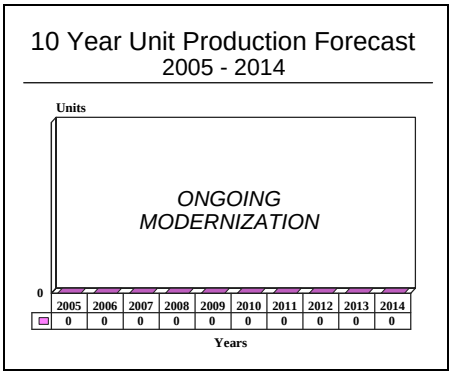
SSBN-726 Ohio Class - Archived 12/2006

Outlook

- Work on new SSBN design in earliest stages
- Operational concepts and parameters yet to be resolved
- SSGNs regarded as being important and valuable assets
- Future modifications will include ability to handle remotely crewed vehicles



Orientation

Description. A nuclear-powered ballistic missile submarine (SSBN).

Status. In service.

Total Produced. 18

Sponsor

United States Navy Trident System Project Office (PM-2)
Naval Sea Systems Command (NAVSEA)
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Pennant List

Hull No. Name	Launch Date	Commission Date	Fleet Assignment
SSGN-726 *Ohio*	4/7/1979	11/11/1981	Conversion
SSGN-727 *Michigan*	4/26/1980	9/11/1982	Conversion
SSGN-728 *Florida*	11/14/1981	6/18/1983	Conversion
SSGN-729 *Georgia*	11/6/1982	2/11/1984	Conversion
SSBN-730 *Henry M. Jackson*	10/15/1983	10/6/1984	Pacific
SSBN-731 *Alabama*	5/19/1984	5/25/1985	Pacific
SSBN-732 *Alaska*	1/12/1985	1/25/1986	Pacific
SSBN-733 *Nevada*	9/14/1985	8/16/1986	Pacific
SSBN-734 *Tennessee*	12/13/1986	12/17/1988	Atlantic
SSBN-735 *Pennsylvania*	4/23/1988	9/9/1989	Atlantic
SSBN-736 *West Virginia*	10/14/1989	10/20/1990	Atlantic
SSBN-737 *Kentucky*	8/11/1990	7/13/1991	Atlantic
SSBN-738 *Maryland*	8/10/1991	6/13/1992	Atlantic
SSBN-739 *Nebraska*	8/15/1992	7/10/1993	Atlantic
SSBN-740 *Rhode Island*	7/17/1993	7/9/1994	Atlantic

Hull No. Name	Launch Date	Commission Date	Fleet Assignment
SSBN-741 *Maine*	7/16/1994	7/29/1995	Atlantic
SSBN-742 *Wyoming*	7/15/1995	7/13/1996	Atlantic
SSBN-743 *Louisiana*	7/27/1996	9/6/1997	Atlantic

Pennant numbers SSBN-744 to SSBN-749 were also reserved for the Ohio class, but will not be used for that purpose, since no more units will be built.

Mission. The fleet ballistic missile submarines' sole mission is to provide strategic deterrence by carrying out extended deterrent patrols throughout the world. They are the U.S. Navy's most survivable and enduring platforms, with a sea-based strategic offensive weapon system capable of launching long-range ballistic nuclear missile strikes.

Price Range. According to the Pentagon's Selected Acquisition Review of 1995, the unit price of an SSBN-726 class submarine was about $1.43 billion.

Contractors

General Dynamics Electric Boat, http://www.gdeb.com, 75 Eastern Point Rd, Groton, CT 06340-4989 United States, Tel: + 1 (860) 433-3000, Fax: + 1 (860) 433-1400, Email: info@gdeb.com, Prime

Technical Data

	Metric	U.S.
Dimensions		
Length	170.7 m	560 ft
Hull Diameter (beam)	12.8 m	42 ft
Maximum Draft	11.2 m	36.6 ft
Displacement		
Surfaced		16,764 tons
Submerged		18,750 tons
Performance		
Maximum Speed		
Surfaced	33+ kmph	18+ kt
Submerged	46+ kmph	25+ kt
Diving Depth	390 m	1,300 ft
Crew (C-4 armed)	14 officers, 136 enlisted	
Crew (D-5 armed)	16 officers, 157 enlisted	
Endurance	70 days	

