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NUCLEAR WEAPONS
COMPLEX

Major Safety, Environmental,
and Reconfiguration Issues
Facing DOE

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Mr. Chairman and Members of the Committee:

We are pleased to participate in this hearing on the Department of Energy's (DOE) progress and plans for resolving safety issues, cleaning up environmental contamination, and reconfiguring the weapons complex. DOE faces a monumental task in addressing the legacy of safety and environmental problems created by nearly a half century of nuclear weapons production and, at the same time, addressing important issues about the size and structure of the complex in light of a substantially reduced nuclear weapons arsenal. The cost will be large and the difficulties immense.

The legacy of weapons production problems has become clear over the last several years as many key facilities have closed and DOE has acknowledged widespread environmental contamination. Although DOE has made progress in addressing these problems, much remains to be done. For example, DOE still needs to refine and implement its safety policy and improve workers' attitude towards safety--in other words, its safety culture. On the environmental side the major challenges are still ahead, such as, dealing with the particularly difficult cleanup task of the high-level waste tanks at Hanford, Washington. The overall cost estimate of cleaning up the complex has been growing and could eventually reach \$160 billion.

In addition to these longstanding problems, DOE must now reconfigure or modernize the complex. This past year has brought a

fundamental shift in our nuclear deterrent policy, creating significant reductions in our nuclear weapons arsenal which dramatize a number of issues DOE needs to address as it reconfigures or modernizes the complex. These include questions about DOE's ability to dismantle the large number of retired weapons and how to dispose, store, or use the plutonium and other materials from these weapons. Furthermore, DOE needs to decide which facilities it must upgrade, close, or rebuild. In our view, it is important for DOE to address all key issues in its planning efforts and determine the size and capabilities of the reconfigured complex for the 21st century.

In my testimony today, I would like to discuss in more detail our observations on (1) the progress DOE has made in developing and implementing a safety policy and culture, (2) the major challenges DOE faces in cleaning up the weapons complex, and (3) the key issues DOE faces in reconfiguring the complex in light of weapons reductions. My remarks today are based on the large body of work on the weapons complex we have completed over the last decade. They also reflect work we are currently performing for this, and other, committees.

SAFETY POLICY AND

CULTURE CONCERNS REMAIN

Resolving safety issues at its facilities continues to be a significant problem for DOE. Safety concerns led to the closure of much of the nuclear weapons complex, and safety issues are an important reason why key facilities remain closed. While DOE has made some strides in promoting safer operation, such as the adoption of a nuclear safety policy, we and others have found that additional work is needed to refine and implement this policy and to develop a safety culture that permeates the entire complex.

As early as July 1988, we reported that DOE had not clearly defined its safety policy.¹ Although DOE did have a policy that its nuclear facilities should be comparably safe to commercial nuclear facilities, this policy was incomplete because it did not state what commercial standards should be applied. We found that unclear safety policy and guidance led to inconsistent application --and in some cases, non-application--of important safety standards. As a result, we recommended that DOE establish a meaningful safety policy and related standards to guide the continued operation of its facilities.

¹Nuclear Health and Safety: Oversight at DOE's Nuclear Facilities Can Be Strengthened (GAO/RCED-88-137, July 8, 1988).

Beyond the need for a safety policy, we have also found over the last several years that DOE needs to do more to establish a sound, consistent safety culture at its facilities. For example, in a report we issued in April 1990, we discussed safety culture problems at Savannah River and the recognition by both DOE and Westinghouse, the site's operator, that the safety culture at Savannah River needed improvement and that such improvement would be a slow process.² We also recognized the difficulty in measuring changes in employees' attitude toward safety. Towards that end, we recommended a comprehensive plan with specific tasks, milestones, and measurement indicators to achieve the desired safety culture changes.

In its response to our recommendation, DOE did not agree with the need for an overall plan, but the agency did indicate that both Westinghouse and itself had begun to strengthen their attitudes toward reactor safety with initiatives like a Reactor Operations Management Plan. We believe that DOE's approach was a positive step. However, I would note that in our March 1991 follow-up report on the Savannah River restart, we continued to identify situations, in such areas as operator training and reactor operations, that illustrated that additional effort was needed to fully address safety culture weaknesses.³

²Nuclear Safety: Concerns About Reactor Restart and Implications for DOE's Safety Culture (GAO/RCED-90-104, April 12, 1990).

