STATEMENT OF

ADMIRAL FRANK L. BOWMAN

DIRECTOR

NAVAL NUCLEAR PROPULSION PROGRAM

BEFORE THE

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STRATEGIC SUBCOMMITTEE

NATIONAL NUCLEAR SECURITY ADMINISTRATION BUDGET

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Naval Reactors is a centrally managed, single-purpose organization with clear lines of authority and total responsibility and accountability for all aspects of Naval Nuclear Propulsion. As the Director of Naval Reactors, I have direct access to the Secretary of the Navy and to the Secretary of Energy. Naval Reactors' principal mission is to provide militarily effective nuclear propulsion plants to the U.S. Navy and to ensure their safe, reliable, and long-lived operation.

Under the visionary leadership of Admiral Hyman G. Rickover, Naval Reactors was organized in the late 1940's with the concept of cradle-to-grave responsibility. Upon Admiral Rickover's retirement, President Reagan signed Executive Order 12344 with the express purpose of "… preserving the basic structure, policies, and practices developed for this program in the past …" This Executive Order was set forth in law, first in the 1984 Defense Authorization Act and subsequently in the FY2000 National Defense Authorization Act, as the charter for the Deputy Administrator for Naval Reactors. The charter, as incorporated within the National Nuclear Security Administration (NNSA) Act, maintains my responsibility for all aspects of the program, including:

- Research, development, design, and construction;

- Operation, operator selection and training, maintenance, and disposal; and

- Administration (e.g., security, nuclear safeguards, transportation, public information, procurement, and fiscal management).

Operating within the tenets of the Executive Order, the Naval Reactors Program has a flat organization with clear, simplified lines of authority and a culture of technical, managerial, and fiscal excellence. The longevity of its senior managers and staff ensures continuity of expertise through the extremely long lives of the nuclear propulsion plants it builds and supports. The Program has compiled an unparalleled record of success:

- Nuclear-powered warships have safely steamed over 119 million miles—equivalent to nearly 5,000 trips around the earth.

- Naval Reactors is responsible today for 103 operating nuclear reactors. For perspective, this is equal to the number of licensed commercial power reactors in the United States. In addition, over the years, we have accumulated over twice the operating experience of the U.S. commercial power industry: Naval reactor plants have accumulated over 5,100 reactor-years of operation compared to over 2,400 for the U.S. commercial industry. In addition, our operating experience is over one-half that of the entire commercial power industry worldwide (our 5,100 reactor-years compared to about 9,200 worldwide—including the United States).

- Naval Reactors' outstanding (and fully public) environmental record enables our ships to visit over 150 ports around the world—critical to our Nation's forward presence strategy and ability to project power.

Both former Senator Warren Rudman and Admiral Henry G. Chiles recognized the importance of Naval Reactors' organizational structure to its success and to national security in testimony before the full Senate Armed Services Committee last June.

Senator Rudman stated:

> We called for the integration of the DOE Office of Naval Reactors into the new agency for nuclear stewardship. We recommend this because we believe the ANS [now NNSA] should be the repository for all defense-related activities at DOE. However, we believe the Office of Naval Reactors must retain its current structure and legal authority, under which its director is a dual-hatted official, both a four-star admiral and a part of DOE.

Admiral Chiles also advised the Committee:

> …I want to state emphatically that Naval Reactors, the DOE arm of the Naval Reactors Program, is carrying out its mission in an exemplary manner. Therefore, I strongly recommend you retain Naval Reactors' authorities, responsibilities, and structure. A most important point is [that it is] crucial to ensure Naval Reactors remains outside the Department of Defense so the program can continue to successfully carry out its regulatory responsibility. I can personally attest, based upon my long and direct experience, to the success of the Naval Nuclear Propulsion Program. This program is a model of how a defense activity should be carried out within the Government.

Today's Navy operates 83 nuclear-powered warships and 1 nuclear-powered research submarine. Nuclear power enhances a warship's capability and flexibility to sprint around the world, where needed, and arrive ready for sustained power projection. The Navy has repeatedly employed the unique capabilities inherent in nuclear propulsion. Sustained high speed (without dependence on a slow logistics train) enables rapid response to changing world circumstances, allowing operational commanders to surge these ships from the U.S. to trouble spots or to shift them from one crisis area to another. Nuclear propulsion helps the Navy to stretch available assets to meet today's worldwide commitments.

