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STATEMENT OF

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TO THE

SENATE ARMED SERVICES COMMITTEE

STRATEGIC SUBCOMMITTEE

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**Statement of Admiral Frank L. Bowman, U.S. Navy**
**Director, Naval Nuclear Propulsion Program**
**U.S. Department of Energy**
**FY 2003 Armed Services Committee Hearing**

Thank you for inviting me to submit a statement on Naval Reactors' FY03 Department of Energy budget request.

Let me also thank you for the faith you continue to place in my Program and for protecting the core values that have been the hallmark of the Program's success for more than 50 years. Through your diligent efforts and support, our nuclear fleet remains deployed around the world, fully engaged in the war on terrorism.

We all recognize that the threats our country faces today are as great as anytime in the past. We also know these threats are not limited to hostile nations with fixed borders but can come from organizations with no fixed borders, operating under a veil of secrecy and outside the international community.

Our ongoing campaign against terrorism underlines the importance of nuclear-powered ships in defending our national interests and in responding to aggression against the United States. As our Nation was being attacked on September 11, USS ENTERPRISE was headed home, by way of a planned port visit. Upon seeing the attack on our country on CNN at sea, the captain ordered the rudder hard over and USS ENTERPRISE reversed course and prepared for action as the first aircraft carrier in position to respond to the attack. Also, a nuclear-powered submarine was within striking distance to attack targets in Afghanistan on September 11.

When the President did order our military forces into action, aircraft from the nuclear-powered aircraft carriers, ENTERPRISE and CARL VINSON, along with *Tomahawk* missiles launched from submarines and surface ships, carried out the initial attacks on targets in Afghanistan without any of the restrictions imposed on most land-based aircraft. Our nuclear fleet again demonstrated its capability to operate freely over much of the globe within striking range of the majority of targets.

It is more than a commercial—our aircraft carriers are 4½ acres of sovereign U.S. territory from which we can conduct sustained combat operations quickly and without having to negotiate staging rights on foreign soil. Nuclear power enhances these warships' capability and flexibility to sprint where needed and arrive ready for around the clock power projection and combat operations. Sustained high-speed capability (without dependence on a slow logistics train) enables rapid response to changing world circumstances, allowing operational commanders to surge these ships from the United States to trouble spots or to shift them from one crisis area to another. Nuclear propulsion helps the Navy stretch available assets to meet today's worldwide commitments.

Our 54 operational nuclear attack submarines (SSNs) in the Navy's inventory possess inherent characteristics such as stealth, endurance, mobility, firepower, and multimission flexibility. These characteristics allow submarines unfettered access to contested battlespace 24 hours a day, 7 days a week, for as long as required. Once there, submarines can covertly monitor adversaries without risk of political or military escalation—a particularly valuable capability since adversaries understand and can sometimes avoid reconnaissance. Should tensions escalate, submarines can also execute *Tomahawk* strikes from undisclosed locations without warning, often from inside an adversary's defensive umbrella.

The Nation's 18 strategic ballistic missile submarines (SSBNs) continue to form the bedrock of the country's strategic deterrence. These submarines carry the majority of our nuclear triad's warheads and are the most survivable units in this force, at the least cost.

Many of the impressive capabilities these ships possess were developed with funding that was supported by this subcommittee.

While new development is important, the number-one priority is ensuring the officers and Sailors that are out there defending our Nation's interests are operating safe, effective nuclear propulsion plants. This is where most of Naval Reactors' funding goes. Today, the Naval Reactors Program supports 102 reactors in 54 operational attack submarines, 18 ballistic missile submarines, 9 nuclear-powered aircraft carriers, 4 training and prototype platforms, a deep submergence vehicle, and 1 attack submarine undergoing inactivation.

The average age of these ships today is 16 ½ years, but this average will exceed 22 years by the end of the decade because so few new ships are being added to the Fleet. As these ships age, they place a greater and greater demand on Naval Reactors' DOE budgets.