	Type	Quantity
Weapons		
SSBN 726-733	Trident I C-4 Lockheed Martin	24
SSBN 734 Onward	Trident II D-5 Lockheed Martin	24
Torpedoes	Mk 48	12
Torpedo Tubes	Mk 68 (21 in)	4
Electronics		
Radar		
Navigation, Surface Search, FC	BPS-15A (I-J band)	1
Electronic Warfare		
ESM (surveillance receiver)	WLR-8(V) GTE	1
Radar Threat Warning	WLR-10	1
Decoy Launchers	Emerson Electric Mk 2	8
Acoustic Interception, Countermeasures	WLY-1	1

	Type	Quantity
Sonars		
Integrated Suite	BQQ-5E(V)4	1
Spherical Bow Array	BQS-13 Raytheon	1
Classification	BQS-15 Raytheon	1
Passive Towed Array	BQR-15 Western Electric	1
Electronics (continued)		
Passive Search	BQQ-6 IBM	
Sonar Processor	BQQ-9	1
Under-Ice Navigation	BQR-19 active navigation Raytheon	1
Fire Control		
Torpedo FCS	Mk 118	1
Missile FCS	Mk 98 Mod 0	1
Attack FCS	Mk 92 Mod 1	1
Weapon Launch Console	Mk 96 Mod 0	1
Range/Bearing Indic	Mk 116 Mod 0	1
Navigation	BRN-5, BQN-3J, UQN-4 Mk 2 Mod 7, UPX-28(V)	
Command Systems		
Combat Data System	CCS Mk 2 Mod 3	
Integrated Comms	WIC BSC-1	
Computers	UYK-43, UYK-44, UYK-20X(V) UYK-7(U)	
Display Consoles	IP-1181(V), OJ-326, CP-890B OJ-172(V)	
Periscopes	Kollmorgen Type 152	1
	Kollmorgen Type 82	1
Propulsion		
Nuclear Reactor	GE S8G natural circulation PWR	1
Turbines	Turbo reduction	2x30,000 shp
Auxiliary Motor	Magnatek	1x325 shp
Propeller		1

Design Features. The Ohio class hull is of single construction, with the sail set far forward in order to provide the volume needed for the 24-tube missile room. Ballast tanks and an external casing are provided fore and aft. The hull cylinder shells and frames were manufactured and installed at EB's Quonset Point (Rhode Island) plant. From there, completed modules were barged to the Groton Shipyard in Connecticut, where the final assembly was performed on a line consisting of a grid system of rail tracks and transfer cars that move the hull cylinders in place.

The hull diameter was set by the requirements of the S8G natural circulation reactor. Since the efficiency of such reactors is determined by the height of the cooling tube drop, the power demands of this very large submarine required a high output and thus great bulk. The power densities of natural circulation reactors are significantly lower than those of forced circulation systems, placing severe restrictions on the final design's performance.

The General Electric PWR S8G reactor has a power output of 35,500 shp to give a maximum speed of more than 18 knots on the surface and 25 knots submerged.

Intense efforts have been made to keep the sound profile down to a minimum. Features include the natural circulation reactor, turbo-reduction machinery, extreme internal and external sound insulation, and a variety of other noise-reduction systems. With the possible exception of the British Vanguard class, these are the quietest submarines ever put to sea, being virtually undetectable.

The class design and its modern main concepts have made it possible to extend the time between major overhauls to 15 or more years, with the overhaul taking about a year.

Operational Characteristics. The Ohio class submarines provide the sea-based leg of the triad of the U.S. strategic defensive forces. The other two are heavy or strategic bombers of intercontinental range, and intercontinental ballistic missiles launched from land

bases. The SSBNs are considered the most cost-effective and least vulnerable of those three arms. In accordance with the strategic arms limitation and reduction talks, these 18 boats carry 50 percent of the total U.S. strategic warheads. In addition, their load, at 24 missiles each, is 50 percent more than on the previous generation Polaris and Poseidon class submarines (16 each). Although the missiles have no preset targets when the submarine goes on patrol, the SSBNs are capable of rapidly targeting their missiles should the need arise, using secure and constant at-sea communications links.

