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Testimony Before the

House Armed Services Committee

Projection Forces Subcommittee

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Good afternoon. I'm John Casey, President of Electric Boat Corporation. It is my distinct privilege and honor to speak to you today on behalf of the men and women of General Dynamics Electric Boat.

I want to thank the committee for conducting this hearing to discuss our nation's submarine industrial base and the Navy's submarine force level. During my career at Electric Boat, I have seen dramatic changes in the People, Product and Processes that make up the submarine industrial base. From my first-hand experience, from tradesman to my position today, I believe unequivocally that our nation's capability to design and build submarines is a vital national asset; and that if it is not continually exercised and advanced, it will be lost.

Today, I want to address several topics. First, I will briefly recount how we have reengineered to adapt to the changes brought forward by the end of the Cold War and resultant low-rate submarine production. Second, I'll address the current Navy force structure plan and its impact on our submarine design and construction workforce. Finally, I'll address how industry and our Navy customer are working together to cut costs, improve processes and deliver the world's finest submarines for the Navy and the nation's taxpayers.

### **A Brief History – Adapting To Change**

The history of the United States submarine force is a testament to Electric Boat's commitment and contribution to submarine design and construction technology. Beginning with the USS NAUTILUS in 1954, through the newest submarine, USS VIRGINIA, a total of 194 nuclear submarines have been delivered to the United States Navy. Of these 194 submarines, Electric Boat has provided twice as many as all other shipbuilders combined. Of the 19 nuclear submarine classes developed for the Navy,

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Electric Boat designed 15 – including every strategic missile submarine ever put to sea by the U.S. Navy. For the last 40 years, Electric Boat has been the sole builder of every U.S. Navy strategic missile submarine, the weapon that helped win the Cold War. Simply put, when it comes to submarines, this country comes to Electric Boat.

*Reengineered for Low Rate Production*

The fall of the Berlin Wall and the demise of the Soviet Union ushered in a vastly different era with immense impact for our Nation’s submarine industrial base. With the abrupt cancellation of the SEAWOLF program in 1992, Electric Boat was confronted with the challenge of remaining a viable enterprise in the face of a business future where its sole production program had been canceled. Electric Boat responded to this challenge with an immediate and complete reengineering of its business.

As a result of this massive effort, Electric Boat has led the industry in shedding excess production capacity, reducing overhead and infrastructure costs, and developing tools and methods to preserve critical skills and capabilities during low-rate production. These actions have resulted in actual and projected cost savings of more than \$2.7 billion from 1993 to 2010. Over 95 percent of those savings accrue to the Government.

*Innovation at Flank Speed*

Perhaps at no time in our history has Electric Boat demonstrated the full depth and breadth of its technical and production capability more than in the last two years, delivering the USS VIRGINIA, the lead ship of the Navy’s newest attack submarine program, and two newly transformed ships: the USS JIMMY CARTER and the USS OHIO (SSGN 726). This remarkable achievement was only possible because we had the infrastructure in place, actively engaged in designing and producing nuclear submarines.

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The lead ship of the VIRGINIA Class, USS VIRGINIA, was delivered in October 2004. Designed by Electric Boat, the VIRGINIA Class is the first US naval combatant ship designed to operate in the post Cold War threat environment. It is the first fully electronic ship design and the first ship to be designed using a revolutionary design / build process, pioneered by Electric Boat.

The delivery of the lead ship, within four months of the original schedule established a decade earlier, and deployment on her first mission 18 months ahead of plan, is an unprecedented achievement in modern shipbuilding. The ship completed its first deployment in September 2005, and in the words of the commanding officer, “performed remarkably.”

Today, the VIRGINIA Class provides the submarine force with the capabilities it needs to dominate both the open ocean and the littorals. In addition to anti-submarine warfare, anti-surface ship and counter mine missions, it is a potent platform for surveillance, Special Operations, and strike capabilities that allow it to prosecute the Global War on Terror. Looking to the future, its innovative modular design and modular construction process will allow us to reduce the cost of future ships and introduce new capabilities, ensuring that the ship will remain relevant against new threats well into the future.

