Statement of C. Paul Robinson, Director
Sandia National Laboratories

United States Senate
Committee on Armed Services
Subcommittee on Strategic Forces

February 26, 1999

INTRODUCTION

Mr. Chairman and distinguished members of the committee, thank you for inviting me to testify today. I am Paul Robinson, director of Sandia National Laboratories. Sandia is managed and operated for the U.S. Department of Energy by the Sandia Corporation — a subsidiary of the Lockheed Martin Corporation.

Sandia National Laboratories has unique responsibilities in DOE's nuclear weapons Stockpile Stewardship and Management programs. Sandia's responsibilities include safing, arming, fuzing, and firing systems; use control systems; gas transfer systems; delivery system interfaces; military liaison; stockpile surveillance; and related testing and instrumentation. Sandia engineers over 90 percent of the component parts of all U.S. nuclear warheads.

With the end of the Cold War, a number of issues affect the viability of the nation's nuclear deterrent, including: (1) the elimination of underground testing, (2) the cessation on new systems development and the aging of the stockpile, (3) changes in mission requirements for the enduring stockpile, (4) the loss of scientific and engineering expertise, and (5) the need to consolidate and modernize the nuclear weapons production complex. These issues present challenges to Sandia's efforts to meet its commitments in stockpile stewardship and management.

Sandia's strategic plan is designed to support DOE's investment plan in accordance with guidelines established under the Government Performance and Results Act. If fulfilled, this plan should ensure that the DOE nuclear weapons complex meets its responsibilities. Appropriations below those requested, or redirection of funds to other initiatives, will jeopardize our ability to meet our mission responsibilities.

In this statement, I will discuss Sandia's role in DOE's Stockpile Stewardship and Stockpile Management programs. As an indication of the value and success of these complementary activities, I am pleased to report that the U.S. nuclear weapons stockpile remains safe, secure, and reliable. I recently affirmed this technical judgment in my annual certification letter to the secretaries of Energy and Defense, who in turn must certify the stockpile to the President. As part of the certification process, the laboratories conduct reliability and safety investigations and prepare a report for each weapon type in the stockpile. We at Sandia National Laboratories see no need to conduct an underground nuclear test at this time to validate our assessment.

STOCKPILE STEWARDSHIP

The stockpile stewardship program maintains and advances the science and engineering technology base that supports DOE's systems design capabilities now and for the enduring nuclear weapons stockpile. Sandia performs a major role in stockpile stewardship and has responsibilities in an array of relevant technologies. I will briefly discuss three core technology areas of stockpile stewardship: the Accelerated Strategic Computing Initiative (ASCI), Microelectronics, and Inertial Confinement Fusion.

Accelerated Strategic Computing Initiative (ASCI)

At Sandia, ASCI consists of programs in applications, problem-solving environments, and high-end computing. The applications program develops high-performance, full-system, full-physics predictive codes to support weapons performance assessments, refurbishment analyses, accident analyses, and certification. The problem-solving environments program creates a computational infrastructure and operating environment that makes ASCI computational capabilities easily accessible and usable. The high-end computing program supports the development and acquisition of the more powerful high-end supercomputing capability required by the ASCI applications.

Consistent with modern industry practice, Sandia designers increasingly depend on modeling and simulation, spending more time computing and less time and fewer resources on physical prototyping and expensive performance testing. Our needs range from integrating, accessing, and preserving existing information (such as war-reserve parts data and the documentation of weapons structures) to creating, disseminating, and assessing new information, including predictions of age-related material degradation and complex accident scenario analysis.

The efficiency and cost-effectiveness of DOE's efforts in product realization will increasingly depend on the ability to integrate modern information-based technologies and resources across the nuclear weapons complex through modern distributed information systems and high-speed secure networks that connect the various laboratories and production agencies. Sandia is DOE's lead laboratory for the Distributed Computing (DISCOM) Technologies element under the ASCI program. DISCOM will develop a remote-access, high-speed integrated computing environment that will interface with DOE's initiative in Advanced Design and Production Technologies (ADaPT), which I will discuss later.