Also, with the funding authorized by this subcommittee, we are designing better, more cost-effective nuclear propulsion plants for the future. When the Navy's new VIRGINIA-class attack submarine is delivered, it will provide needed capability for the 21$^{st}$ century at an affordable price. The reactor plant design uses advanced component and systems technology—including the first core designed from the start to operate throughout the life of the ship. The VIRGINIA-class also has a simplified plant arrangement with fewer components compared to previous designs, which reduces construction costs and will reduce future maintenance costs.

The nuclear propulsion plant design of the new CVNX-class aircraft carrier is well underway. The CVNX reactor plant will provide 25 percent more energy than NIMITZ-class ships and substantially more electric generating capacity than the reactors and electric plant used in NIMITZ-class ships. The extra energy will support higher operational tempos and future electrical load growth in the CVNX-class or longer life. We are designing and developing the CVNX nuclear propulsion plant without an increase in our DOE budget.

To meet the increasing demands on our submarine fleet, Naval Reactors is working on a Transformational Technology Core (TTC) to deliver a significant energy increase to future VIRGINIA-class ships with minimum impact to the overall ship design.

New transformational capabilities will soon be coming to the nuclear-powered submarine fleet through the conversion of four Trident submarines into SSGNs. With these ships, the Navy will be able to give theater CINCs an extraordinary strike/Special Operating Forces capability with a flexible, survivable platform that simultaneously relieves the operational strain on our naval forces. Surface ships and attack submarines now carrying *Tomahawks* can be freed up for other missions—a force multiplier. To this end, we are on course for a UUV and *Tomahawk* demonstration in December 2002 on an OHIO-class submarine.

**NUCLEAR FLEET ISSUE**

Let me briefly discuss the most important issue I see with our submarine fleet today—put simply, we do not have enough of them:

- Today, we have only 54 operational SSNs – not enough to meet all of the Unified CINCs' and the national intelligence community's highest operational and collection requirements as identified in the 1999 Joint Staff SSN report on force level.

- Fleet operational data and Joint CINC demands clearly show the mismatch between current force structure and requirements. With force structure decreasing over the past several years, submarine operational commanders have had to reduce the number of deployed ships. And in spite of the fact that fewer SSNs have been available to deploy, the demand for submarines continues to increase, especially since September 11.

- The Navy is doing what it can to stretch existing assets to meet requirements within today's budget and overall priorities. For example:

  - We are refueling the first generation of the LOS ANGELES-class submarines and extending these submarines from 30 to 33 years. However, pushing the hull life comes at a cost. Life extension exacerbates the "aging Fleet" problem. As the Fleet ages, more resources are required for support, and we have our young submariners out there with outdated technology.

  - Additionally, to improve the operational effectiveness of the submarine fleet, we have taken steps to forward-base three submarines in Guam to maximize their effectiveness by putting them closer to the action.

  - To meet just the highest priority requirements being placed on the submarine fleet, we should refuel all remaining LOS ANGELES-class submarines. Two are currently scheduled for inactivation. While this is the right near-term decision to stem the bleeding for submarine force restructure, refueling LOS ANGELES-class submarines does not solve the longer-term problem with submarine force structure. Next decade, we will decommission three or four LOS ANGELES-class submarines per year as the boats built in the 1980s reach end of service life.

The only long-term solution to meeting force level requirements is to build more submarines. As we consider future budgets, we must include increasing the VIRGINIA-class submarine build rate to meet the Nation's long-term force level requirement for attack submarines. The force level issue is ultimately a resource question. The practice of buying submarines one at a time will not achieve the submarine numbers we need for the future and is not a cost-effective way to buy anything, including submarines. Multi-year procurements of more than one ship per year would provide significant savings compared to one per year. Coupled with leverage from buying material in Economic Ordering Quantities, real savings can be achieved. Innovative contracting approaches should be encouraged in this period of tight resources for ship construction.

As my good friend, Admiral Bob Natter, our Atlantic Fleet Commander, says, "We can fight 'em here or we can fight 'em over there. I prefer to fight them over there." Well, me too. Everyone knows and agrees submarines will be an absolutely necessary part of fighting them over there. Deputy Secretary of Defense Paul Wolfowitz recently said we must exploit our military strengths as the war on terrorism continues. These strengths, he said, are intelligence, precision strike, and the ability to operate underwater. Well, that sounds just like submarines to me. We need to get going.