Following closely on the heels of the delivery of the USS VIRGINIA, Electric Boat delivered the USS JIMMY CARTER, the third and final submarine of the SEAWOLF Class. This milestone marked the second submarine delivery by Electric Boat in three months. Unlike its two sister ships, the USS JIMMY CARTER includes a unique 100-foot long hull section that provides greatly enhanced payload capacity. This enables the ship to accommodate the advanced technology required to develop, test and deploy the next generation of weapons, sensors and undersea vehicles. Beginning with a notion for this special section that was little more than a viewgraph, Electric Boat moved from concept design, to completion of detail design in 29 months -- half the time historically

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needed to advance through this development cycle. Through the benefit of concurrent design and construction, five months later this 2,500 ton module was delivered from our Quonset Point, RI manufacturing facility, to the Groton shipyard, for final assembly.

Electric Boat is also the prime contractor for the conversion of four OHIO Class submarines to SSGN configuration underway at the Norfolk Naval Shipyard and at Puget Sound Naval Shipyard. When the Nuclear Posture Review determined that 14 of the 18 strategic missile submarines provided sufficient strategic deterrence, the Navy decided to reconfigure the first four submarines in the class which had more than 20 years of useful service life remaining. Drawing on its OHIO program history and technical innovation, Electric Boat developed a plan to transform these four ships no longer required for strategic deterrence into highly capable, tactical platforms. Moving from concept to sea in 39 months, the first of these ships, USS OHIO, returned to service in February of this year.

When completed, these four newly transformed SSGNs will operate stealthily and independently, providing non-provocative reconnaissance, large scale special operations force presence, and the ability to put massive firepower on time-critical targets.

### *Industry Benchmarking*

In designing, building, and delivering these three highly complex warships, Electric Boat has set an unprecedented pace for ship engineering and construction. With this demonstrated record of major accomplishments, Electric Boat stands clearly as the premier resource in the world for nuclear submarine design and construction technology.

Electric Boat is recognized not just as the premier U.S. submarine designer and builder, but as a world-class shipyard based on independent analysis by internationally recognized shipbuilding industry consultants. In late 2004, the Deputy Under Secretary of Defense

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for Industrial Policy (DUSD-IP) commissioned First Marine International (FMI) to conduct a *Global Shipbuilding Industrial Base Benchmarking Study* of the major U.S. and top-performing international shipyards. The resulting report, *First Marine International Findings for the Shipbuilding Industrial Base Benchmarking Study, Part 1: Major Shipyards*, was submitted to the House and Senate Armed Services Committees and the House and Senate Defense Appropriations Subcommittees on January 9, 2006, by the Under Secretary of Defense.

Key findings of that report were:

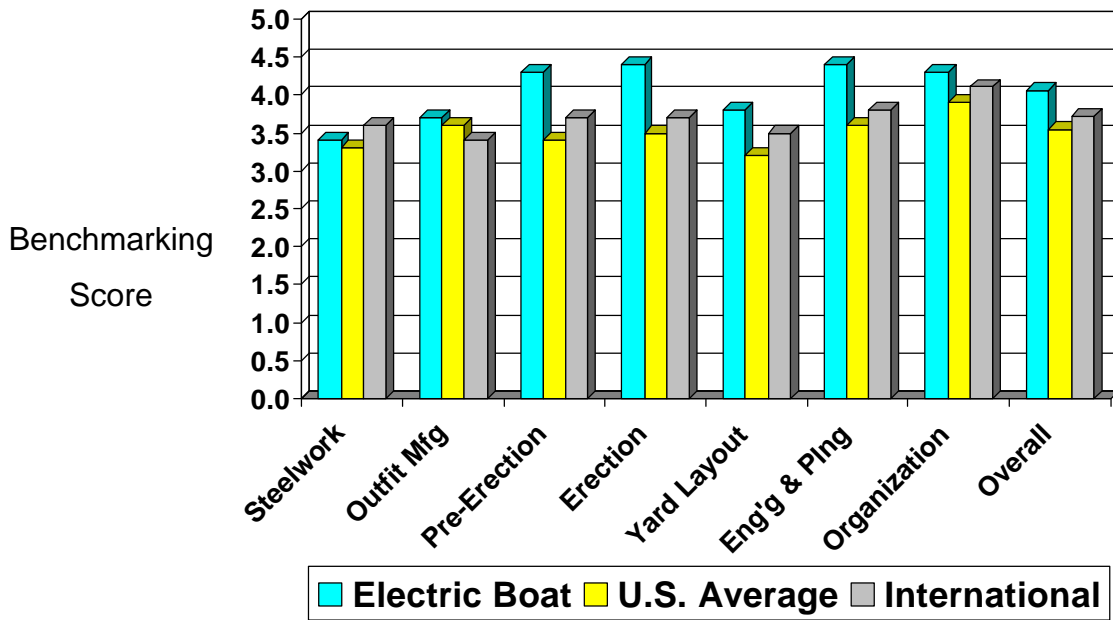
- “The six major private shipyards have made progress in improving shipbuilding best practices since 1999.”
- “There has been an increase in performance improvement activity and some substantial investments in facilities, plant, and equipment.”
- “U.S. Naval vessels appear to have more work content and increasingly complex naval ship designs than comparable international vessels.”
- The six major U.S. yards averaged 3.6 on a 5.0 scale, commensurate with a top international yard average of 3.8.