Sandia requests two construction starts in FY2000 that are vital to its activities in the ASCI program:

1. The Joint Computational Engineering Laboratory (JCEL) at Sandia's site in New Mexico will house equipment and activities associated with ASCI high-performance computing, communications, and computer-aided design and engineering. The

project will involve renovation of existing facilities, with new construction required only for adding a few specialized capabilities. Funding for JCEL had originally been requested to start in FY1999, but was delayed to FY2000.

2. The Distributed Information Systems Laboratory (DISL) will house similar activities at Sandia's site in California. The conceptual design report and life-cycle cost analyses for DISL showed that new construction is preferable to renovation of existing facilities. Old, substandard, and excess facilities will be decommissioned and demolished. The result will be a net reduction of substandard space at the site.

Radiation-Hardened Microelectronics

Sandia's expertise in microelectronics and photonics provides the science and technology base for affordable radiation-hardened microelectronics for use in DOE weapon systems and other defense applications. This foundation includes fundamental research in solid-state physics, applied research into process technologies, and engineering research for design and fabrication of integrated circuits and integrated microsystems. Our program also depends upon strategic partnerships with industry and universities, in order to keep pace with this rapidly-changing field.

Microelectronic circuits can be damaged or destroyed by radiation. It is for this reason that electronic components in satellites, for example, are specially designed to withstand the effects of cosmic radiation. Circuits in nuclear weapons must be hardened against the much more intense radiation fluxes that would be encountered in proximity to nuclear blasts during a nuclear exchange. This design criterion has not gone away with the end of the Cold War. STRATCOM has revalidated its hardening requirements for strategic systems.

Similarly, radiation-hardened microelectronic components are important for many tactical, non-nuclear weapon systems that could encounter radiation under battle conditions. Consequently, the capability to design and produce “rad-hard” integrated circuits is of great importance to our Nation’s defense.

Unfortunately, commercial, off-the-shelf microelectronic technologies are not designed to withstand radiation, and in most cases they cannot be shielded effectively to protect them from damage. In fact, as commercial integrated circuits (ICs) evolve toward ever-smaller feature sizes, they will become even less suitable for defense or space applications that may be susceptible to radiation.

Production of radiation-hardened integrated circuits requires special designs and strictly controlled, nonstandard manufacturing. Most integrated-circuit manufacturers are simply not interested in diverting highly profitable resources to nonstandard and limited-volume design and production of radiation-hardened microelectronics.

Military requirements for radiation-hardened microelectronics cannot be met with devices available for commercial space instrumentation. Moreover, production quantities for radiation-hardened circuits are relatively small and offer little economic incentive for most private manufacturers. Only two of fifteen suppliers of these specialized radiation-hardened circuits remain.

In the past, this Committee has urged DOE and the Department of Defense to work together to formulate measures to maintain the supply of radiation-hardened integrated circuits (ref. *National Defense Authorization Act for FY1998,* S. Rept. 105-29, p. 429). An interagency Rad-Hard Oversight Council was recently formed, although it is too early to report how successful that body will prove to be. In any case, it is important to maintain the rad-hard microelectronics capability at Sandia. DOE requires a robust technology base for research and development combined with a modest, back-up production capability in its laboratory system, and Sandia is the only facility where such capabilities exist.

We are mindful of Congressional guidance directing us to foster rad-hard production capability in the private sector (ref. *Energy and Water Development Appropriation Bill, 1998,* S. Rept. 105-44, p. 102).

Sandia's approach has always been to work closely with manufacturers in strategic partnerships. We are very proud of a recent announcement that demonstrates the value of these long-term alliances and our own success as stewards of these national trust responsibilities.

I am very pleased to tell you about an action by the Intel Corporation that will be very significant for government rad-hard microelectronics. On December 8, 1998, Intel announced that it would grant a royalty-free license of its Pentium processor design to Sandia for development of a radiation-hardened version. Intel's patriotic action builds on a relationship with Sandia that goes back many years involving numerous cooperative research and development projects.