All 14 SSBN-rated submarines are under the command of the U.S. Strategic Command Headquarters, operating from Offutt Air Force Base in Omaha, Nebraska. The first four are homeported at the Bangor Naval Submarine Base (SUBACE) in the state of Washington, subordinate to the Pacific Fleet. The other 10, belonging to the Atlantic Fleet, are stationed at the Naval Submarine Base in King's Bay, Georgia, which is also the home of the Strategic Weapons Facility Atlantic (SWFLANT). SWFLANT is the site that is responsible for assembling the D-5 missile and processing the missile guidance and launcher subsystem components. SWFLANT provides strategic missiles and strategic weapons system (SWS) support to the Fleet and is the only D-5 missile processing facility in the world, serving also the British Trident missile submarines.

The Ohio class boats normally spend 70 days on patrol and 25 days in dock for maintenance and replenishment; normally, 65 percent of the force is at sea at any given time. In common with previous ballistic missile submarines, the Ohio class boats use two alternating crews ("Blue Team" and "Gold Team"), which operate the boats in shifts. To cut the time needed for maintenance, three large logistics hatches are fitted to provide large-diameter resupply and repair openings. These hatches allow the crew to rapidly transfer supply pallets, equipment replacement modules, and machinery components.

The main battery consists of the array of 24 launch tubes for Trident I C-4 or Trident II D-5 missiles, depending on the age of the submarine. The more recent Trident II is capable of delivering significantly more payload than the Trident I C-4, and more accurately.

Defensive weaponry is restricted to four Mk 68 tubes for 21 inch torpedoes, a total of 12 weapons being carried on board. Munitions for the tubes are restricted to Mk 48 torpedoes, although at one time there were suggestions that some of these could be replaced by nuclear-tipped Tomahawks. This has not been followed up, although the option remains.

More recently, as a consequence of the end of the Cold War and the progression of the START strategic arms reduction talks, many proposals have been advanced for converting the role of these submarines to other missions. These could conceivably include carrying a load of cruise missiles such as the Tomahawk or the Army Tactical Missile System, functioning as a platform for Special Operations Forces in covert missions, or serving in mining and mine counter-measures operations, using unmanned underwater vehicles. The submarines themselves are extremely quiet and relatively new, having up to 15 years of service life remaining.

Ohio Class Submarine Diving

Source: U.S. Navy

Variants/Upgrades

SSBN-730 to 733. These submarines carry the UGM-93 Trident C-4 missile. They are usually called Trident I boats.

SSBN-734 to 743. These submarines carry the UGM-133 Trident D-5 missile. They are normally referred to as Trident II boats.

The first 10 boats (SSBN-726 to SSBN-735) had Rockwell BQQ-9 broadband stand-alone processors for their long TB-16 arrays; they also towed short TB-16 arrays as part of their integrated systems. Subsequent Ohio class submarines came with the less expensive BQR-23 narrow band processors in place of the BQQ-9. The five BQR-23-equipped units in service are to receive the Rockwell Autonetics Towed Array Broadband Interim Display Unit (TABIDU) to restore some of the lost capability.

Existing submarines are being refitted with the BQQ-5E(V)4 sonar suite in place of the BQQ-6, and the new system was offered as standard equipment on new-construction boats entering service after 1995.

SSGN-726 to -729. The planned conversions of Trident class SSBNs to SSGNs with strike and special operations features would provide capabilities that current and planned strike and SOF support assets cannot offer. In the "Strike/SOF" configurations (with 66 SOF personnel and as many as 140 Tomahawk Land Attack Missiles), they could operate covertly in close proximity to an enemy coast to perform multiple surveillance and intelligence-gathering missions for 90 days or more. Such a campaign capability would provide the Commander Joint Task Force with an improved picture of the enemy's activities.

In its "Maximum Strike" configuration with 154 TLAMs, a single SSGN provides striking power almost equal to the 120-180 TLAMs normally carried by all the ships in the typical carrier battle group deployed to the Persian Gulf. In crisis and transition to war, when air dominance and surface superiority are not assured, an SSGN can serve as a stealthy strike platform that can operate independently in denied areas, no matter who dominates the air or surface battle space. Additionally, during crises, the covert nature of the SSGN will provide the National Command Authorities and the Commander in Chief a non-provocative presence option without sacrificing striking power. With the SSGN, the Commander Joint Task Force gains a platform that will complement and leverage the rest of the force.