The FMI study examined seven major areas of shipyard technology and productivity:

- Steelwork production
- Outfit manufacturing and storage
- Pre-erection activities
- Ship construction and outfitting
- Yard layout and environment
- Design, engineering, and production engineering
- Organization and operating systems

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In all seven areas, Electric Boat exceeded the U.S. average, and in six of the seven areas Electric Boat exceeded the international average. In fact, in two of the areas Electric Boat scored higher than any international yard, and equaled the top international performance in four others. The one area where Electric Boat did not excel, steelwork production, was the result of having older, less automated technology in the plate and shape storage and handling categories, an area FMI explicitly stated was at the correct level of technology given the limited value of steelwork in a submarine as compared to a commercial vessel. FMI noted that “to achieve the lowest cost, a shipyard needs to have an appropriate level of technology for its cost base, its product mix and throughput. The extent to which the use of best practice influences productivity in a particular area is related to the proportion of man-hours spent in the area.”



**Electric Boat was the top-performing major U.S. shipyard, and met or exceeded world-class standards.**

The graph above shows the relative performance of Electric Boat, compared to other U.S. and international shipyards. It clearly demonstrates that Electric Boat is a world-class shipbuilder, with processes and technologies equivalent to or better than those found in the top-performing international commercial shipyards.

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### *Submarine Supplier Base*

Since 1996 the number of Electric Boat's active suppliers has shrunk by 38 percent to 4,825 from 7,800. In the early 1990s we had more than 11,000. This has led to approximately 80 percent of contractor furnished material for a Virginia Class submarine being awarded on a single or sole source basis.

Some specific examples of single-source suppliers include Hansome Energy, Curtiss-Wright Engineered Pump Division and Mittal Steel.

Hansome Energy (Linden, NJ) is our single-source supplier of acoustically quieted electric motors used in the Virginia Class propulsion plant and seawater connected pump services. Quiet motor technology is critical to future quieting and electric drive initiatives.

Curtiss-Wright Engineered Pump Division (Phillipsburg, NJ) is the single-source supplier of acoustically quieted propulsion plant and seawater connected pump services for the VIRGINIA Class. Should they exit the submarine pump business, a significant investment would have to be made in quiet pump production test facilities.

As a result of US Steel exiting the plate business, Mittal Steel is now the sole domestic producer (although foreign owned by Mittal Building Company of New Delhi India) of HY-80 and HY-100 steel plate. Mittal's "206" mill (Coatesville, PA) is dependent upon shipbuilding to maintain consistent production due to limited demand for extra wide plates. Currently the only potential alternative is Luxembourg-based Arcelor, a company that Mittal is now attempting to acquire. Overseas procurement of steel plate for U.S. nuclear submarines would result in significant cost and schedule impact.

Our submarine supplier base is fragile. Beyond the slow rates of orders for their submarine related products they suffer from drastically rising health care, material, and

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energy costs and have to continually make decisions on whether to shift to more stable and profitable commercial product lines. We must hold on to these critical material and component providers.