The Pentium offers a ten-fold increase in processing power over currently available radiation-hardened microprocessors for applications such as earth satellites, space probes, missile defense, and other military and intelligence systems. The agreement will save U.S. taxpayers millions of dollars in research and development costs that would have been required to emulate this capability with a new design. Several government agencies will participate with DOE in the rad-hard redesign of the Pentium chip, including NASA, the Air Force, and the National Reconnaissance Office.

After successfully adapting the design for radiation hardness, Sandia intends to transfer the capability to produce the rad-hard Pentium to the private sector. We will soon issue a broad-area announcement to seek qualified vendors to produce these specialized radiation-hardened microprocessors for government and space applications. We anticipate that the availability of the higher-performance Pentium design may stimulate greater interest among potential suppliers in the limited market for radiation-hardened microelectronics.

Among the national laboratories, only Sandia has both the design and the microelectronics fabrication infrastructure to attempt a project as complex as redesigning and fabricating a Pentium-class chip with radiation-hardened characteristics. Last year's appropriation of $30 million set the stage for this important effort by allowing Sandia to strengthen our internal capabilities to support a project as challenging as radiation-hardening of the Pentium.

Inertial Confinement Fusion

Pulsed Power and Inertial Confinement Fusion (ICF) at Sandia are tools that help us in understanding radiation effects and allow us to certify weapon components against those destructive effects — without nuclear testing. To address this important stockpile issue, Sandia has designed and constructed three of the world's most powerful accelerators. The most recent of them, Sandia's Z Accelerator, has made extraordinary progress in the last couple of years. That progress was acknowledged in the 1999 *Senate Energy and Water Development Appropriation Bill Report 105-206* (pages 106–107), which included support for continuing experiments and initial design studies for a larger facility.

The Z Accelerator is used for weapon physics experiments by Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and the United Kingdom's Atomic Weapons Establishment, as well as for weapon effects experiments by Sandia and the Defense Threat Reduction Agency. Experiments on Z have produced the world's most powerful and energetic pulses of x–rays. The Z Accelerator will continue to be used for experiments to understand weapon functions and to improve computer codes for weapon evaluations.

The nuclear weapons program has a need for a follow-on machine to Z, that can also complement the program of the National Ignition Facility (NIF). Our plans are to construct an enhanced machine called "ZX," using much of the existing test infrastructure at Sandia. The design will allow for extensive use by the nuclear weapons community as well as the academic physics community.

STOCKPILE MANAGEMENT

The stockpile management program provides near-term and long-range support for the enduring nuclear weapons stockpile, including surveillance, advanced manufacturing, and system refurbishment, as well as normal and corrective maintenance. I will share with you a sampling of some of the ongoing stockpile management activities at Sandia, including: (1) the design and development of new components to replace aging or defective parts, (2) the formal implementation of the DOE Stockpile Life Extension Program, and (3) the surveillance and assessment of warhead functionality and reliability.

Ongoing Stockpile Activities and Upgrades

Over the past year we continued installation of the Alt. 335 Trajectory Sensing Signal Generator (TSSG) and the Alt. 339 Multiple-code coded switch Encryption Translator (MET) to provide surety enhancements to a set of the B61-3, -4, and -10 family of gravity bombs. The TSSG is a safety improvement that increases the nuclear safety of the bomb in certain normal and abnormal environments. The MET capability improves the positive controls over use of the warhead. These enhancements were performed in conjunction with the Allied Signal/Kansas City Federal Manufacturing & Technology plant, part of the DOE production complex.

In the area of reliability enhancements, we developed and are producing a new solid-state radar for the B83 gravity bomb, and we are developing a new radar and nose housing for the B61 gravity bomb — with a first production unit in FY2001. In the latter case, we are relying very heavily on ASCI computer models in the design of the radar nose, and, through their use, we expect to achieve significant cost and time savings.

