critical to ensuring a safe and reliable U.S. nuclear stockpile.

According to DOE sources, release of the ROD has allegedly been withheld twice for political reasons: the first delay was meant to avoid upsetting delicate "endgame" negotiations on a CTBT in the Conference on Disarmament in Geneva, while the second, more recent delay was attributed to a desire to avoid bad news for the President's re-election campaign by announcing further layoffs at DOE sites in "battleground states" on the eve of the election.

Recapitalization

Maintaining sufficient production capacity of nuclear and non-nuclear weapon components is critical to sustaining the stockpile over the long-term. By themselves, new diagnostic and computational tools will be inadequate. Replacement components also must be produced and weapon service life-extension programs (SLEPs) must be implemented in a timely manner. Yet today the nuclear weapons production plants, where many critical components are manufactured and SLEPs are performed, are severely hampered by old equipment, inadequate maintenance, and deferred investment. Karen K. Clegg, President of Allied Signal Federal Manufacturing and Technologies, which manages DOE's weapon component manufacturing plant at Kansas City, Missouri, echoed an oft-repeated lament in testimony before the Senate Armed Services Committee on March 13, 1996. Clegg stated that under DOE's plan, "there will be insufficient future funding available to recapitalize our process lines and keep our reconfigured plant current with the modern manufacturing capabilities that our products demand."[16]

Examples of antiquated production machinery and manufacturing processes abound. The Pantex Plant has aging power plants, corroding fire main lines, and major roof leaks in need of replacement or repair. The Y-12 Plant at the Oak Ridge Reservation still uses some archaic PDP-11 computers from the early 1980s for a range of diverse tasks — computers that are so old that the manufacturer no longer supports them. The Kansas City Plant has five heat treatment furnaces more than thirty-five years old, a hydroform press (for forming sheet metal for nuclear weapon components) that is thirty years old, as well as some obsolete PDP-11 and PDP-8 computers. At the Savannah River Site, several critical ventilation systems, installed in the late 1950s during initial construction of some of the still-operational tritium facilities, are in need of replacement or repair, tritium production reactors are obsolete and being dismantled, while the still operating chemical separation canyons for refining plutonium are over forty years old and milling machines used in the tritium reservoir reclamation operation are almost thirty years old and must be replaced.

Insufficient attention to maintaining a viable nuclear production capability and manufacturing infrastructure at the four DOE plants will have adverse consequences. Deferred maintenance and old equipment pose safety risks, increase costs, and result in frequent breakdowns that idle the workforce and delay schedules.

Despite the benefits that would accrue from even a modest investment in recapitalizing the production sites and manufacturing infrastructure, DOE has refused to allocate adequate resources for this purpose. Instead, the 104th Congress was forced to provide additional resources to the plants as part of a major initiative to begin recapitalization and modernization of the nuclear production sites and manufacturing infrastructure. Over $100 million was authorized and appropriated for plant modernization in Section 3137 of the National Defense Authorization Act for Fiscal Year 1996 (Public Law 104-106) and in the Energy and Water Development Appropriations Act for Fiscal Year 1996 (Public Law 104-46). Unfortunately, DOE diverted a significant percentage of these funds and did not apply them to long overdue recapitalization at the plants. An additional $80 million was authorized and appropriated in fiscal year 1997 to continue this important initiative.[17]

Tritium Production

U.S. nuclear weapons require tritium, a radioactive gas, to achieve their explosive yield.[18] Without tritium, U.S. nuclear warheads would produce only a small fraction of their design yield and, therefore, would likely be unable to meet specific military requirements established by DOD. In the decades since the reactors that produce tritium began operation at the Savannah River Site, DOE and its predecessor (the Atomic Energy Commission) have spent billions of dollars on these facilities only to close them. Tritium has not been produced in the United States since 1988, when the K Reactor at Savannah River Site was shut down.

In the "1996-2001 Nuclear Weapons Stockpile Plan" issued earlier this year, the President directed that DOE must be capable of fully supporting U.S. nuclear forces at the higher, START I level until START II is ratified and implemented. This in turn requires that a new tritium production source be available by 2005. This schedule represents a significant acceleration from DOE's original plan for producing tritium, which was predicated on START II force levels and would not have achieved a new tritium production source until 2011. However, the Russian Duma's refusal to ratify START II has called DOE's plan into question. To meet immediate stockpile needs, DOE is currently recycling tritium recovered from dismantled weapons.