³Nuclear Safety: Status of Reactor Restart Efforts and Safety Culture Changes (GAO/RCED-91-95, Mar. 13, 1991).

In April 1991, we reported on persistent safety and health problems at DOE's Pantex Plant in Texas, where the nation's nuclear weapons are assembled and dismantled.⁴ In particular, we noted that Pantex had not completed its required safety analysis reports --a longstanding problem within the complex. As a result, DOE could not adequately ensure that the plant was operating safely. Moreover, Pantex and DOE officials could not document or clearly explain why safety analysis reports on less hazardous facilities were being completed before reports on the more hazardous ones.

In September 1991, the Department issued a new Nuclear Safety Policy. However, DOE's Advisory Committee on Nuclear Facility Safety, in its November 1991 final report, criticized the new policy for substituting nebulous language such as "continuous improvement" for measurable standards; for paying little attention to the largely chemical nature of the risk at some Department facilities; and for inadequately treating the inevitable conflict between safety and production responsibilities by simply asserting that they are "compatible." The Advisory Committee's report stated that DOE needs to spell out how safety goals will be achieved, how priorities will be set, how self-assessments will be judged, and how progress and success will be measured.

⁴Nuclear Health and Safety: More Attention to Health and Safety Needed at Pantex (GAO/RCED-91-103, April 15, 1991).

In response to the Advisory Committee's report, DOE defended the broad scope of its safety policy. At the same time, DOE noted that it was developing the necessary specifics to implement the policy, including additional safety goals for workers, additional safety rules and requirements, and independent, internal self-assessments of compliance. While we recognize the strides DOE has made to improve safety at its facilities, we believe that sustained effort to develop and implement safety rules and to assess compliance will be needed to replace past practices with a solid safety culture.

CLEAN-UP PROGRESS HAS BEEN SLOW

AND BROAD QUESTIONS REMAIN

On the environmental side, DOE has begun to report its initial accomplishments in cleaning up the nuclear weapons complex. This effort is a key step in providing the Congress and the public with important information on the return they are receiving on their annual multi-billion-dollar investment. However, this progress is not widespread. As our work over the last year has shown, many of DOE's most important clean-up projects continue to be hampered by technological, compliance, and management problems leading to missed clean-up milestones and escalating budgets. Moreover, broader policy issues, which deal with the scope of the clean-up, remain unresolved.

Technological, Compliance, and Management
Problems Impede Clean-up Progress

Cleaning up the almost 57 million gallons of high-level radioactive waste in the single-shell and double-shell tanks at DOE's Hanford facility is one of the biggest challenges in the weapons complex. Progress has been slow, and costs continue to rise. For example, in our April 1991 report on the status of DOE's effort to characterize the 37 million gallons of high-level radioactive waste in the single-shell tanks, we concluded that DOE was unlikely to complete its efforts by its compliance agreement milestones.⁵ Technical problems--such as how to sample hardened waste and how to avoid explosions in tanks containing hydrogen gas and other potentially explosive materials, such as ferrocyanide--blocked this effort, which must be completed before the wastes can be removed and treated.

In addition, in our June 1991 report on DOE's planned approach to pretreat the high-level waste in Hanford's double-shell tanks, we found that DOE's plan to modify a 46-year-old facility known as B Plant would not work because (1) the plant could not meet current environmental standards and (2) the technology being considered for treating the waste could eat through the piping in the facility,

⁵Nuclear Waste: Problems and Delays With Characterizing Hanford's Single-Shell Tank Waste (GAO/RCED-91-118, April 23, 1991).

quickly rendering it useless.⁶ We recommended that DOE cancel further work on B Plant and shift its effort to developing an acceptable alternative. In December 1991, DOE decided not to proceed with B Plant but instead develop an alternative approach. DOE's failure to recognize B Plant's problems will cause DOE to delay milestones it had previously agreed to with the state and Environmental Protection Agency, and could lead to a potential \$2 billion increase in the cost of pretreating Hanford's waste.

Not only have we found problems with technology development and environmental compliance, we have also found that DOE has not managed existing, proven technologies very well, leading again to increased delays and costs. For example, in our January 1991 report on DOE's "pondcrete" program at its Rocky Flats plant, we pointed out that DOE's attempt to mix low-level radioactive waste with concrete to create solid blocks was hampered by the lack of a plan, inadequate quality control, and cost escalation.⁷ Over one-half of the 16,000 blocks created crumbled and cracked because they were improperly mixed. Our recent report on the Rocky Flats pondcrete program found continuing problems.⁸ Completion costs

⁶Nuclear Waste: Pretreatment Modifications at DOE Hanford's B Plant Should Be Stopped (GAO/RCED-91-165, June 12, 1991).