Earlier this month, we achieved a significant production milestone for the new MC4380 neutron generator for the W76 warhead. You may recall that when DOE closed the Pinellas (Florida) neutron generator plant in 1995, it transferred that responsibility to Sandia. We brought a production facility on-line very rapidly and, in fact, DOE has just formally accepted, as war reserve (WR) qualified components, the first production lots of neutron tubes, which are a major internal component of the neutron generator. We are on schedule to achieve our first production unit of the complete neutron generator by October 1999.

We are also on track to certify the neutron generator to meet its hostile environment requirements by October 1999. We will do so without underground nuclear testing, as would have been necessary in the past. Rather, we will use a combination of ASCI computational modeling and tests using aboveground simulators to provide the final certification. I believe that this will be the first time that a major component of US nuclear weapons will be introduced into the active stockpile without being qualified through nuclear tests.

We have completed the conversion of a set of B61-7 gravity bombs into B61-11 earth-penetrating warheads. They are now operationally deployed, having replaced the B53 gravity bombs, which we were anxious to retire, as they did not have modern surety features. However, during final design certification of the B61-11 warhead, we observed a design issue (that could cause problems for at least a portion of its operating envelope) that forced us to delay final certification. In a short period of time, we used a number of ASCI models and special tests to understand this design issue, particularly in terms of its potential impacts on performance of the nuclear package, the ultimate design margin of the warhead, and the robustness of various options being considered. All this culminated in devising a particular fix to address the design issue, thereby allowing the warhead to meet its full set of original military characteristics and its stockpile-to-target sequence (STS) requirements.

As these examples show, Sandia is vigilantly discharging its role as a steward of the nuclear weapons stockpile. We are already exploiting benefits derived from the science-based stockpile stewardship program. We will remain alert to the short-term and long-term needs of the stockpile, drawing upon DOE’s investments in the science and engineering base for stockpile stewardship.

The Stockpile Life Extension Program (SLEP)

The DOE Office of Defense Programs established the Stockpile Life Extension Program to maintain the long-term safety, reliability, and performance of the U.S. nuclear deterrent—not with complete replacements of aging warheads, but by replacing certain warhead components and subsystems as needed. This program defines the design, development, and production requirements for the nuclear weapons complex, thereby providing the detailed and integrated planning necessary for developing an overarching cost-effective stockpile support strategy.

The Stockpile Life Extension Program (SLEP) will permit us not only to schedule routine limited-life component exchanges, but also to perform systematic life-extension upgrades in related subsystems and components that need replacement. While primarily driven by the need to replace limited-life components, SLEP will also upgrade the technological currency of those components that cannot otherwise be certified for another 20-40 years of service. Inputs to this decision process will come from a number of the ongoing initiatives, including Dual Revalidation, Advanced Design and Production Technologies (ADaPT), Enhanced Surveillance, and the Accelerated Stockpile Computing Initiative (ASCI).

The Stockpile Life Extension Program provides a planning process for evaluating components in every type of weapon in the nuclear weapons stockpile by focusing on each component’s contribution to reliability, performance, and safety over the long term. The program places particular emphasis on components whose age degradation might cause a reduction in weapon safety or performance. It provides the planning factors for evaluating and prioritizing weapon refurbishment actions in light of such concerns.

Of course, to accomplish SLEP in a tight budgetary environment, vitally important considerations are cost and the residual capabilities and capacity of the weapons production complex. Sandia has adopted a strategy, for developing and producing new components and subsystems, that we must be on-budget, on-schedule, with zero defects (i.e. a “better, cheaper, faster” maxim). We are upgrading our business and engineering practices and tools to allow us to achieve this goal. For example, we have baselined the cost of the weapons complex to design and produce the W88 arming, fuzing and firing (AF&F) system, and identified design and manufacturing cost targets for a future W76 AF&F replacement. As part of our concurrent engineering process, we have adopted the DoD approach of "Cost As an Independent Variable" (CAIV), whereby we engage our DOE and DoD customers up-front in requirements definition and design option trade-offs as a function of cost.