### **Submarine Force Structure – The Navy’s Plan**

The strength of Electric Boat is largely due to its singular focus -- our dedication to the nation’s nuclear submarine programs. Not surprisingly, this also presents us with the greatest threat to our future -- our success and the preservation of this unique national capability is inextricably linked to the Navy’s submarine programs. That is why it is absolutely critical that we work together — industry, the Navy, and the Congress — to develop a long term plan that will ensure the predictability and stability of these programs.

In 1996, Congress directed that VIRGINIA Class submarines be constructed by the two shipyards capable of constructing nuclear warships. Accordingly, the VIRGINIA Program acquisition plan was developed to ensure procurement properly addressed submarine force structure requirements and adequately provided the volume necessary to support the two-builder base. This procurement plan relied, in part, on volume to control unit price.

At the beginning of the program, it was estimated that the fifth and follow VIRGINIA Class ships would cost about \$1.55B each in FY1995 dollars. This cost estimate assumed the Navy would purchase 2 ships per year. As the chart below indicates, we have seen 10 changes to the VIRGINIA acquisition profile in as many years. The start of two ships per year has been postponed by a decade, from 2002 to 2012. This loss of volume has been a key contributor to program cost growth.

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### Changes to VIRGINIA Class Procurement

	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	TOTAL
DEC 95	1	0	1	0	2	2	2	2	2	2	2	2	2	2	2	24
DEC 96	1	1	0	1	1	0	1	2	2	2	2	2	2	2	3	22
NOV 97	1	1	0	1	1	0	1	2	2	2	3	3	2	3	2	24
FEB 98	1	1	0	1	1	0	1	2	2	2	3	3	2	3	2	24
OCT 98	1	1	0	1	1	0	1	1	2	2	3	3	3	3	2	24
MAR 99	1	1	0	1	1	1	1	1	2	2	3	3	2	3	2	24
JUN 00	1	1	0	1	1	1	1	1	1	2	2	3	3	2	3	23
JUN 01	1	1	0	1	1	1	1	1	1	2	2	3	2	2	3	22
APR 02	1	1	0	1	1	1	1	1	1	1	2	2	2	2	3	20
MAY 03	1	1	0	1	1	1	1	1	1	2	2	2	2	2	3	21
MAR 04	1	1	0	1	1	1	1	1	1	1	1	2	2	2	2	18
JAN 05	1	1	0	1	1	1	1	1	1	1	1	1	1	1	2	15
JAN 06	1	1	0	1	1	1	1	1	1	1	1	1	1	1	2	15

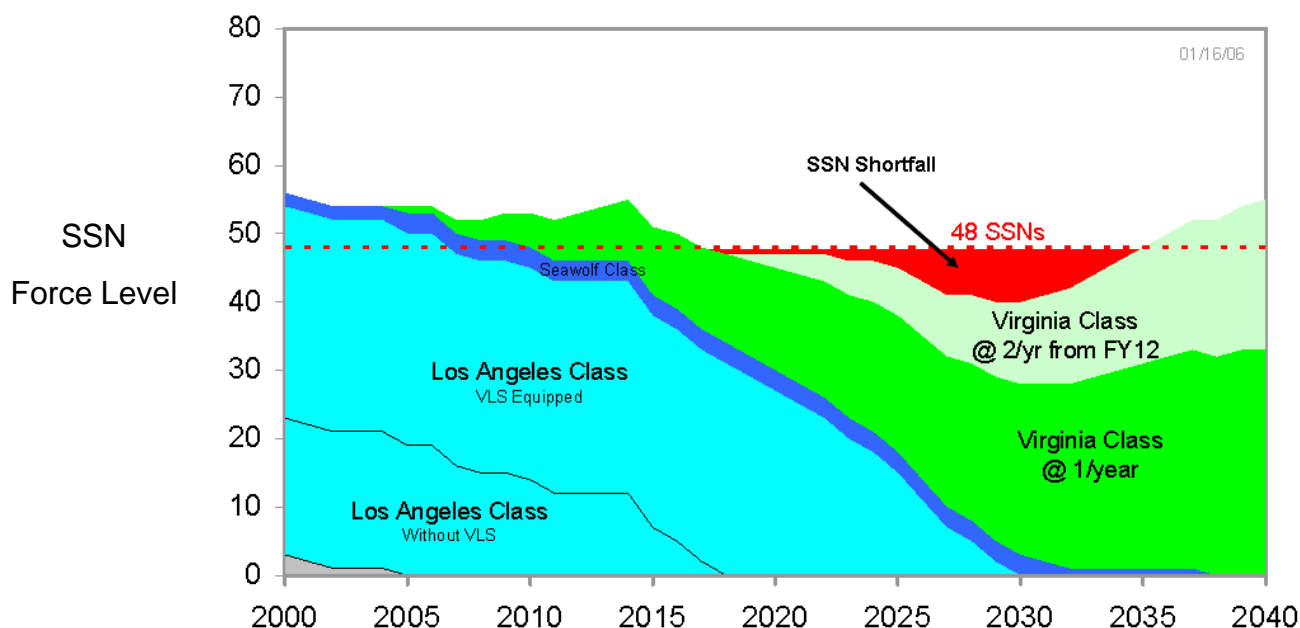
**The FY06 shipbuilding plan again delayed the start of 2 ships / year from FY09 to FY12.**