The SSGN can thus be used as a joint enabler, facilitating combat operations that permit earlier introduction of other forces into the theater. Its ability to suppress an enemy air defense campaign from positions near the enemy coast will allow less stealthy assets (e.g., tactical air) to be deployed sooner. It can also act as an SOF and Strike Platform, combining a unique SOF campaign capability with an ample load-out of land-attack missiles in a self-sustaining platform that could deploy to an assigned station rapidly and remain there covertly for long periods with very low risk. SOF and the Advanced Submersible Delivery System could also be used to extend the SSGN intelligence/ surveillance horizon and increase the range of strike options. The SSGN does not require an escort or other assets to provide force protection because of its inherent stealth, nor does it have in-theater logistics requirements.

The SSGN could also serve as a non-provocative intelligence-collector providing surveillance and indications and warning against enemy naval and land-based threats. At the same time, it would remain a powerful deterrent, combining large-scale firepower, on-station time, and stealth to increase the spectrum of deterrent options. The presence, implied or actual, of the aggregate firepower of one or more SSGNs could well be sufficient to deter hostile actions by a potential adversary.

Finally, the SSGN is a significant force multiplier, allowing other forces greater freedom of action and flexibility in weapon load-outs while doing the job of several submarines. Four two-crew SSGNs can effectively provide 154 cruise missiles forward-deployed in any theater *and* SOF operations – 365 days a year. Eight to 10 single-crew ships would be required to provide that same forward presence capability. As a consequence, surface combatants could be tailored to include more theater missile defense (TMD) and counteroffensive air missiles, while attack submarines (SSNs) could focus primarily on anti-ship and undersea warfare missions, rather than being constrained by land-attack missions.

Program Review

Background. The development of the SSBN-726 Ohio class strategic ballistic missile submarine in November 1966 was a U.S. Navy response to a requirement to defeat the perceived growth in Soviet ballistic missile

defense capability. The U.S. Navy proposal involved designing a missile with a greater number of warheads and increased range. Increasing the range reduced the overall cost of the system by allowing the platforms to commence a deterrent patrol immediately on leaving port, thus reducing the number of platforms required to bring a given number of missiles to bear.

Contrary to many opinions, the new design was not intended as a replacement for the earlier SSBN-616 Lafayette class and SSBN-640 Benjamin Franklin class. Even the fact that it would be available to replace the 10 older SSBNs of the Washington and Ethan Allen classes was serendipitous rather than intended.

The missile proposal (then known as ULMS) was approved in August 1967, and advanced development of the missile system started in February 1968. By 1970 this had proceeded to the point of preliminary design on the new submarine, which was funded in FY70. An immediate problem was combining the requirements for extreme silence and adequate speed. The former was essential to avoid the attentions of ill-disposed anti-submarine warfare groups, but adequate speed was also essential to preclude counterbattery fire directed by back-tracking the trajectories of launched missiles, and to provide adequate power to plane up to the surface in an emergency.

These considerations led to the specification of a speed bracket ranging from 25 to 27 knots. Given existing reactor technology, this would require two S6G reactors and a 38,000-ton hull (the similarities between this proposal and the Russian Project 941 Typhoon class are intriguing and suggest that similar logic was being followed by both sides).

This impasse was broken by the development of a large, natural circulation reactor based on (but with twice the output of) the S5G designed for the submarine USS *Narwhal*. Combined with a turbo-reduction powertrain, this reactor offered an output of 35,500 shp. The often-quoted figure of 60,000 shp for the Ohio class is incorrect and refers to a reactor intended for an aborted class of very large cruise-missile submarines.

A number of design studies were carried out to measure the cost-effectiveness balances on the number of tubes per hull. These suggested that the optimum number of missiles per submarine on operational grounds was 20 (again, an intriguing parallel with Typhoon), but structural considerations meant that 24 tubes could be housed in the same volume as 20. Thus, the final Ohio design, approved in March 1971, featured 24 tubes.