**FY03 DEPARTMENT OF ENERGY BUDGET REQUEST**

Naval Reactors' FY03 DOE budget request is $708M, an increase of only $5M after inflation from FY02 to FY03. To put my budget request in perspective, it is less than 4 percent of the DOE budget. From the early 1990s to 2000, Naval Reactors' budget has declined 32 percent in real terms, and has remained fairly steady for the last 3 years.

Naval Reactors supports the 81 nuclear-powered warships that make up over 40 percent of the Navy's major combatants. This responsibility includes ensuring safe and reliable operation of reactor plants in these ships, enhancing the reactor plants' performance, as well as developing improved reactor plants to support the Navy's needs for the future.

Sustaining today's 102 operating reactors requires continual 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 harmful effects of irradiation, corrosion, high temperature, and high 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 shock; and be safe and easily maintainable by the Sailors who must live next to them.

Naval Reactors' DOE laboratories have made significant advancements in components, materials, core lives, and predictive capabilities. These advancements allowed the Navy to extend the service life and intervals between major maintenance periods for nuclear-powered warships and to reduce ship off-line time for maintenance. Increasing ship availability also increases the Navy's warfighting capability, while reducing maintenance costs. Added ship availability is particularly important in the face of Fleet downsizing, because the operational demands on each remaining ship continue to increase. In the same vein, some development

effort is devoted to ensuring Naval Reactors can meet the Navy's need to extend warship lifetime. Longer ship lifetimes are achievable because we are able to extend reactor plant lifetime. But longer lifetimes require more resources to support an older fleet.

We are able to extend the lifetime of existing reactor plants because of the robust designs that resulted from solid engineering and design work done upfront. After significant additional engineering work, we determined that those reactor plants will be able to stay in service longer than we had originally intended. The engineering work to support those ships in their extended lives will continue during that period of life extension. For new reactor core and reactor plant designs, we are using the experience of the past 50+ years to incorporate improvements into both design and construction. It is imperative that we continue to deliver robust designs. It is equally important that we do the necessary engineering work now to ensure that those reactor plants are able to meet the needs of national defense now, and for the next several decades.

New plant development work at the Program's DOE laboratories is focused on completing the design of the next-generation submarine reactor for the Navy's new VIRGINIA-class attack submarines and on continuing the design for a new reactor plant for the Navy's new CVNX-class aircraft carriers.

The design of the reactor plant for the VIRGINIA-class submarine is nearly complete. Today, 100 percent of reactor plant components have been delivered—all on schedule to support ship construction, and within budget. The pre-reactor-fill testing and initial reactor fill for the lead ship have been completed. Reactor plant construction is over 98 percent complete, and overall lead ship construction is over 70 percent complete and on schedule. VIRGINIA is expected to go to sea in FY04 and will provide needed capability for the Navy at an affordable price.

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

Reactor plant design work is on schedule to support the long design and manufacturing lead-times of reactor plant components needed for the CVNX ship construction schedule. Current design efforts include general arrangement design, system description and diagram development, and component design (such as final sizing and system interface evaluations). Long-lead reactor plant forging procurements began in FY01, and the first reactor core procurements will begin in FY03. Necessary system descriptions and general arrangements required for later design activities have been established.

Major inactivation work on shutdown prototype reactors is nearly finished. The last of the prototype reactor plants at the Naval Reactors Facility in Idaho was defueled in FY99. Inactivation and cleanup work at the Windsor site in Connecticut is complete, and regulatory approval for unrestricted release has been requested. The two shutdown prototype reactors at the Kesselring site in New York have been inactivated and defueled, and major dismantlement work will be completed in FY02.