After being criticized by the 104th Congress for failing to provide a new tritium source that would meet national requirements, Secretary O'Leary announced a new plan in December 1995. DOE's so-called "dual-track strategy" directed that only two technological approaches to future tritium production would be given further consideration: building a linear accelerator-based system or purchasing irradiation services from a commercial light water reactor (CLWR). DOE studied, but rejected, other options including a multipurpose reactor that could burn excess weapons plutonium, produce tritium, and generate electricity (which is possible with many existing or new reactors); existing DOE reactors; and purchasing tritium from foreign sources.

DOE asserts that both the accelerator production of tritium (APT) or CLWR options can be implemented in time to meet the stockpile tritium requirements. For the next three years, DOE plans to develop the technology associated with both options, at which time a preferred approach will be selected. The option not chosen as the preferred approach, if proven feasible, will be established as an "assured backup" or contingency capability. DOE has reported that the APT option would provide a new tritium supply by fiscal year 2007, while the CLWR option could supply new tritium by fiscal year 2005. In the event the APT option is chosen as the preferred approach and new tritium is needed before fiscal year 2007, it could be produced in commercial reactors in the interim—although not without controversy.

Despite the Administration's rhetorical commitment to producing tritium on an accelerated timeline, DOE's record of failing to make difficult decisions does not inspire confidence that the more ambitious schedule will be met. Furthermore, the Administration's budget requests for tritium have been inadequate; DOE underfunded the tritium program by $25 million in its fiscal year 1996 budget submission and by $60 million in its fiscal year 1997 budget submission.

Likewise, there are significant risks and uncertainties associated with the Administration's plan. In an October 1, 1996, "Report to Congress on the Administration's Tritium Production Program," DOE acknowledges that "each approach has significant cost uncertainties, the accelerator has technical uncertainty, and the [commercial light water] reactor option faces policy, legal, and regulatory issues that could delay or even block implementation." While the APT option entails significant technical and engineering challenges, the CLWR approach faces certain other, unique challenges. Using CLWRs for tritium production assumes that surplus electrical power will be generated for civilian consumption while tritium is being produced. This raises traditionally thorny issues regarding the separation of civil and military applications of nuclear facilities. Nonetheless, DOE cost estimates indicate that the CLWR option is far less expensive than the APT option. Between fiscal years 1996-2007, the CLWR is estimated to cost $500 million for irradiation services without purchasing a reactor and $2.4 billion if purchase of a reactor is required, whereas the APT option is anticipated to cost $4.9 billion over the same period.

Section 3133 of the National Defense Authorization Act for Fiscal Year 1997 (Public Law 104-201), criticizes DOE's failure to develop a technically sound data base sufficient to select a preferred tritium production option and its continued under-funding of this program. The legislation directed the Secretary of Energy to make a final decision during fiscal year 1997 on the technologies to be utilized, and the accelerated schedule to be adopted, for tritium production in accordance with the requirements specified in the "1996-2001 Nuclear Weapons Stockpile Plan". It also directed the Department to initiate site preparation for a new tritium production facility and to develop and test new tritium target rods for the CLWR program option. Finally, Congress approved an additional $60 million for tritium production-related activities in fiscal year 1997 in order to fully fund the underfunded program.

The fact remains, however, that the United States today has no means of producing tritium. If the Administration delays much longer in acquiring an affordable means of producing tritium, confidence in the stockpile will erode along with the credibility of the U.S. nuclear deterrent.

Plutonium "Pit" Fabrication

With the 1989 shutdown of plutonium production capabilities at Building 707 at the Rocky Flats facility, the United States terminated its ability to mass produce critical plutonium components ("pits") for new or redesigned weapons. Plutonium is the fuel contained in a nuclear weapon that undergoes fissioning to achieve explosive yield in an atomic weapon, or in the "trigger" or "primary" of a fusion weapon.