The initial contract for the Ohio class ballistic missile submarine was awarded in July 1974 to the Electric Boat Division of General Dynamics. The $285.4 million contract later became a source of acrimonious relations between the U.S. Navy and Electric Boat. Combined with delays in delivering the first submarine, the strained relations, at times, jeopardized the program's funding in Congress. Electric Boat aimed for a 1978 delivery date, but delivery did not occur for three more years. Originally, the U.S. Navy had requested Electric Boat to show "best effort" to deliver the Ohio by December 1977, but this was clearly impossible since the IBM command and control system could not be available by then. The first Trident submarine, the USS *Ohio*, was launched on April 7, 1979, and commissioned November 11, 1981.

The original plan was for the first 10 Trident class submarines to be built at a rate of three per year in FY75, FY76, and FY77. In fact, only two were ordered in FY75, then one per year in FY76 and FY77, followed by two in FY78. No order was placed in FY79, but orders then resumed at a rate of one per year until FY82, when no submarine was ordered due to contractual disputes. The U.S. Navy requested funding for two SSBN-726 class submarines in FY83 in hopes of recouping the loss of funding for an Ohio class submarine in the FY82 budget. This request was cut to one submarine. For FY84, the U.S. Navy requested $1.83 billion for SSBN-736 and an additional $609.4 million in cost growth funding. On November 22, 1983, the U.S. Navy awarded Electric Boat a $535.3 million contract increment for construction of the SSBN-736.

The Trident program was delayed for much of FY85 due to a controversy between the U.S. Navy and General Dynamics over cost overruns at the Electric Boat shipyard and other divisions of General Dynamics. The contract for the twelfth submarine, the SSBN-737, was held back pending discussions between the U.S. Navy and General Dynamics. They settled their differences in August 1985, and Electric Boat received a $616.35 million contract for the SSBN-737. Its keel was laid in late 1987. The U.S. Navy awarded the contract for the FY86 Ohio class submarine in March 1986. Two Ohio class submarines joined the Fleet in 1986: the USS *Alaska* in January and the USS *Nevada* in August.

The U.S. Navy began shore-based testing of the Trident II D-5 missile in mid-1987 from the Cape Canaveral test range. In December 1986, the USS *Tennessee* was launched; this was the first submarine to deploy the UGM-133 Trident II (or D-5) missile. The USS *Tennessee* began its sea trials in early 1988, with commissioning on December 17, 1988. In March 1989, the U.S. Navy conducted the first flight test of the Trident II missile from the USS *Tennessee*. The test failed when the missile pinwheeled immediately upon egress from the water. Two more test launches took place in FY89, in July and August. The first was successful, but the second was not. These failures led

some congressmen to call for a postponement of the Trident II procurement until the problems with the missile were solved.

In late 1986, Newport News was invited to bid for the construction of future Ohio class submarines. The company rejected this request at first, but later reversed its position and stated it would bid for the FY88 submarine. It added that the costs of building facilities for such a program were unjustified, in view of the likelihood that it would only obtain contracts for building three or four submarines.

The U.S. Navy asked Congress for $1.193 billion for one SSBN-726 class submarine in its FY88 budget request, and Congress responded with $1.153 billion for one submarine. When the U.S. Navy issued the Request for Proposals for this submarine, both Newport News and Electric Boat responded. Newport News submitted a bid that was considerably higher than Electric Boat's. The U.S. Navy awarded the contract (N00024-88-C-2000) to Electric Boat. With Newport News losing the contract, Electric Boat remained the sole source of SSBN-726 class submarines.

When the U.S. Navy was asked to cut approximately $10 billion from its FY89 budget request, the service indicated plans to drop the request for one SSBN-726 class submarine as a cost-saving measure. The Secretary of Defense told the U.S. Navy that it would have to keep the submarine in its budget request. The U.S. Navy received $1.1 billion for the SSBN-741 in the FY89 budget. The order for this submarine was placed on October 5, 1988.