The Navy's recently submitted long-range shipbuilding plan establishes the attack submarine force level at 48 ships. As previously noted, the current VIRGINIA acquisition plan calls for VIRGINIA procurement to continue at a rate of one ship per year through fiscal year 2011. Despite this increase, the plan will leave the Navy short of its stated force level requirement for more than 16 years, starting in 2018 and going through 2034.

In an apparent recognition of this shortfall, the 2006 Quadrennial Defense Review recommended "a return to steady-state production rate of two attack submarines per year not later than 2012 while achieving an average per-hull cost objective of \$2 billion" in FY2005 dollars. If we begin 2 ships per year in FY2009, this will mitigate the risk posed by the SSN Force Level shortfall by making it less deep and over a shorter span.

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## Attack Submarine Force Level



**Accelerating procurement to 2 ships per year starting in FY09 will mitigate force level shortfall.**

### Submarine Design and Construction Workforce

Today, Electric Boat employs about 11,400 people. Our workforce includes a cadre of more than 3,000 engineering and design personnel with the unique skills and capabilities that cover the entire spectrum of submarine technologies.

These unique skills are most apparent on the design side, and include such varied specialties as:

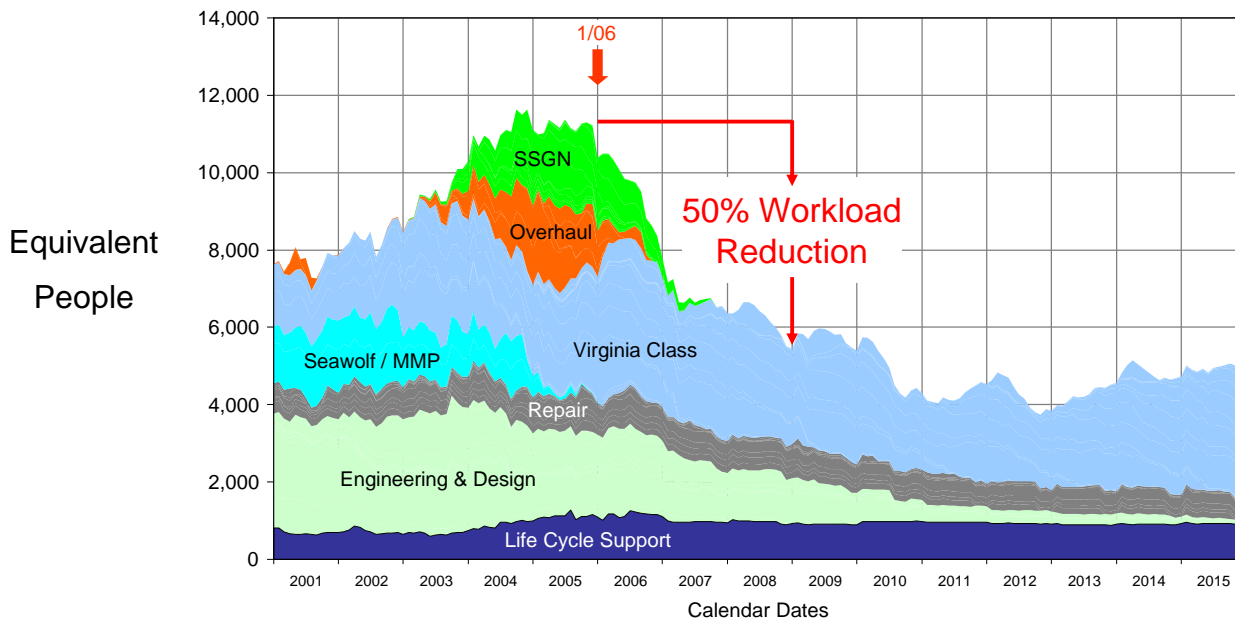
- Submarine hydrodynamicists and hydro-acousticians;
- Submarine weapons and combat systems engineers and designers;
- Submarine propulsion, piping, and electrical system engineers;
- Underwater shock and magnetic silencing experts; and
- Shielding and reactor plant specialists.