⁷Nuclear Health and Safety: Problems With Cleaning Up the Solar Ponds at Rocky Flats (GAO/RCED-91-31, Jan. 3, 1991).

⁸Nuclear Health and Safety: Problems Continue for Rocky Flats Solar Pond Cleanup Program (GAO/RCED-92-18, Oct. 17, 1991).

have escalated to almost \$169 million and DOE has not met its first major milestone.

Broader Policy Issues

Remain Unresolved

While DOE is proceeding with its clean-up program, broader issues of which sites should be cleaned up, in what order, and to what standard, remain unresolved. In its review of DOE's environmental clean-up program, the Advisory Committee noted that while some of DOE's efforts show promise, effective technologies have not been demonstrated for cleaning up many sites. The Advisory Committee called the goal of cleaning up all contaminated sites for unrestricted use by the year 2019 unattainable. The Advisory Committee also challenged DOE to adopt a more practical policy on the program's ultimate objectives, which would employ land-use planning to determine which parts of the agency's sites may be released for unrestricted use and which must be restricted in some way.

Over the last several years, we have repeatedly noted that as more is known about the types of waste and degree of contamination at DOE's sites, the ultimate cost of the cleanup will increase. The estimated cost of the cleanup, over this time, has risen from initial estimates in the billions of dollars to about \$100 billion to currently as much as \$160 billion. We have also stated that it

is important to acknowledge that some areas of the weapons complex may be irreversibly contaminated and thus require long-term institutional control.

In response to the Advisory Committee, DOE acknowledged that it is possible that some sites will not be released for unrestricted use, but rather will be restricted in order to ensure public health and safety and overall program cost effectiveness. DOE saw the development of a Programmatic Environmental Impact Statement as the proper forum for the resolution of the broader question of how much to cleanup specific sites.

RECONFIGURATION OF DOE'S

WEAPONS COMPLEX

Next, I would like to address DOE's efforts to reconfigure, or modernize, the nuclear weapons complex which DOE has been studying for about 3 years. In late 1988, DOE proposed a \$50 billion plan to modernize the complex. Recognizing important world events, DOE, in early 1991, issued a reconfiguration study which laid out a framework for developing plans for a smaller, more consolidated complex. In developing its reconfiguration plan, DOE will have to make important decisions concerning which facilities it consolidates, upgrades, closes, or builds anew. In our view, it is important that DOE address all key issues in its planning efforts,

and more clearly determine the size and capabilities of the complex before reconfiguration.

Issues Affecting Reconfiguration

Last year, when DOE's reconfiguration study came out, we testified before this Committee and pointed out that planned reductions in our nuclear weapons stockpile raised important new issues for DOE to address as it reconfigured the complex.⁹ Since then, the President has announced two major reductions in our nuclear weapons stockpile. One was on September 27, 1991, and the other, more recently, was in his state of the union speech. I believe these announcements further dramatize several issues for DOE:

- What facilities and/or operations within the complex should be restarted and what facilities should be closed?
- What new tritium production capacity (technology and size) is needed?
- Does DOE have sufficient capabilities to dismantle large numbers of nuclear weapons?

⁹Nuclear Weapons Complex: GAO's Views on DOE's Reconfiguration Study (GAO/T-RCED-91-8, Feb. 25, 1991).

-- How will DOE dispose, store, or use plutonium and other material from retired weapons?

Many of DOE's key facilities, such as the Savannah River Reactors and the Rocky Flats Plant, were shut down in the late 1980s for safety reasons. DOE has spent billions of dollars in upgrading these facilities but has experienced delays in restarting them. Restart plans have also been changing as a result of reductions in our nuclear weapons arsenal. For example, originally DOE planned to restart three reactors, now it plans to restart only one. In addition, DOE must decide if it needs to continue operations at many of its facilities in light of weapons reduction. This may involve the actual closing of plants or, at a minimum, specific operations at a plant.