Under the Clinton Administration's SSMP, Los Alamos National Laboratory personnel will, following modifications to the Laboratory's TA-55 facility, perform pit fabrication. This is a new mission for Los Alamos, which has not been responsible for large-scale production of nuclear weapon components for the U.S. stockpile since the early days of the Cold War. Originally designed to support fabrication of unique, prototype weapons and to conduct advanced weapons and scientific research, Los Alamos is not now capable of mass producing pits.

DOE plans to modify the TA-55 facility so that it will be able to produce a minimal number of pits — approximately 50 per year — by 2003. The Clinton Administration asserts that such a pit fabrication rate will support U.S. national security requirements. However, the Administration's plan assumes that both the United States and Russia will be operating under the numerical ceilings on weapons contained in the START II Treaty — a questionable proposition given the Russian Duma's refusal to ratify START II. Furthermore, such a limited pit production capability is likely to be insufficient in the event of either a sharply deteriorating international security environment or the appearance of unexpected problems in the U.S. nuclear stockpile. Also, the TA-55 facility will not have the capacity to rapidly replace large numbers of pits if a design defect is discovered or an aging-related problem occurs that effects all warheads of a given type. Since the future U.S. nuclear stockpile will be more uniform, having fewer design types than at present, the ability to maintain a credible nuclear deterrent will necessitate having the capacity to quickly correct defects that pose safety or reliability problems.

If U.S. decision-makers promulgate a requirement to rapidly produce large numbers of new nuclear weapons or redesign existing weapons in the years ahead, the U.S. would have to rely on reusing old pits. The idea of reusing old pits is relatively new and much still remains to be learned. Although reusing old pits may be feasible under certain circumstances, having confidence in a new or modified weapon design that relies on a reused pit would probably require one or more nuclear tests. To date, the U.S. has not incorporated a reused pit into the nuclear stockpile.

Because of concerns about the adequacy of the Department's plan for producing plutonium pits, the 104th Congress was forced to take remedial actions. Section 3131 of the National Defense Authorization Act for Fiscal Year 1997 (Public Law 104-201) provided an additional $85 million for various SSMP-related activities, including accelerating the capability to produce prototype plutonium pits. Section 3151 of P.L. 104-201 directed the Secretary of Energy to prepare a baseline report on DOE's plans for producing and remanufacturing plutonium pits in the future, taking into account the need for capacity to expand pit production beyond the currently-planned 50 per year production rate at Los Alamos National Laboratory's TA-55 facility. It is worth noting that Russia and the PRC retain the capacity for large-scale plutonium pit production. Indeed, Russia recently announced its intention to continue developing advanced design nuclear weapons, which will require the capacity to produce additional pits as well as the capacity to design and produce pits of new configuration.[19]

Conclusion

The net impact of Clinton Administration policies on the nuclear weapons industrial and scientific base will not be known for perhaps another decade, when the consequences of decisions made today will come to fruition. However, the trends already evident are not encouraging. Closures and downsizing of plants has, predictably, sacrificed much of the industrial means that sustained the U.S. nuclear deterrent through the Cold War. What is left is not a small-scale version of the earlier nuclear weapons industrial base, appropriately sized for the post-Cold War world, but an infrastructure with vital capabilities missing. The Clinton Administration has so far concentrated on dismantling and downsizing the U.S. nuclear weapons infrastructure while asserting that it will eventually fix what it has broken in order to leave a legacy of a more efficient, less costly nuclear complex. In the meantime, however, the Administration is downsizing the very personnel and facilities that are supposed to implement its SSMP. Unless the United States invests in recapitalization of the nuclear production plants and reacquires the capability to produce tritium and plutonium pits, the current Administration's current course will inevitably result in what one observer has termed "unilateral structural disarmament."

Workforce/Personnel Issues

Yet another critical element of the nation's nuclear complex at risk is the unique and highly skilled workforce at the weapons laboratories and the production plants. The ability to maintain a credible nuclear deterrent is dependent upon maintaining a cadre of skilled, experienced personnel to perform critical stockpile stewardship and management missions, including:

- maintaining the capability to design, fabricate, and certify new weapons;

- monitoring and assessing the reliability of the stockpile;

- safely assembling and disassembling old and excess weapons;

- remanufacturing limited-life and aging weapon components;

- maintaining the capability to resume nuclear testing.

