| Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Navy | | | | | | | | | | DATE: February 2010 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | | | | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | | | | | | | |
| **COST ($ in Millions)** | **FY 2009 Actual** | **FY 2010 Estimate** | **FY 2011 Base Estimate** | **FY 2011 OCO Estimate** | **FY 2011 Total Estimate** | **FY 2012 Estimate** | **FY 2013 Estimate** | **FY 2014 Estimate** | **FY 2015 Estimate** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 153.783 | 549.392 | 608.566 | 0.000 | 608.566 | 841.214 | 911.568 | 1,127.274 | 681.979 | Continuing | Continuing |
| 0223: *Sub Combat System Improvement (ADV)* | 45.764 | 51.038 | 51.040 | 0.000 | 51.040 | 48.082 | 46.211 | 46.194 | 47.296 | Continuing | Continuing |
| 2033: *Adv Submarine System Development* | 61.044 | 72.301 | 42.515 | 0.000 | 42.515 | 37.230 | 34.525 | 36.632 | 37.384 | Continuing | Continuing |
| 3197: *Undersea Superiority* | 35.631 | 32.176 | 21.983 | 0.000 | 21.983 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 89.790 |
| 3220: *SBSD Advanced Submarine System Development* | 0.000 | 385.910 | 493.028 | 0.000 | 493.028 | 755.902 | 830.832 | 1,044.448 | 597.299 | Continuing | Continuing |
| 9999: *Congressional Adds* | 11.344 | 7.967 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 73.206 |

**A. Mission Description and Budget Item Justification**

This program element supports innovative research and development in submarine hull and combat systems technologies and the subsequent evaluation, demonstration, and validation for submarine platforms. It will increase the submarine technology base and provide subsystem design options not currently feasible. The program element also supports programs
transitioning from Science and Technology (S&T), Defense Advanced Research Projects Agency (DARPA), Industry Research and Development, and Small Business Innovative Research (SBIR) projects.

Project Unit 0223:
The Advanced Submarine Combat Systems Development non-acquisition (NON-ACAT) program supports Navy Submarine Acoustic Superiority and Technology Insertion Initiatives through the application of advanced development and testing of sonar and tactical control systems improvements. This Project transitions technologies developed by Navy Technology bases, the private sector, Office of Naval Research (ONR), Future Naval Capabilities, and DARPA. The Project addresses technology challenges to improve tactical control in littoral and open ocean environments for a variety of operational missions including peacetime engagement, surveillance, battle space preparation, deterrence, regional sea denial, precision strike, task group support, and ground warfare support. Prototype hardware / software systems are developed to demonstrate technologically promising system concepts in laboratory and at-sea submarine environments. Specifically, the focus of the technology efforts will be Advanced Processing Build-Acoustic (APB-A), Advanced Processing Build-Tactical (APB-T), Advanced Processing Build - Imaging (APB-I), tactical control, and Advanced Sonar Arrays. APBs develop and demonstrate improvements to current and future sonar/combat control systems. The Advanced Sonar

| Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Navy | DATE: February 2010 |
|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* |

Arrays program develops and tests new sensors and demonstrates large array configuration. This Project is funded under demonstration and validation, as it develops and integrates hardware for experimental tests related to specific platform applications.

Project Unit 2033:
The Advanced Submarine Systems Development (ASSD) Program is a non-acquisition program that develops, matures, and transitions Hull, Mechanical, and Electrical (HM&E) technologies from Science & Technology (S&T) to operational platforms, develops and demonstrates submarine design and naval architecture products destined for backfit, forward fit, and/or future submarines, and operates unique Research and Development experimentation, modeling, and simulation facilities to enhance submarine stealth, maneuverability, capability, and affordability. The program is structured to support near term technology insertion to achieve VIRGINIA Class cost reductions and influence future submarine concepts and core technologies. In support of Sea Power 21, Sea Trial experimentation supports the naval enterprises in identifying and prototyping capabilities and technologies that support the warfighter. Focus is on the Undersea Enterprise (USE), the Naval Network/ FORCENET (NNFE), Naval Expeditionary Combat Enterprise (NECE), Surface Warfare Enterprise (SWE), and Special Operations Force Enterprise (SOFE). In addition to enterprise support, experimentation may identify, develop, integrate, and test Intelligence, Surveillance, and Reconnaissance (ISR) technologies and develop littoral precision strike capabilities supporting the Overseas Contingency Operations (OCO). Experimentation and demonstration is conducted in a joint warfighting context with other services, (i.e. the U.S. Marines, U.S. Army, and the U.S. Air Force), to enable early assessment of warfighting capabilities, and to contribute to better technology selection decisions for potential incremental development. This program also supports Information Exchange Programs and joint Project Arrangements (PA) with the United Kingdom, Canada, and Australia.