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On the production side, unique skills include but are not limited to:

- Lead bonding for radiation shielding installation;
- Submarine unique testing including weapons systems, nuclear, and ship control;
- Installation of acoustic sound dampening materials, internal and external;
- Installation and testing of materials and components designed to withstand underwater shock
- Structural fit-up, welding, and component installation to tolerances beyond the requirements of any other naval shipbuilding program; and
- Modular construction techniques tailored to the physical confines of a submarine.

The current business forecast across all our product lines, construction, maintenance/modernization and engineering/design, portends a dramatic reduction for Electric Boat. By year's end, I am faced with the despicable task of removing more than 2,000 people from our business.



**Electric Boat workload is forecast to be reduced by 50% by the end of 2008.**

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The impact of the lack of new submarine engineering, design, and construction work was demonstrated by the United Kingdom's experience with its new Astute Class submarine program. Erosion of the UK's submarine industrial base was caused by extended gaps in submarine design and production activity. This resulted in the closure of a UK shipyard, major job losses, and the loss of "corporate knowledge" as experienced personnel shifted to other industries.

After years of delay in designing and building Astute, the UK requested Electric Boat, via the U.S. Navy, to assist with the completion of this program. Electric Boat responded with engineering and design resources.

The rapid and costly depletion of the UK's submarine design and construction capability has elements that are strikingly similar to those now faced by the United States' submarine industrial base. Our nation's submarine base "corporate knowledge" is at risk. If we lose the capability to design and build nuclear submarines, we will have nowhere to turn.