The downsizing of DOE facilities and associated personnel reductions under the Clinton Administration have created a serious deficiency in the nuclear work force. Scientists providing technical support to core nuclear weapons research and development activities, crucial for stockpile stewardship, have been particularly hard hit by reductions. For example, at Lawrence Livermore National Laboratory, the number of scientists supporting nuclear weapons research and development has declined from a 1987 peak of 1,800 personnel to 800 personnel in 1995. In 1995, Lawrence Livermore National Laboratory could afford only 15 new hires into nuclear weapons research and development.

A December 1995 study by Lawrence Livermore National Laboratory, **"**Nuclear Weapons Personnel at Lawrence Livermore National Laboratory: A Demographic Analysis", highlighted the issue of declining personnel and other problems afflicting all of the weapons laboratories. Some of the key conclusions of the report were:[20]

- "Over a ten-year period, an average recruiting rate of about 140 per year into the weapons-supporting divisions (with half of these doing weapons work) will be required to maintain 1995 staffing levels....Unfortunately, lack of budgetary support in FY95 had a bigger impact on personnel availability than retirements or recruiting difficulties....Only 15 career hires were made into the entire set of weapons supporting divisions in FY95, and on average we might expect only half of these to be recruited for weapons tasks";

- "The lack of nuclear testing opportunities over the past decade (with none since 1992) has prevented younger designers from acquiring the broad range of expertise common to the previous generation";

- "In recent years retirements have far outstripped recruitments, yet it has not been feasible to increase recruiting efforts significantly in the face of continuing budget reductions. At Lawrence Livermore National Laboratory there was a net loss of 548 career scientists, engineers, and skilled technicians in the weapon supporting divisions in FY93-94."

The Lawrence Livermore report concluded "that the laboratories have serious concerns about their ability to maintain U.S. capability in nuclear weapons research, and to maintain the skilled workforce necessary for this work."

Robinson observed that the Administration's stockpile management policy means that maintenance of U.S. nuclear weapons will ultimately depend upon scientists and engineers who have never designed and built a real nuclear weapon:

> During the Cold War a continuous stream of new weapon development programs permitted us to continuously exercise and improve our capabilities. When problems were encountered in the stockpile, we had experienced designers on hand with the skills to fix them. However, in the future, the engineers who will perform stockpile support and stockpile extension programs will not have had original weapon system design experience.[21]

U.S. nuclear weapons will eventually need to be replaced "at some point in the first half of the next century," Robinson said, and "the engineers and scientists who will do that work are probably entering kindergarten this year. No old-timers will be around in 2025 who have had actual experience in designing a warhead." Robinson argues that these future engineers "need to work on real systems. We cannot expect them to acquire critical design skills merely by performing piecemeal component replacement and development simulations."

Robinson also cautioned that the Administration's SSMP could deprive future engineers of the opportunity to work with experienced weapon engineers, contrary to training that will be available for Russian engineers: "Ideally, we would like to train our junior weapon design engineers alongside experienced engineers, but this will not be possible during a decades-long hiatus of no weapon development. The Russian laboratories, by contrast will be able to pass along their critical weapon design skills to a new generation under their announced plans to rebuild thousands of weapons each year."

These personnel trends and concerns are also evident at the nation's nuclear weapons production plants. Sufficient numbers of well-trained and highly motivated engineers, technicians, and laborers are critical to maintaining the safety and reliability of the U.S. nuclear stockpile. Yet many of the engineers who are most experienced at performing stockpile management functions have been let go from the production plants. Their unique expertise will continue to be lost as the plants are further downsized under the Administration's SSMP. A highly skilled workforce possessing irreplaceable experience in producing limited-life and other components, as well as assembling and disassembling weapons is being lost.