Also, we are exploring specific changes to improve our quality monitoring and acceptance processes, and we are moving towards process-based quality techniques. We are relying on close partnering with commercial parts vendors to obtain COTS (Commercial Off The Shelf) parts and other custom parts, built using commercially-derived manufacturing processes. We are relying heavily on ASCI computational models early in the design process to minimize development tests and design iterations and to reduce the time and cost to certify new components. In short, we recognize cost is a big driver in SLEP refurbishment decisions, and we are working hard to make all of our decisions cost-effective. We are also working with DOE and the production agencies to identify future SLEP requirements and to schedule them in phases so that the production complex will experience consistent work levels, sized appropriately for their own capability and capacity issues—again, with cost as the principal concern.

We also helped DOE define a new "6.x" phased-acquisition process for stockpile life extension refurbishments within Phase 6 (stockpile life and maintenance) of the warhead life cycle. We are very pleased to be part of two new Phase 6.2/2A studies, one for the W76 (Trident I) with the Navy, and the other for the W80 (ALCM and ACM) with the Air Force. Both of these joint DOE/DoD studies were approved by the Nuclear Weapons Council Standing and Safety Committee, and they represent the formal implementation of SLEP. The studies will identify a set of life-extension design options, along with their associated costs and implications for the production complex. Subsequently, decisions would then be made whether to proceed to Phase 6.3, engineering development.

(Note: The above phase designations are not to be confused with DoD's numbering system for their research and development cycle [Phase 6.1, 6.2, etc.]. In the DOE nuclear weapons life cycle, Phase 6 represents the production in quantity of the weapon and the maintenance of the weapon in the stockpile. Stockpile life extension activities are performed while a weapon is in Phase 6 and therefore are being designated as subdivisions of Phase 6.)

People

Most importantly, we recognize that skilled people are the crucial ingredient for the success of the Stockpile Stewardship and Stockpile Life Extension programs. Unfortunately, direct manpower in the nuclear weapons program at Sandia has been eroding at an annual rate of 3 percent since 1989, and today we are down more than 25 percent from a decade ago. This continuing trend is a matter of great concern to us. It is partly the result of budgetary forces, but it directly creates difficulty in attracting qualified personnel to work in the nuclear weapons program. Young engineers are not interested in a career of paper studies. By the end of 1992, all Phase 3 engineering development programs of the Cold War were cancelled, and we have had no full-scale weapon development programs since then. The absence of real hardware programs has had a far greater deleterious effect on our laboratory than has the nuclear test moratorium. The Phase 6.3 engineering-development programs, which we anticipate for the W76 and W80, are therefore particularly vital; since they will develop real hardware — the kind of work that will allow us to attract and retain outstanding people.

Over the past year, we have tried to address our staffing trends and skills-mix problems in the weapons program with a recruitment initiative that tries to hire the best-and-brightest scientists and engineers from our nation's premier colleges and universities. We inaugurated a Weapons Intern Program, where each year we competitively select and train a group of about fifteen new staff in all facets of the weapons program. After a two year training period, we place them into key weapons program positions. We also continue to conduct a Knowledge Preservation Program to capture (through interviews, data mining, archiving, and mentoring sessions) all possible relevant information from designers and testers of retirement age, who had worked on weapon development programs during the Cold War.

Non-nuclear Stockpile Assurance Testing

Stockpile evaluation activities involve both laboratory and flight tests of the non-nuclear components of stockpiled weapons. The information from these tests and supporting assessments provides the technical bases for the continued confidence and credibility in the safety, security, and reliability of the stockpile. Test results that identify deviations from weapon performance and surety requirements are thoroughly investigated. These investigations may result in repairs, retrofits, or recommendations for stockpile improvement programs.

Joint tests of weapons in their intended delivery modes are performed in cooperation with the Department of Defense. We continue to be concerned about budgetary constraints and other issues that may affect the ability of the laboratories and the military services to support the joint DOE/DoD Stockpile Surveillance program. An example of our concern is the possibility of Air Force ICBM strategic missile testing shortfalls that could impact reliability assessments of the W62, W78, and W87 warheads. Developments under START-II that impact the ICBM warhead surveillance program include: moving from multiple to single reentry vehicle configurations while maintaining the same number of missile test flights each year (thus reducing reentry vehicle flight opportunities) and the possible elimination of Peacekeeper flight tests. This presents an important long-term issue that must be continuously monitored and carefully managed.