## **A Solution**

### *Engineering & Design*

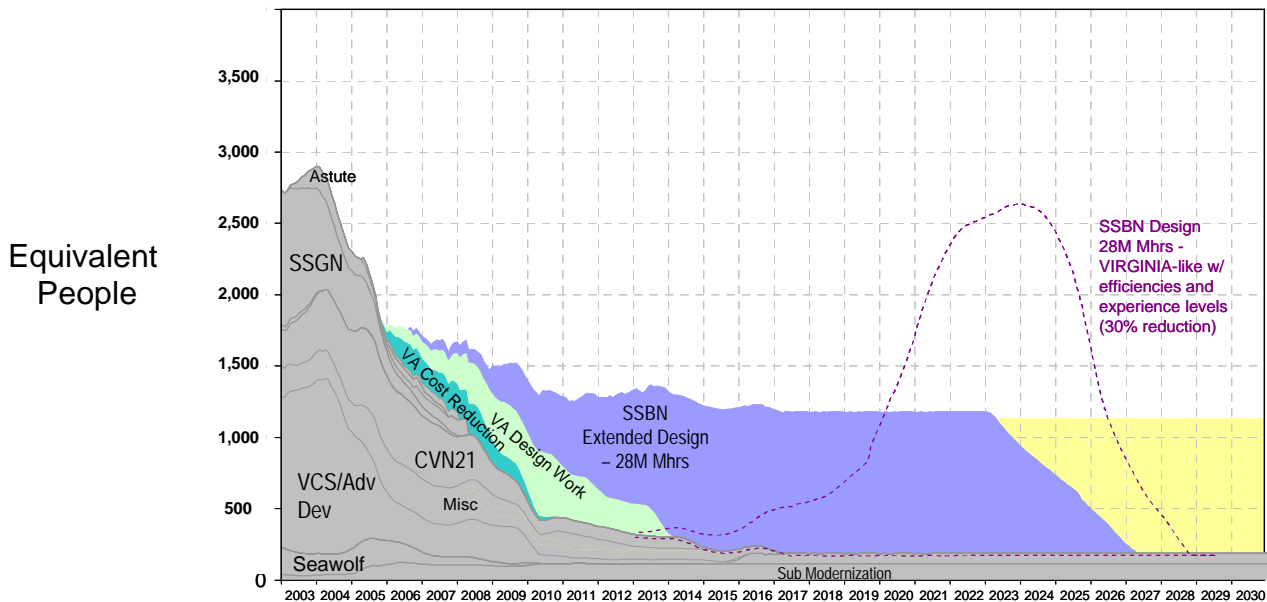
For the first time in the history of the nuclear submarine Navy, the current submarine research and development forecast does not include a new submarine design program. Similar to the production industrial base, the submarine engineering and design industrial base is a highly specialized, unique capability. It is a capability that takes years to develop and must stay actively engaged in submarine design to retain its vitality.

Today, Electric Boat and the Navy are working together to preserve the engineering and design capability of Electric Boat by developing a long range plan that will reduce the cost of VIRGINIA ships and accomplish the design of the Navy's next generation

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strategic submarine (SSBN). Although we have successfully reengineered the operations side of business for low-rate production, we have not done so with the design and engineering enterprise.

The first step in this plan is to establish a VIRGINIA design effort that is aimed specifically at reducing the production cost of future VIRGINIA Class ships. Already, Electric Boat has identified a number of areas where design enhancements would result in cost reductions. If funded today, these design changes could be accomplished in time to apply to the fiscal year 2009 ships. The second step in our plan is a dramatic departure from the historical approach to submarine design, but is one that will deliver the next new SSBN design to the Navy and provide long term stability for our engineering and design capability.



**Electric Boat’s plan will allow us to sustain an effectively balanced design and engineering workforce of experienced and new workers.**

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Current Navy plans indicate a requirement to start construction of a new SSBN around the year 2021 to replace today's Trident ballistic missile submarines as they begin to retire. Following a traditional submarine design and construction timeline, the design of this ship would not begin until about the year 2012, and would demand a rapid ramp up in resources to accomplish the design. Shortly after reaching this peak, the workforce would begin a similarly rapid reduction as the design completed. Years of investment and training would be lost.

Our proposal will reduce Electric Boat's technical workforce down to the minimum level necessary to sustain core engineering and design competencies. During this drawdown, VIRGINIA cost reduction design efforts will be accomplished. We will then sustain this minimal level by completing the concept requirements and the detail design for the next SSBN.

While our plan will add several years to the traditional design process, it will be accomplished for significantly fewer manhours than VIRGINIA. Equally as important, it will allow us to sustain an effectively balanced workforce of experienced and new workers. This approach addresses concerns about existing demographics and ensures a long-term commitment necessary to recruit and retain new employees who can be mentored by the current workforce.

Electric Boat recognizes that cost of design products must continue to be reduced with the application of new design tools and processes. Electric Boat is also pursuing new engineering and design business both inside and outside of our traditional product lines.

### *Submarine Construction*

Electric Boat recognizes the Navy's budgetary constraints and ever-growing demands for defense funding. As one of the stewards of the naval shipbuilding enterprise, we will

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continue to look at every opportunity to reduce the cost of submarines. There are three principal areas we can look to reduce the costs associated with the VIRGINIA Program:

- Volume
- Costs associated with government furnished equipment (GFE) and,
- Costs associated with shipbuilder-supplied material and labor

#### *Volume Savings*

Current Navy plans will procure 7 submarines over the period from fiscal year 2009 through 2013. It is anticipated that these ships will be procured, similar to the Block II ships, using a multi-year procurement contract. This will bring the total number of VIRGINIA ships procured to 17, with 13 remaining to complete the 30 ship class.