- Nine of twelve aircraft carriers are nuclear-powered—growing to eleven of twelve by 2008 when CVN 77 enters the fleet. Nuclear-powered carriers can transit to a crisis area unsupported at sustained high speed and arrive fully ready to launch the awesome firepower of the airwing. Then, they can sustain that presence and response without immediate replenishment of combat consumables, with tactical mobility and flexibility, free from the need for propulsion fuel replenishment. The future carrier, CVNX, will continue to provide these benefits.

- The 56 U.S. nuclear attack submarines possess inherent characteristics such as stealth, endurance, mobility, firepower, and multimission flexibility. This affords unfettered access to contested battlespace 24-hours a day, 7 days a week for as long as required. Once there, submarines can clandestinely surveil new or emerging adversaries and provide timely insight on their intentions and capabilities to policymakers without risk of political escalation—particularly valuable since many potential adversaries understand their vulnerability to satellite reconnaissance, and often employ deceptive methods to defeat it. The usefulness of these traits has resulted in the near doubling of Intelligence, Surveillance, and Reconnaissance (ISR) tasking requirements over the last 10 years while submarine force levels have been reduced by nearly 40 percent. Should tensions escalate, submarines can also execute Tomahawk strikes from undisclosed locations without warning, often from inside an adversary's defensive umbrella.

  Additionally, within its Research and Development (R&D) programs, the Navy is investing the R&D dollars necessary to equip submarines with new and dominant technologies. The Navy is developing offboard sensors like unmanned undersea vehicles to facilitate a clearer picture of the battlespace, and is leveraging the explosion in information systems technology to more readily share this insight with other naval and joint forces in a timely and useful manner. The Navy is working to increase payload capacity and enhance multimission flexibility. These technologies will be integrated into VIRGINIA Class submarines as they are built, and backfitted into earlier submarines, where appropriate. The Navy is also pursuing electric drive technology that will dramatically improve our acoustic stealth and provide the power density required for revolutionary advances in sensors and weapons.

  Finally, it is worth noting that the Joint Staff, in conjunction with our Unified warfighting CINC's, recently completed an exhaustive 18-month study of attack submarine missions and force structure. The study reconfirmed that submarines are far from being Cold War relics. They provide unprecedented multimission capability and will continue to be of significant value as we execute the national security strategy in the challenging decades of the 21st century.

- The 18 nuclear-powered OHIO Class ballistic missile submarines are the most survivable and cost-effective leg of the Nation's strategic deterrence triad. These reliable, stealthy ships also carry more strategic warheads than the other two legs of the Nation's strategic deterrence triad combined. These ships use only 34 percent of our strategic budget and are manned by less than 1.5 percent of our naval personnel.

FY2001 DOE BUDGET REQUEST

Naval Reactors' principal charge, as well as the bulk of its resources and work, is to ensure safe and reliable operation of reactor plants in U.S. Navy nuclear-powered warships, enhance their performance, and develop improved reactor plants in support of the Navy's needs.

Sustaining today's 103 operating reactors requires continuous analysis, testing, and monitoring of plant and core performance. Nuclear propulsion is a demanding technology—the harsh environment within a reactor plant subjects equipment and materials to the deleterious effects of irradiation, corrosion, high temperature, and pressure over a lifetime measured in decades. In addition, naval reactor plants must be rugged enough to accommodate ships' pitching and rolling; have the resilience to respond to rapidly changing demands for power; be robust enough to withstand the rigors of battle; and be safe and easily maintainable for the Sailors who must live next to them.

Development efforts at Naval Reactors' DOE laboratories have led to significant advancements. Improved components and materials, longer core lives, and improved predictive capabilities have allowed the Navy to extend the service life and intervals between major maintenance periods for nuclear-powered warships. The reduction in ship off-line time for maintenance effectively increases ship availability and, thus, the Navy's warfighting capability, while also reducing maintenance costs. Added ship availability is particularly important in the face of Fleet downsizing, as the operational demands on each remaining ship increase. In the same vein, development efforts are ensuring that we can meet the Navy's need for extended warship lifetime.

However, new development and analysis challenges arise as a result of these advancements. For example, the longer intervals between major maintenance periods reduce opportunities to examine and/or replace aging components. Thus, a more extensive analytical and testing effort is required to verify materials and component performance. Extended ship lifetime also demands exhaustive testing and performance enhancements to ensure that component endurance—despite potential corrosion and mechanical strain—can be assured for significantly greater than the design life. As data are gathered from deploying ships with long-lived reactor cores, the emphasis on this area has grown. A life-of-the-ship core offers extraordinary advantages in terms of ship availability, cost reduction, and reduction in radiation exposure and waste generation; however, a life-of-the-ship core eliminates mid-life opportunities to examine reactor components. Moreover, the adverse consequences of, and the cost to deal with, a flawed core or component would be much greater. Testing and verification, therefore, will be paramount to ensure that naval reactor plants will continue to perform safely.