The Ohio class program was originally intended to run to a total of 24 hulls. By mid-1990, it was obvious that the Soviet Union was disintegrating and that the strategic rationale for the very high stockpiles of nuclear weapons was fading fast. A series of arms-reduction agreements paralleled the progressive collapse of the USSR. These agreements included the accelerated elimination of all pre-Ohio class SSBNs, and the abandonment of plans to retrofit Trident II to the first eight submarines of the Ohio class.

The Nuclear Posture Review called for the modification of the remaining C-4 boats to D-5 standard at a convenient time, possibly at their first refueling. (Then) Deputy Defense Secretary John Deutch ruled in August 1994 that the Navy would have to find the funds (estimated at $2.8 billion) for this retrofit within its own budget. The number of warheads per missile would be increased from four to five, to compensate for the reduction in the number of delivery systems.

The funding for modifying four C-4 Trident boats to D-5 standard has been the subject of considerable debate, with the original proposals to provide the necessary resources in the FY98 budget falling victim to cutbacks. After much discussion, a decision was made to modify one submarine per year from FY00 to FY05. Northrop Grumman received the $77.8 million contract in January 1998. This work will resolve much of the financial difficulty at the cost of some operational dislocation.

A related problem was the fate of the other four Trident boats, armed with the older C-4 missile. The Ohio class are very capable, modern and quiet, making them excellent platforms for a variety of non-strategic roles, and their future use was examined during 1996-2000. Among the suggested new roles for these platforms have been conversion to conventional missiles (Tomahawk or ATMS), use as a SEAL team platform, or use for mine warfare. The problem with all these proposed conversions is that the arms-reduction agreement with Russia requires dismantling and physical destruction of not only the Trident missiles but the launch systems on board these submarines, starting in 2003.

By the end of 1999, the proposal to convert the four oldest SSBNs into cruise-missile-armed SSGNs was gaining momentum. The proposed conversion would arm the ships with 154 Tomahawk cruise missiles and provide accommodation for 102 special forces personnel. The estimated cost per ship was set at $500 million. By mid-year, the Senate Armed Services Committee had asked the U.S. Navy to conduct additional studies of the proposed conversion. By the time of the U.S. elections, the conversion program remained strongly supported but controversial, and its fate lay in the hands of the next U.S. administration.

The Bush administration has proved strongly supportive of the SSGN conversion program. Funding for the first pair of conversions was included in the FY02 budget, and the money for the second pair of conversions was scheduled to follow in FY03. But progress in this program picked up more quickly than anticipated, with the detail design contract being awarded to Electric Boat in January 2002. Navy plans envision much of the work being carried out at naval shipyards, with two of the SSGNs to be modified at Norfolk and two at Puget Sound. In each case, the reconstruction would be carried out while the submarines were being refueled. According to this plan, all four SSGNs would return to service by 2007. In addition, further weapons options were evaluated, including the provision of a navalized Army Tactical Communications Management System (ATACMS) round that would answer the requirement for time-critical missions.

Throughout 2002, contracts for the conversion work were placed, mostly with General Dynamics for the design and long-lead time conversion components.

However, in December 2002 it was discovered that the Navy had overlooked a conflict in drydock scheduling that would prevent the conversions being carried out in the schedule of record. The solutions to the problem were either to advance the conversion schedule by six months, reprogramming funds accordingly, or to delay the program by a similar amount of time. Despite this organizational problem, the USS *Florida* landed her Trident missiles at the end of 2002 and received the new pennant designator SSGN-728. She entered Norfolk Navy Yard for the start of her conversion on June 27, 2003.

In January of 2003 the Navy ran a test named Giant Shadow designed to test the viability of the SSGN concept as designed. Giant Shadow presented a scenario where access to a country was denied to U.S. forces and military action was necessary. SEALs were attached to the USS *Florida* (before her conversion) and sent to help scout out and destroy a suspected bio-terror plant. An EP-3 simulating a high-altitude Global Hawk unmanned reconnaissance aircraft first located the building and vectored the submarine in. A remotely controlled underwater reconnaissance vehicle was launched from the *Florida* and scouted the approaches to the island for the SEALs, ensuring that there were no mines or other weapons obstructing their progress.

With the determination that the simulated factory was in fact a legitimate target for the exercise, the *Florida* was ordered to destroy it with cruise missiles, and a simulated launch brought the exercise mostly to a close. Before it was totally over, however, the SEALs destroyed the building with C4 charges to evaluate how well their remote sensors could report post-attack analysis.