Our proposal is to accelerate procurement of 2 ships per year to Fiscal Year 2009. This plan would result in 2 submarines being procured in each year of the FYDP under a 10 ship multi-year procurement contract. The resulting volume of 2 ships per year, combined with ongoing efforts to improve production efficiencies and design initiatives to enhance production, will help to significantly reduce ship acquisition costs, bring much needed stability to the industrial base, and help to mitigate the Navy's attack submarine force level shortfall.

We are not proposing that the Navy buy more submarines than they are currently planning for the 30-ship VIRGINIA Class. What we are proposing is to buy them in a more cost-effective manner. We recognize that this proposal will increase shipbuilding funding levels in the near term. However, in the longer term, this proposal does not add cost to the overall program, but in fact will serve to significantly reduce the total acquisition cost of the program.

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### *GFE Savings*

Government Furnished Equipment accounts for almost 40 percent of the cost of a VIRGINIA Class Submarine. We believe that under a multi-year contract with additional volume, GFE material procurement can yield savings similar to contractor supplied material.

### *Contractor Material Savings*

CFE material accounts for about 30 percent of the cost of a nuclear submarine. The continuation of multi-year procurement and the earliest possible shift to two ships per year is essential to the preservation of the submarine supplier industrial base, and the continuation of material cost savings exhibited on VIRGINIA Class Flight II. A true multi-year including two ships per year will enable investment in long term capital assets, preservation of critical skills and technologies and financial economies generated through rate stability, learning curve optimization, volume economies and balanced profitability.

### *Process Improvements Savings*

Increased production provides a broader base from which to capture learning curve improvements. Efforts are also underway to deliver a fully mission-capable ship in a shorter construction span time. With the Navy's assistance, we've made capital improvements in our manufacturing infrastructure, replacing fabrication equipment with state-of-the-art tooling.

For example, we've established a Light Metal Fabrication Cell with automated material storage and delivery that provides improved schedule and safety performance at a reduced cost. It is estimated that this facility will save \$30 million over the remaining

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ships in the class. Navy incentives have also allowed us to build a Coatings Center of Excellence for special hull treatment and high-solids paint. This facility will save an estimated \$142 million over the class by reducing cycle time.

## **Summary**

For fifteen years, beginning with the abrupt rescission of the SEAWOLF program in 1992, Electric Boat and the nation's submarine supplier base have fought to remain viable in the face of constantly changing plans and low rates of production.

In the face of these challenges, Electric Boat has responded at every turn. Over this period, we delivered the last six of the ships in the OHIO program, recognized as one of the most successful acquisition programs in the history of the Department of Defense. We successfully completed the first and have nearly completed the second of four conversions of the class from SSBN to SSGN. We delivered all three SEAWOLF Class submarines, including the unique USS JIMMY CARTER. And we have designed and delivered the lead ship of the new VIRGINIA Class attack submarine.

We have responded to our customer's call to support a significant increase in attack submarine maintenance requirements; and to their call to assist the Royal Navy with their submarine program.

At the same time, we have been forced to reduce our production workforce by several thousand people. All the while, we have aggressively attacked all areas of cost in an unyielding effort to deliver affordable products and to remain competitive. We have made prudent investments in design and manufacturing capabilities that have delivered superior capabilities to our customer

The Navy wants to maintain a minimum of 48 attack submarines, yet we all recognize we will dip below that number in the future. The hurdle is cost. However, if we do not

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accelerate production now, it will cost jobs – jobs that will be costly to reestablish while further escalating unit cost.

This Nation needs a long-term, stable submarine program that provides the submarines required to continuously meet the Navy's established submarine force level requirements. We have a plan to build those submarines at the lowest cost to the taxpayer and to continue to develop new technologies and designs to ensure the United States maintains the finest, most technologically-advanced submarine fleet.

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