New DOE laboratory development work is focused on the next generation submarine reactor for the Navy's new VIRGINIA Class attack submarines and on a new reactor plant intended for the Navy's new CVNX Class aircraft carriers.

The design of the reactor plant for the Navy's VIRGINIA Class submarine will be about 93 percent complete by the end of FY2001. Currently, the design of the reactor plant for the VIRGINIA Class is about 85 percent complete. Today, 90 percent of the components have been delivered; all on schedule and within budget. The pre-reactor-fill test program has begun and is on schedule to support ship delivery. The forward end of the engine room module including associated reactor plant systems has been delivered from Quonset Point to Electric Boat for final outfitting. Overall, ship construction is 25 percent complete and is on schedule. The lead submarine incorporating this plant is expected to go to sea in FY2004. The VIRGINIA Class submarines will provide badly needed capability for the Navy at an affordable price.

In September 1998, the Defense Acquisition Board approved the Navy recommendation for a new design nuclear propulsion and electric plant for CVNX Class aircraft carriers and authorized the beginning of propulsion plant design efforts. CVNX is expected to be authorized in FY2006 and to go to sea in FY2014 to replace USS ENTERPRISE (CVN 65).

The CVNX reactor plant design will be consistent with the CVNX Mission Needs Statement approved in March 1996, the approved CVNX evolutionary strategy, and the CVNX Operational Requirements Document, which is expected to be approved shortly.

CVNX is the first new carrier designed since the 1960's NIMITZ Class design. The new design CVNX reactor plant will build on three generations of nuclear propulsion technology developed for submarines since NIMITZ to incorporate needed advancements in warfighting capabilities and to significantly reduce life-cycle costs.

Last year was the first full year of a 15-year DOE laboratory development effort on the new reactor plant for CVNX. Reactor plant design work began in earnest to support the long design and manufacturing lead-times required for reactor plant components and the CVNX ship construction schedule. Current design efforts include general arrangement studies, system description development, and component design, including sizing and system interface evaluations. Naval Reactors approved the first CVNX system description (steam generating system) this month. Current design work is focused on supporting procurement of long lead reactor plant forgings planned for FY2001 and establishing the necessary system descriptions and general arrangements required for later design activities.

Naval Reactors also is proceeding with the inactivation of six shutdown DOE developmental and training prototype reactor plants. The increased sophistication of computer models and the accumulation of operational data, along with the decrease in the need for Navy plant operators, have allowed the shutdown of six of the eight land-based prototype reactor plants. Since 1993, Naval Reactors has been inactivating and dismantling the shutdown plants as promptly as funding and manpower will allow to eliminate surplus facilities, reduce environmental liabilities, and contribute to positive remediation in three States.

This inactivation and cleanup work is progressing well. Today, this effort is over 80 percent complete. The last of the prototype reactor plants at the Naval Reactors Facility in Idaho was defueled in FY1999. By the end of FY2000, inactivation at the Windsor site in Connecticut will be complete and regulatory approval for unrestricted release is expected. Two of four prototype reactors at the Kesselring site in New York have been inactivated and defueled, and dismantlement and cleanup are proceeding.

NAVAL REACTORS DEPARTMENT OF ENERGY BUDGET DETAIL

PROGRAM TECHNICAL REQUIREMENTS

Naval Reactors' technical budget request is categorized into "areas of technology" including Reactor Technology and Analysis; Materials Development and Verification; Plant Technology; and Evaluation and Servicing. This approach conveys the integrated and generic nature of our DOE research and development work. When research, development, and design work is executed in individual technology areas, it frequently can be both retrofitted into existing ships and incorporated into future ships.

- The FY2001 request of $216.9M for Reactor Technology and Analysis will ensure continuation of work on the next generation reactor for the VIRGINIA Class submarine and development work on the new reactor for CVNX Class aircraft carriers, as well as ensure the safe and reliable operation of existing reactors. The reduction in operating plant maintenance periods places greater emphasis on thermal-hydraulics, structural mechanics, fluid mechanics, and vibration analysis work to accurately predict reactor performance and to avoid problems. The continued push for longer life cores also means we will continue to operate reactors beyond our operational experience base for many years to come. Improved analysis tools and understanding of basic nuclear data will allow us to predict performance more accurately and safely through a more than 30-year core life. Other efforts in this area are dedicated to revising core manufacturing processes to reduce cost and hazardous waste; perform reactor safety analyses; accomplish component and system development efforts to support the Navy's acoustic requirements; and develop improved shield designs to reduce costs and radiation levels.