"These trends present significant challenges to our ability to maintain the nation's nuclear weapons stockpile. Without careful and continuing management attention, our ability to ensure the safety and reliability of our weapons systems may decline in the future," Clegg testified to the Senate Armed Services Committee on March 13, 1996. Clegg described

attrition rates at the Kansas City plant that will reduce the workforce by over half in 1997, and perhaps by nearly two-thirds by 2003:

> Over the past five years, the Kansas City plant has been significantly downsized due to budget pressures and a reduced workload…In 1990, over 6,800 people worked at the Kansas City plant; by 1997 about 3,300 will be employed. The Department of Energy recently released its [draft SSMP] environmental impact statement which could further reduce our total plant population to approximately 2,400 by 2003.

Clegg further warned that DOE's Kansas City facility will not have a large enough workforce to support a U.S. nuclear stockpile at the START I level and, therefore, will not be able to meet current policy guidelines: "The facilities and equipment will be sized to support a stockpile at the START I level, but will be staffed to support a stockpile at the START II level."

These personnel deficiencies in the Administration's SSMP have long been recognized by the Defense Nuclear Facilities Safety Board (in Recommendation 93-6 to the Secretary of Energy) and the Congressional Research Service which published its own review of demographic trends at the laboratories in 1994.[22] Congress also recognized this problem and has taken steps to address it. Section 3131 of the National Defense Authorization Act for Fiscal Year 1995 (Public Law 103-337) and Section 3140 of the National Defense Authorization Act for Fiscal Year 1996 (Public Law 104-106) authorized funds to establish fellowship programs that would provide educational and research assistance to attract scientists and engineers with the skills most relevant to laboratory and plant mission requirements. Unfortunately, DOE has done nothing to address this "brain drain" problem. Indeed, DOE has failed to spend the funds earmarked for these fellowship programs.

Conclusion

The sacrificing of uniquely talented people is perhaps the most injurious consequence of the Clinton Administration's approach to stewardship of the U.S. nuclear stockpile. Thousands of scientists, engineers, and technicians with irreplaceable experience have been forced to retire or let go. These are the men and women who made and maintained a viable U.S. nuclear deterrent for decades. Their premature departure precludes them from mentoring the next generation, the workers who will be responsible for maintaining the U.S. nuclear deterrent without nuclear testing in the 21st century. The Clinton Administration's SSMP's success depends on talented human resources — the very resource they have most neglected.

Compelling Arguments Against a Comprehensive Test Ban Treaty (CTBT)

The Clinton Administration's SSMP is driven by, and subordinate to, its support for a CTBT. Yet, the President's September 24, 1996, signing of the CTBT raises formidable technical obstacles to maintaining a safe and reliable nuclear deterrent and ignores the compelling arguments against ending explosive nuclear testing. Although President Clinton supposedly has devised a number of "safeguards" to protect the U.S. from problems that could arise under a CTBT, the Administration's track record to date does not inspire confidence that these safeguards would ever be implemented.

CTBT No Bar to Proliferation

The CTBT is, in fact, no bar to nuclear proliferation and the expansion of nuclear threats. In fact, it is widely known that simple nuclear weapons can be designed without testing, as has been done by the United States and several other declared and undeclared nuclear states. North Korea, Pakistan, South Africa, and Israel all acquired nuclear weapons without nuclear testing. Israel, according to defector Mordecai Vanunu, who had inside knowledge of Israel's nuclear weapons program, has been able to develop reasonably sophisticated nuclear weapons and warhead miniaturization technologies without nuclear testing. North Korea has probably acquired at least one nuclear bomb, and is working on long-range missile delivery systems, at the same time that the United States has been faithfully observing its self-imposed nuclear testing moratorium in the hope of discouraging such programs. Investigations of Iraq's nuclear weapons program after Operation Desert Storm further indicate that nuclear testing is not required to develop weapons.

The President's signing of the CTBT raises formidable technical obstacles to maintaining a safe and reliable nuclear deterrent and ignores the compelling arguments against ending explosive nuclear testing.

U.S. experts have noted that a CTBT is unlikely to ever be verifiable. Low yield tests, which are useful for nuclear weapon design and development, cannot be detected with confidence by U.S. national technical means. Kathleen Bailey, an expert on proliferation issues at Lawrence Livermore National Laboratory, notes that a test ban cannot be verified below approximately one kiloton. With efforts by the testing nation to seismically decouple or hide the signal in other seismic signals, the size weapon to be tested could be increased substantially with little or no risk of discovery.