My concern over these issues derives from Sandia's half century of test experience with nuclear bombs and warheads. We sized our stockpile surveillance program to provide a high level of assurance in the reliability and safety of the weapons. To achieve the requisite levels requires that we test approximately eleven warheads per year of each of the (eight) types currently in the active stockpile. Generally, two to four flight tests of each type are conducted jointly with the military, and eight laboratory tests (for a total of approximately eleven) are conducted by Sandia at DOE's Pantex plant. We also perform surveillance tests on warheads in the inactive stockpile, but at a lesser rate.

By analyzing our historical surveillance databases, we know that approximately 22 percent of the defects found were discovered in flight tests. Given the stringent reliability requirements that nuclear weapons must meet, we have determined that the minimum requirement for flight tests is in the range of two to four per year, per weapon type. To help make up for current shortfalls in flight test opportunities, we have developed on-board enhanced fidelity instrumentation units to collect relevant data from fewer flight tests. Over the past year, we had several successful flight tests of more highly-instrumented W87 reentry vehicles and W76 reentry bodies. I would also add that we have experienced a specific problem over the past year, in having had a "no-test" rate (where reliability data were NOT obtained for a variety of reasons) at twice the historical rate. In light of this, the enhanced fidelity instrumentation flight tests are critically important, and provide much needed information.

Results from the stockpile surveillance program are, indeed, a foundation for maintaining confidence in the stockpile. We believe the stockpile surveillance program should continue to perform an adequate number of flight tests each year using military personnel, procedures, and hardware in order to provide a credible basis for evaluating actual system reliability. I urge you to help assure an appropriate level of support in the joint surveillance flight test program, in both the DOE and the DoD, in order to sustain continued confidence in the credibility of our strategic nuclear deterrent forces.

SUMMARY AND CONCLUSION

I have touched on some of the highlights of Sandia's role in stockpile stewardship and management. This work relies on the science and engineering technology base that maintains and ensures the safety, security, and long-term reliability of the enduring stockpile. I believe that with proper funding, DOE's stockpile stewardship plan provides the highest probability of success that we can maintain a stockpile whose quality is not in doubt.

However, without proper funding, we will increasingly face the tough dilemma of how we can simultaneously address the hardware needs of today's stockpile while adequately supporting the people and skills that are essential to maintain the stockpile, now and for the future. An important responsibility of the nuclear weapon R&D program—and a major responsibility for Sandia—is the modernization of nonnuclear "sunset technologies" in the stockpile. We can see from our planning charts that many of the systems in the stockpile will require refurbishment at about the same time — at some point in the first half of the next century. I believe the needs for extensive refurbishment will be quite urgent by 2012 to 2020. The Phase 6.3 engineering development programs we anticipate for the W76 and W80 are the first ripples of what will ultimately be a bow wave of stockpile management work.

The Stockpile Stewardship and Management Program must be prudently managed to nourish the core expertise in stockpile stewardship as well as to provide the strategic investments we must make in stockpile management — today and in the future. The attention and support of this subcommittee will be a crucial element in determining if the United States will be able to maintain its strategic deterrent under the constraints that are in place. On behalf of the men and women who labor to meet these challenges, I thank you for your past strong support and urge your continued vigilance to assure success in this work, which is so vital to this nation's ultimate defense.

Federal funding of Sandia National Laboratories:

	[Budget Authority in Millions]		
	FY96	**FY97**	**FY98**
DOE Funding[1] (by primary secretarial office)			
Assistant Secretary for Defense Programs	$ 599	$ 614	$ 648
Office Of Nonproliferation & National Security	102	126	138
Assistant Sec. for Env. Restoration & Waste Managem	129	91	94
Assistant Sec. For Energy Efficiency & Renewable Ens	40	43	43
Office of Energy Research	30	33	34
Office of Nuclear Energy	16	11	13
Assistant Sec. for Civilian Radioactive Waste Mgt.	0	0	0
Assistant Sec. for Fossil Energy	6	7	7
Office of Material Disposition	4	4	4
Other DOE offices	1	0	0
Sub-Total DOE Funded	$927	$929	$981
Non-DOE Funding[2]			
Department of Defense	196	162	167
Nuclear Regulatory Commission	12	11	9
Orders or reconciling transfers from other DOE contrac	58	72	66
Other Federal Agencies (Other Than DoD/NRC)	27	67	74
Non Federal Entities Including CRADAs	27	45	58
Sub-Total Non-DOE Funded	$320	$357	$374
Sandia Laboratories Operating	$1247	$1286	$1355
Sandia Laboratories Capital Equipment	37	28	25
Sandia Laboratories Construction	38	38	23
Sandia Laboratories Totals	$1323	$1352	$1403

Notes:
[1]Work for DOE is under a single prime contract.
[2]Number of contract actions for non-DOE sponsors:

			(est.)
Department of Defense	271	273	273
Nuclear Regulatory Commission	38	40	40
Orders or reconciling transfers from other DOE contr	206	210	210
Other Federal Agencies (Other Than DoD/NRC)	94	87	87
Non Federal Entities Including CRADAs	277	280	280
Sub-Total Non-DOE Funded	886	890	890

WITNESS DISCLOSURE FORM

Witness name: C. Paul Robinson

Capacity in which appearing: Representative

Name of entity being represented: Sandia National Laboratories

Curriculum vitae:

C. Paul Robinson serves as President of Sandia Corporation and Laboratory Director of Sandia National Laboratories. Sandia Corporation, a Lockheed Martin company, operates Sandia National Laboratories for the U.S. Department of Energy.

Dr. Robinson served as Vice President for Laboratory Development at Sandia from August 1991 through August 1995, having previously served as Director for Systems Analysis. During this period, he was responsible for strategic and operational planning, systems studies and analysis, information architectures, and new program initiatives.

From February 1988 to October 1990, Ambassador Robinson served as the Chief Negotiator and Head of the U.S. delegation to the nuclear testing talks between the U.S. and the U.S.S.R. in Geneva, Switzerland. He was appointed by President Ronald Reagan, confirmed by the U.S. Senate, and subsequently reappointed by President George Bush. Those negotiations produced two major agreements: protocols to the Threshold Test Ban Treaty and the Peaceful Nuclear Explosions Treaty.

From December 1985 to February 1988, Dr. Robinson served as Senior Vice President and Principal Scientist of Ebasco Services, Inc., a major engineering and construction firm headquartered in New York. He was responsible for the advanced technology sector of the company, with major contracts in nuclear power, advanced power systems for defense and commercial energy needs, and support activities for major U.S. and international research projects.

Dr. Robinson spent most of his early career (1967-1985) at the Los Alamos National Laboratory, operated by the University of California for the U.S. Department of Energy. Initially he served as a physicist in the Nuclear Test Division, then became a member of the advanced concepts group. He started the laboratory's efforts in laser spectroscopy, explosives-driven lasers, laser-induced chemistry and isotope separation. Dr. Robinson led the laboratory's defense programs, with responsibility for nuclear weapons research, development, testing and stockpile maintenance, strategic defense initiatives, inertial fusion, nuclear materials and safeguards, advanced conventional weapons, as well as arms control and verification activities.

Dr. Robinson earned a Bachelor of Science degree in Physics from Christian Brothers College in 1963 and a Ph.D. in Physics from Florida State University in 1967. He also was awarded an honorary doctorate from Christian Brothers University in 1989.

He is presently a member of the Strategic Advisory Group for the Commander-in-Chief, U.S. Strategic Command, where he also serves as the Chairman of the Policy Group, which is helping to develop new nuclear weapons policy for the post-Cold War period. In 1991, he served as chairman for the Presidential Technical Advisory Group on Verification of Warhead Dismantlement and Special Nuclear Materials Controls. He previously served on the Scientific Advisory Group on Effects for the Defense Nuclear Agency, as well as an advisor for other government agencies.