## PROGRAM BUDGET REQUIREMENTS

Naval Reactors' FY03 DOE budget request of $708M is adequate to meet Program requirements for now. To live within our means over the past several years, Naval Reactors has eliminated infrastructure, consolidated functions and facilities, revised work practices to become more efficient, and downsized the nuclear industrial base. To support higher priority efforts—fleet support, CVNX- and VIRGINIA-class reactor plant designs, spent fuel processing, and prototype inactivation work—I have deferred important work, such as advanced reactor technology work and technology development for a submarine with electric drive, dismantlement and clean up of shutdown facilities and laboratory facility upgrades. It is not healthy to defer advanced concept development for a long period. This is the seed corn to meet future requirements and to ensure that we maintain our preeminent position in naval power. In addition, my laboratory facilities are approaching or exceeding the 50-year point and need upgrading and refurbishment. Also, we are beginning development of a new, high-energy core to meet Fleet demands in the future. I am reviewing future resource requirements to determine what will be necessary to deliver technology the Fleet will need in decades ahead.

## NAVAL REACTORS FY03 DEPARTMENT OF ENERGY BUDGET DETAIL

Naval Reactors' technical budget request is categorized into four areas of technology: ***Reactor Technology and Analysis***, ***Plant Technology***, ***Materials Development and Verification***, and ***Evaluation and Servicing***. This approach supports the integrated and generic nature of our DOE research and development work. The results of Naval Reactors DOE-funded research, development, and design work in the following technology areas will be incorporated into future ships, and retrofitted into existing ships.

- The $228.6M requested for ***Reactor Technology and Analysis*** will fund continued work on the next generation reactor for the VIRGINIA-class submarine and development work on the new reactor for CVNX-class aircraft carriers, and will ensure the safe and reliable operation of existing reactors. The reduction in operating plant maintenance periods places greater requirements on thermal-hydraulics, structural mechanics, fluid mechanics, and vibration analysis work to accurately predict reactor performance and to identify and avoid problems. Also, the continued push for longer life cores means we will continue to operate reactors beyond our operational experience base for many years to come. Developing improved analysis tools and a better understanding of nuclear data will allow us to predict performance more accurately throughout extended core life. Other efforts in this area include improving and streamlining core manufacturing processes to reduce cost and hazardous waste, performing reactor safety analyses, developing components and systems to support the Navy's acoustic requirements, and developing improved shield designs to reduce costs while preserving our record of excellence in radiological and environmental control. In addition, Naval Reactors is beginning concept studies on a new high-energy core, the transformational technology core (TTC), to support increased Fleet operation requirements.

- The $112.1M requested for ***Plant Technology*** provides funding to develop and analyze those systems that transfer, convert, control, and measure reactor power to maximize plant performance. The request reflects the goal of enhancing steam generator performance, which will benefit CVNX steam generators—the largest components developed to date by Naval Reactors. Development of technologies in the areas of chemistry, energy conversion, instrumentation and control, plant arrangement, and component development will continue to improve performance and support operational requirements. Naval Reactors is also developing components to address known limitations or to improve reliability of instrumentation and power distribution equipment to replace older, technologically obsolete equipment that is increasingly difficult to support.

- The $136.2M requested for ***Materials Development and Verification*** will fund essential material analysis and testing as ships are kept in service longer than originally intended as well as part of Naval Reactors' share of the Advanced Test Reactor (ATR). Reactor core and reactor plant materials will have to perform safely and reliably for a longer time. Work 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 materials with improved corrosion resistance. Testing and development of reactor plant materials also ensures reliable performance and leads to improvements such as reduced cracking and stress.

- The $144.4M request for ***Evaluation and Servicing*** sustains the operation, maintenance, and servicing of land-based test reactor plants and part of Naval Reactors' share of the ATR, a specialized materials testing facility operated by the DOE Office of Nuclear Energy, Science, and Technology. Materials, components, cores, and systems in these plants provide important technical data and experience under actual operating conditions, thus allowing potential problems to be identified and addressed before they occur in the operating Fleet. With proper maintenance, upgrades and servicing, the two operating test reactor plants and the ATR will continue to meet testing needs for quite some time.

  Evaluation and Servicing funds also support initiation of a dry spent fuel storage process line that will allow for placement into dry storage at Naval Reactors Facility (NRF) of naval spent nuclear fuel currently stored at the Idaho Nuclear Technology and Engineering Center (INTEC). Additionally, these funds support ongoing cleanup of facilities at all Naval Reactors sites to reduce hazards to personnel, and reduce potential liabilities due to aging facilities, changing conditions, or accidental releases.