Funding

The U.S. Navy has funded several research and development efforts related to the Ohio class boats. PE#0101221N develops improved sonar processing equipment for all SSBN boats. PE#0101224N assesses threat counter-SSBN technology and examines possible countermeasures. PE#0101228N develops upgrades to the SSBN-726 Ohio class ballistic missile submarines. PE#0603588N identifies threats to the U.S. Navy's ballistic missile submarines and develops technologies to counter those threats. PE#0604363N is developing the Trident II D-5 ballistic missile.

Recent Contracts

Contractor	Award ($ millions)	Date/Description
Electric Boat	16.0	Jan 2002 – Detail design for SSGN conversions.
Electric Boat	442.9	Sep 2002 – Advance procurement for the SSGN conversions.
General Dynamics	90.0	Nov 2002 – Development of SSGN Attack Weapons Control System and Trident Fire Control System.
Charles Stark Draper Lab	13.9	Nov 2002 – Development of Ohio class strategic weapons control systems.
Kollmorgen	9.6	Nov 2002 – Supply of four universal modular masts for SSGN conversions.

Timetable

Month	Year	Major Development
	1970	Preliminary design funded
Sep	1971	Trident Decision Coordinating Paper approved
Mar	1972	Submarine baseline design completed
Dec	1972	Secretary of Defense approves full-scale development
May	1973	Submarine contract design completed
Jul	1974	Lead boat construction contract awarded to Electric Boat
Oct	1974	Approved/authorized for production
Nov	1981	First-of-class, USS *Ohio*, commissioned

Month	Year	Major Development
Dec	1988	First Trident II-carrying submarine, USS *Tennessee*, commissioned
Sep	1994	Nuclear Posture Review sets anticipated class size at 14 ships
Sep	1997	The last of the series, USS *Louisiana*, commissioned
Jan	1998	Production contract for D-5 launch tubes to be fitted on first four subs
May	1998	Senate Armed Services Committee urges study on role conversion
	2001	First pair of SSGN conversions funded
	2002	First submarine decommissions for SSGN conversion
June	2003	USS *Florida* starts conversion process
	2007	First pair of SSGN conversions to rejoin fleet
	2008	Second pair of SSGN conversions to rejoin fleet

Worldwide Distribution

United States. 14 SSBN and 4 SSGN

Forecast Rationale

The SSGN conversion program is a clear example of the radical changes in strategic outlook over the last decade. When the Ohio class was conceived, the idea that the United States would convert a significant proportion of its strategic nuclear deterrent force to the delivery of special forces personnel and firing cruise missiles at land targets was too absurd to contemplate. Now, those tasks are of equal importance to the strategic nuclear delivery role and may even have a higher short-term priority. It has even been suggested that the balance between SSBN and SSGN forces may shift further in favor of the latter with the conversion of four additional hulls.

Part of the attraction of the SSGN concept is that the modified boats will have the same mission capability as SSNs. This will include operations such as intelligence, surveillance, reconnaissance, and targeting; anti-submarine warfare; anti-surface warfare; and mine warfare. The SSGNs are elusive and powerful combatants and offer a wide range of capabilities. What is more, they give a potential enemy little idea what the intended operational plans are.

There is considerable growth potential inherent within the SSGN concept. At additional cost, tubes could be further modified to carry 12 missiles each rather than the currently planned six. The sheer size of the missile compartment is a tempting area for experimentation. It could be radically modified to provide a hangar for unmanned aerial or underwater vehicles that would allow increased situational awareness and targeting capability.

In the far term, there is already consideration as to the replacements for the existing Ohio class SSBNs. At present, what form those replacements will take or even if they will be SSBNs is unclear. The Ohios still have at least half their hull lives remaining, indeed the most recent members of the class probably have as much as 30 years of life left in them. Their replacement is not urgent and this allows much time to reflect on what the strategic demands of the mid-21st century are likely to require.

Ten-Year Outlook

No new production is projected, but modernization and upgrade activity of the onboard systems will continue throughout the forecast period; the forecast chart has therefore been omitted. Four ships are still in the process of being converted to a modified role.

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