Furthermore, countries intent on cheating could identify and implement denial and deception measures that would make it virtually impossible for U.S. sensors to detect low yield tests. Secretary of Defense William J. Perry reported in 1996 that Russia, officially a CTBT supporter, may have violated its own moratorium and conducted a nuclear test. Russian clandestine measures at the test site may have thwarted U.S. capabilities to establish definitively that a test occurred. This bodes ill for Russia's reliability as a CTBT party and hints that Moscow may be preparing to be able to violate the CTBT.

Safeguards and the Administration's Track Record

In announcing his decision to support a zero yield CTBT, President Clinton issued a number of so-called "safeguards" on which U.S. acceptance of a CTBT is formally conditioned. Among the safeguards was the conduct of an effective SSMP, the maintenance of the human scientific resources on which SSMP depends, and retention of a capability to resume nuclear testing should the United States cease to be bound by the Treaty. The President also pledged that if other nations conducted nuclear tests or if U.S. "supreme national interests" were threatened by a problem in the U.S. nuclear stockpile that required testing to rectify, the United States would resume nuclear testing.

Previous sections of this report noted the risks, uncertainties, and other impediments that could preclude accomplishment of the ambitious goals of the SSMP and call into question the President's commitment to fulfilling his own safeguards.

The issue of permitted and prohibited activities under the CTBT raises additional concerns and questions about whether the CTBT undermines the Administration's safeguards. In testimony before the House National Security Committee on March 12, 1996, Robinson cautioned that stockpile stewardship without nuclear testing depends upon the conduct of experiments involving inertial confinement fusion (ICF):

> Some would have the United States take the extreme position that inertial confinement fusion is incompatible with zero-yield policy. This contention has been thoroughly studied in the past and found to be without merit. The yields of ICF are so small that they fall well within the intent of a zero yield policy, and they certainly do not present a proliferation threat. Further restrictions on ICF are not at all necessary for the purposes of the testing treaty....If the ICF language of the 1975 Non-Proliferation Treaty were to be carried over to a Comprehensive Test Ban Treaty, some of the high-energy simulators the laboratories use today to simulate a variety of radiation conditions, and some that will be needed in the future, will have to be abandoned.

"Such restrictions were not part of the laboratory directors' understanding when we told the President we could perform our missions without underground nuclear testing," Robinson testified. "Our clear expectation was that further limitations would not be placed on our ability to employ the various approaches to inertial confinement fusion in support of the stockpile stewardship efforts. In my view, it is essential that inertial confinement fusion be permitted under a CTBT without such restrictions."

The possibility that ICF activities might be prohibited altogether by the Administration raises further concerns about the Administration's commitment to stewardship, and about whether the United States will eventually lose its ability to sustain a safe and reliable nuclear stockpile under a CTBT.

Finally, despite numerous nuclear tests conducted by other nations during the U.S. testing moratorium, the Clinton Administration did not fulfill its promise to direct DOE to resume testing or consult with Congress about a resumption of tests. Given the Administration's poor track record in conducting standard non-nuclear tests, and in failing to commit adequate resources to implement its own SSMP, the Clinton Administration's promise to resume nuclear testing in an emergency remains highly circumspect. Indeed, as a cost saving measure, DOE has allowed U.S. preparation time required to resume nuclear testing to lengthen from six months to three years.

Conclusion

The end of the Cold War has provided the U.S. with an opportunity to draw down domestic defenses in a manner consistent with a clear and concise national defense strategy reflecting the changed international environment. First and foremost, however, there should be recognition that the world remains a dangerous place. The proliferation of nuclear weapons technology is an increasing threat. Russia and China are potentially unstable regimes with geopolitical interests often inconsistent with those of the United States – interests that may well pose a clear and present nuclear danger.

As long as other nations covet or control nuclear weapons or other weapons of mass destruction, the U.S. must retain a credible nuclear deterrent. Our friends and allies must continue to have confidence in the security provided by U.S. nuclear forces.

Whether supporting a force of 20,000 or 3,500 warheads, there are unavoidable responsibilities associated with maintaining a credible nuclear stockpile. Both the Congress and the Administration have an obligation to ensure that those responsibilities are met. However, actions taken by the

Administration over the past four years call into serious question its willingness to step up to those responsibilities.