At the same time DOE faces these important decisions, decisions will be needed regarding new tritium production capacity. As you know, tritium is perishable radioactive material used in nuclear weapons that must be periodically replenished. DOE has not produced tritium since 1988, and will eventually have to if this country maintains a nuclear weapons arsenal into the 21st century. The timing of when the new capacity is needed, what new technology is best, and how large a capability is needed are all important, costly decisions that DOE will have to address.

Another important issue stemming from weapons reductions is dismantling. Over the next several years, DOE must take custody of and dismantle thousands of nuclear weapons that the Department of Defense will retire. The capability of DOE to safely dismantle so many weapons could present a problem and tax the limited capabilities of DOE resources at the Pantex plant. We are currently addressing this issue in an assignment for this Committee. We will examine, among other things, DOE's capabilities and plans for dismantling retired weapons.

The last issue I want to briefly discuss is the disposition of weapons-grade material. The end result of the retirement process will be a relatively large inventory of weapons-grade plutonium and enriched uranium. These materials must be carefully safeguarded to prevent proliferation and must be stored in an environmentally safe manner until used or disposed. Criticality concerns may prohibit any simple disposal method. The enriched uranium material can be remanufactured into nuclear fuel, but this could impact the nuclear fuel industry. Plutonium may present an additional problem because, among other things, its use as a commercial fuel on a large-scale in this country would have to be approved by the Nuclear Regulatory Commission. DOE is currently studying this important issue.

The Reconfiguration Process

We believe that all of these issues must be addressed in the reconfiguration process DOE laid out in its 1991 reconfiguration study. The study will lead to a programmatic environmental impact statement on various alternatives by mid-1993. However, some decisions associated with reconfiguration may be made earlier. In this regard, DOE is currently conducting a separate environmental assessment on consolidating its non-nuclear weapons facilities, where parts such as electronic components are produced. This is scheduled to be completed in the fall of 1992 and may lead to consolidating some operations within the complex.

We recognize the difficulties in developing a well-conceived plan to address the reconfiguration of the complex. Many interrelated problems must be addressed, each of which could be individually difficult and costly to resolve. We commend DOE on its willingness to perform an overall programmatic environmental impact statement to address the issue. However, we are concerned that the process may continue without determining what size and capabilities the complex of the 21st century should have. As we stated in our testimony before this Committee last year, DOE's reconfiguration study recommended a smaller nuclear weapons complex in the future but did not clearly specify what the complex will look like in the next century. The study concluded that the

Nuclear Weapons Council should select specific sizing level(s) upon which the future complex should be based. As of January 1992, the Council had not determined the appropriate size for the complex.

The selection of the complex's capacity or size is a critical baseline for nearly all reconfiguration planning. Historically, the complex has been driven by nuclear weapons demands initiated by the Department of Defense. The high demand for nuclear material for weapons in the 1980s created an atmosphere within the complex that emphasized production over safety, health, and environmental considerations. Currently, weapons reductions announcements have been overtaking planning events within the Department. For example, in November 1991 shortly after the President's September announcement on weapons reduction, DOE decided not to make a decision on a new production reactor in 1991, but rather address the selection of new production capacity in the programmatic environmental impact statement for the overall complex scheduled to be completed in mid-1993. Major changes in the sizing of new production capacity are likely to be made when DOE completes its reevaluation.

In our view, before serious consideration of a modernized, reconfigured nuclear weapons complex can be undertaken, a consensus must be reached on what capability the complex must have to produce and maintain nuclear weapons. Once parameters are placed on the

future production capability of the complex, planning for a modernized complex with that capability can go forward. Future nuclear weapons requirements would then be more in line with the production capacity of the complex.

SUMMARY

In summary, Mr. Chairman, the problems facing the complex are diverse, formidable, and costly. DOE's efforts to date in addressing its safety and environmental problems, while commendable, still face significant technological, compliance, and management challenges. Moreover, broader questions remain unresolved. In particular, DOE still needs to develop a sound framework for implementing its safety programs. Realistic cleanup goals and defensible priorities are also needed.

In addition, DOE now faces an additional major challenge--how to reconfigure the weapons complex to meet the nation's defense needs into the 21st century. Key decisions still need to be made about the size of the complex, where to relocate various operations, what technologies should be used for new tritium production, and what should be done with excess weapon-grade material. DOE and the Congress will face a difficult task in making these decisions, given the conflicting demands for limited resources.

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Mr. Chairman, this concludes my prepared remarks. We will be happy to respond to any questions you may have.

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