- The $118.2M request for Plant Technology will allow Naval Reactors to develop and analyze those systems that transfer, convert, control, and measure reactor power to maximize plant performance. The request reflects the requirement to design and develop CVNX steam generators—the largest developed to date—as well as instrumentation and control equipment for the new carrier reactor plant. Development of technologies in the areas of chemistry, energy conversion, instrumentation and control, plant arrangement, and component development will continue to improve performance and address operational problems. Naval Reactors is also developing components to address known limitations or to improve reliability, including a redesigned main coolant pump for the NIMITZ Class plants and new instrumentation and power distribution equipment to replace older, technologically obsolete, and increasingly hard-to-support equipment.

- The $127.6M request for Materials Development and Verification is the amount necessary to conduct essential material analysis and testing as ships are kept in service longer than originally intended, and materials are called upon to perform safely and reliably over longer time periods. Effort on the core and core structural materials includes testing and analysis of fuel, poison, and cladding materials to verify acceptable performance, as well as developing improved materials with enhancements such as reduced susceptibility to corrosion or swelling. Testing and development of reactor plant materials also ensures reliable performance and leads to improvements such as reduced cracking and stress.

- Evaluation and Servicing ($134.0M in FY2001) decreased 17.2 percent from FY2000. The decrease is primarily due to completion of A1W prototype defueling and reduction in inactivation work at Naval Reactors Facility, Idaho and at the S1C prototype in Windsor, Connecticut. Evaluation and Servicing funds the operation and servicing of land-based test reactor plants and Naval Reactors' share of the Advanced Test Reactor, a specialized materials testing facility operated by DOE's Office of Nuclear Energy Science and Technology. Testing of materials, components, cores, and systems in these plants provides important technical data and experience under actual operating conditions, and allows potential problems to be identified and addressed before they occur in the Fleet. The two operating test reactor plants and the Advanced Test Reactor, with proper maintenance and servicing, will meet testing needs for some time.

  Evaluation and Servicing also funds the inactivation of the six prototype plants which have been shut down. Fuel has been removed from all six plants, and extensive dismantlement and disposal have been accomplished. Cleanup of one site, the Windsor site in Connecticut, is nearly complete; regulatory approval for unrestricted release is expected later this year. The other shutdown prototypes are located in Idaho and New York on sites that have continued use for the Program. At these sites, we have defueled the plants and are conducting plant and site remediation. For those plants that have progressed to dismantlement, the Program desires to complete the dismantlement work as promptly as funding and manpower allow, consistent with published environmental impact statements for those projects.

PROGRAM INFRASTRUCTURE AND ADMINISTRATIVE REQUIREMENTS

The $21.4 million in Program Direction request will cover Naval Reactors' 201 DOE personnel at headquarters, the Program's field offices, and the Idaho Operations Office, including salaries, benefits, travel, and other expenses. This staff maintains oversight of the Program's extensive day-to-day technical and administrative operations, while continuing to ensure compliance with growing environmental, safety, and other regulatory requirements, which— notwithstanding our excellent record—necessitate substantial effort.

The $42.2 million in Facilities Operations (a 9 percent decrease compared to FY2000) will maintain and modernize the Program's facilities, including the Bettis and Knolls laboratories and the Expended Core Facility (ECF).

The Construction funding request in the amount of $17.3 million principally provides for refurbishment and replacement of the Program's facilities. This includes continuation of West End Modification to the ECF Dry Cell project to allow transfer of nuclear fuel from the Idaho Nuclear Technology and Engineering Center to ECF for interim dry storage and beginning the Major Office Replacement Building project. Overall, investment in these various projects will extend the lives and improve the efficiency of the Program's facilities.

CONCLUSION

The Naval Reactors Program recently moved into its second half century of successfully supporting the Nation's national security with safe and effective nuclear propulsion plants for the Navy's most formidable forward-deployed ships. At no time in the history of our Program has the value of nuclear propulsion been more clear. As the Navy diligently works to more

efficiently meet increasing worldwide demands with decreasing assets, naval nuclear propulsion eases the strain.

Nuclear-powered warships' long lives, ability to surge to meet emergent requirements, and fast transits allow our Nation to ensure American forces are in place when needed. No other nation has this level of capability. To a large extent the credit for this capability belongs to the wisdom of the Congress, which has consistently supported our Program, our ideas, and the way we conduct business.

Naval Reactors, working with the Navy and the DOE, is committed to maintaining this record of excellence and ensuring that our technology meets the rigorous demands of this new century. Your support will continue to be needed and appreciated.