Over the last half century, U.S. nuclear weapons have evolved into highly sophisticated systems developed, produced, and maintained to meet U.S. national security challenges. These weapons require maintenance, logistical support, and testing — both nuclear and non-nuclear— commensurate with their complexity if they are to continue to serve as reliable, safe, and effective components of U.S. national security.

Without nuclear testing, new, safe, secure, reliable, and less complex nuclear weapons cannot be developed and produced. Without nuclear testing, whether or not the U.S. can maintain existing nuclear weapons with a high degree of confidence in the future has become a dangerously open question for the first time in more than fifty years.

[1] John B. Stewart, Jr., "Rethinking the Unthinkable: Russia's Evolving Nuclear Weapons Threat" (Washington, D.C.: The George C. Marshall Institute, 1996).
[2] Richard F. Starr, "Boris's Belligerent Backers," *The Wall Street Journal* (12 June 1996), p. 16.
[3] Institute of Defense Studies, "Conceptual Provisions of A Strategy for Countering the Main External Threats to Russian Federation National Security" (Moscow: October 1995).
[4] Interview with Anton Surikov, *ITAR-TASS* (10 March 1995).
[5] J. Michael Waller, "The Russian Nuclear Threat Is Not Gone," *The Wall Street Journal* (17 July 1996), p.6.
[6] Patrick E. Tyler, "As China Threatens Taiwan, It Makes Sure U.S. Listens," *The New York Times* (24 January 1996), pp. 1,
[7] U.S. Department of Energy, "Draft Programmatic Environmental Impact Statement for Stockpile Stewardship and Management" (Washington, D.C.: February 1996), pp. 11, 15. Hereinafter cited as "Statement for Stockpile Stewardship and Management."
[8] George H. Miller, "Meeting the Laboratory's Newest Challenge," *Science & Technology Review*, August, 1996, p.4.
[9] DOE, "Statement on Stockpile Stewardship and Management", p. 15.
[10] Ibid, p. 16.
[11] Statement of Siegfried S. Hecker, Director of Los Alamos National Laboratory, to U.S. House of Representatives, Committee on National Security, Subcommittee on Military Procurement (March 12, 1996).
[12] See testimony of Deputy Secretary of Energy Charles Curtis before the House National Security Committee, Subcommittee on Military Procurement, March 29, 1995, and September 19, 1996.
[13] Keay Davidson, "Livermore Loses Test, Must Cut Staff," *The Washington Times* (19 June 1996), p. 6.
[14] U.S. General Accounting Office, "Nuclear Weapons: Status of DOE's Nuclear Stockpile Surveillance Program," GAO/T-RCED-96-100 (Washington, D.C.: March 13, 1996).
[15] "Statement for Stockpile Stewardship and Management", p. 21.
[16] Statement of Karen K. Clegg, President of Government Services and Federal Manufacturing and Technologies, Allied Signal Inc., to U.S. Senate, Committee on Armed Services, Subcommittee on Strategic Forces (March 13, 1996).
[17] See Section 3132 of the National Defense Authorization Act for Fiscal Year 1997 (Public Law 104-201) and the Energy and Water Development Appropriations Act for Fiscal Year 1997 (Public Law 104-206).
[18] Tritium has a half life of only 12.5 years (that is, half of the tritium turns into helium by radioactive decay in that time) and must be replenished continually.
[19] "Russia to Continue Research In Nuclear Weapons Sphere," INTERFAX, September 26, 1996.
[20] Kent C. Johnson and Franklin D. Barish, "Nuclear Weapons Personnel at Lawrence Livermore National Laboratory: A Demographic Analysis," UCRL-AR-123839 (Lawrence Livermore National Laboratory: December 29, 1995).
[21] Statement of C. Paul Robinson, Director of Sandia National Laboratory, to U.S. House of Representatives, Committee on National Security, Subcommittee on Military Procurement, March 12, 1996.
[22] Jonathan Medalia, "Nuclear Weapons Stockpile Stewardship: The Role of Livermore and Los Alamos National Laboratories," 94-418 F Congressional Research Service 912 May 1994).