**PROGRAM INFRASTRUCTURE AND ADMINISTRATIVE REQUIREMENTS**

- In addition to the budget request for the important technical work discussed above, infrastructure and administrative funding is also required for continued operation of the Program. Specifically, the FY03 budget request includes:

- ***Facility Operations:*** $50.0M in funding is to maintain and modernize the Program's facilities, including the Bettis and Knolls laboratories and the Expended Core Facility (ECF).

- ***Construction:*** $11.3M in funding is to refurbish and replace Program facilities. This includes the continuation of the ECF Dry Cell project in Idaho, which will significantly improve Naval Reactors' ability to process naval spent fuel for dry storage. (As identified and agreed to in a Settlement Agreement signed by the Department of Energy, the Navy, and the State of Idaho, Naval Reactors fuel must be among the early shipments of spent fuel to the first permanent repository or interim storage facility.) The requested funding also enables the continuation of the Major Office Replacement Building project.

- ***Program Direction:*** $25.4M in funding is to cover Naval Reactors' 191 DOE personnel at Headquarters and the Program's field offices, 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, all of which, notwithstanding our excellent record, necessitate substantial effort.

**PERFORMANCE MEASUREMENTS, GOALS, AND ACCOMPLISHMENTS**

My Program has a long history of operating with the highest levels of integrity and operational accountability. Our husbanding of taxpayer dollars provided by this subcommittee has been positively recognized in two very recent reports. In forwarding my FY03 budget request to you, The Office of Management and Budget (OMB) rated Naval Reactors as "Effective"—the highest adjectival rating on OMB's scale and noted: "Outputs are identifiable and make key contributions to national security. Delivery schedules are consistently met. Contracts have positive and negative incentives, and include performance requirements."

Furthermore, in a report dated December 12, 2001, the General Accounting Office recognized Naval Reactors' strong performance within DOE and NNSA. The report stated: "The Office of Naval Reactors, which is a part of NNSA, has long been recognized as having a focused mission, strong leadership, clear lines of authority, long-serving employees, and a strong set of internal controls, as well as a culture that enhances accountability and good control over its costs and contractor performance." The Naval Reactors Program has always been dedicated to continual improvement. We use semiannual reviews of short- and long-range plans to rebaseline work and revisit Program priorities. Monthly financial reports from contractors are used to compare actual performance against short- and long-range plans. Additionally, Naval Reactors headquarters maintains close oversight of its Management and Operating contractors through periodic reviews, formal audits, and performance appraisals.

For FY01, my Program met or exceeded all three major performance targets. We ensured the safety, performance, reliability, and service life of operating reactors for uninterrupted support of the Fleet. We exceeded 90 percent utilization availability for test reactor plants, and by the end of FY01, U.S. nuclear-powered ships had safely steamed over 122 million miles. Naval Reactors developed new technologies, methods, and materials to support reactor plant design, which

included surpassing the FY01 goal of 93 percent design completion of the next generation submarine reactor. We initiated detailed design on the reactor plant for the next generation aircraft carrier, which is on schedule to meet the planned ship construction start. Additionally, Naval Reactors maintained its outstanding environmental performance—no personnel exceeded Federal limits for radiation exposure, and no significant findings resulted from environmental inspections by State and Federal regulators.

**CONCLUSION**

The ongoing support of the Senate Armed Services, Strategic Subcommittee, is one of the most important factors in our success story. The Subcommittee has recognized the requirements and demands the Program confronts daily: a growing need for power projection and forward presence far from home, which strains our dwindling number of nuclear ships; an aging nuclear fleet; and the funding required to meet these commitments today and in the future.

The unique capabilities inherent in nuclear power have played a vital role over the past 50 years in our Nations' defense. This legacy is as strong and vibrant today as it ever has been. Actions in the Persian Gulf, peacekeeping actions in Eastern Europe, and, most recently, the war against terrorism have demonstrated the value of nuclear power. With your continued support, this legacy will continue far into the future as the Nation meets each new threat with strength and resolve. Naval Reactors' record is strong, the work is important, and the funding needs modest.

I thank you for your support.