Project Unit 3197:
The Undersea Superiority Project supports offboard Anti-Submarine Warfare (ASW) technologies selected by the Chief of Naval Operations (CNO) ASW Cross Functional Team for technologies that hold the potential for deployment and/or use by submarine platforms. Efforts associated with these technologies include design, development, integration and testing of future Undersea Superiority systems.

Project Unit 3220:
The objective of the Sea Based Strategic Deterrent (SBSD) Advanced Submarine System Development project is to design and prepare for construction of the replacement of the OHIO Class SSBN.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Navy | DATE: February 2010 |
|---|---|
| **APPROPRIATION/BUDGET ACTIVITY**<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 ITEM NOMENCLATURE**<br>PE 0603561N: *Adv Submarine System Dev* |

**B. Program Change Summary ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 150.686 | 551.836 | 0.000 | 0.000 | 0.000 |
| Current President's Budget | 153.783 | 549.392 | 608.566 | 0.000 | 608.566 |
| Total Adjustments | 3.097 | -2.444 | 608.566 | 0.000 | 608.566 |
| • Congressional General Reductions | | -2.289 | | | |
| • Congressional Directed Reductions | | -8.000 | | | |
| • Congressional Rescissions | 0.000 | -0.155 | | | |
| • Congressional Adds | | 8.000 | | | |
| • Congressional Directed Transfers | | 0.000 | | | |
| • Reprogrammings | 6.601 | 0.000 | | | |
| • SBIR/STTR Transfer | -3.504 | 0.000 | | | |
| • Program Adjustments | 0.000 | 0.000 | 608.566 | 0.000 | 608.566 |

| Congressional Add Details ($ in Millions, and Includes General Reductions) | FY 2009 | FY 2010 |
|---|---|---|
| **Project:** 9999: *Congressional Adds* | | |
| Congressional Add: *Fiber Optic Conformal Acoustic Velocity Sensor (FO* | 1.995 | 0.000 |
| Congressional Add: *Organic Submarine ISRT Demonstration (IRST OSAID)* | 0.000 | 2.390 |
| Congressional Add: *SSBN(X) Systems Development* | 0.000 | 1.992 |
| Congressional Add: *Underwater Explosion Modeling for Non-Pressure Hull Fairing* | 0.000 | 1.992 |
| Congressional Add: *Large Displacement UUV At Sea Launch and Recovery* | 1.690 | 0.000 |
| Congressional Add: *LOW COST - LASER MODULE ASSEMBLY FOR THE NAVY'S AC* | 1.596 | 0.000 |
| Congressional Add: *UNDERSEA MISSILE LAUNCH STUDY (ULMS)* | 3.190 | 0.000 |
| Congressional Add: *Acoustic Research Detachment Large Scale Vehicles* | 0.479 | 0.000 |
| Congressional Add: *Submarine Fatline Vector Sensor Towed Array* | 0.798 | 1.593 |
| Congressional Add: *Submarine Littoral Defense System* | 1.596 | 0.000 |
| | 11.344 | 7.967 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Navy | DATE: February 2010 |
|---|---|
| **APPROPRIATION/BUDGET ACTIVITY**<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 ITEM NOMENCLATURE**<br>PE 0603561N: *Adv Submarine System Dev* |

| Congressional Add Details ($ in Millions, and Includes General Reductions) | FY 2009 | FY 2010 |
|---|---|---|
| Congressional Add Subtotals for Project: 9999 | | |
| Congressional Add Totals for all Projects | 11.344 | 7.967 |

**Change Summary Explanation**

The Program adjustment shown in FY10 reflects the removal of funds for the Overseas Contingency Operations (OCO) support.

FY11 from previous President's Budget is shown as zero because no FY11-15 data was presented in President's Budget 2010.

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | | DATE: February 2010 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>0223: *Sub Combat System Improvement (ADV)* | |

| COST ($ in Millions) | FY 2009 Actual | FY 2010 Estimate | FY 2011 Base Estimate | FY 2011 OCO Estimate | FY 2011 Total Estimate | FY 2012 Estimate | FY 2013 Estimate | FY 2014 Estimate | FY 2015 Estimate | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0223: *Sub Combat System Improvement (ADV)* | 45.764 | 51.038 | 51.040 | 0.000 | 51.040 | 48.082 | 46.211 | 46.194 | 47.296 | Continuing | Continuing |
| Quantity of RDT&E Articles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |

**A. Mission Description and Budget Item Justification**

Project Unit 0223: The Advanced Submarine Combat Systems Development Non-ACAT program supports Navy Submarine Acoustic Superiority and Technology Insertion Initiatives by the application of advanced development and testing of sonar and tactical control systems improvements. This Project transitions technologies developed by Navy technology bases, the private sector, ONR, Future Naval Capabilities, and DARPA. The Project addresses technology challenges to improve tactical control in littoral and open ocean environments for a variety of operational missions including peacetime engagement, surveillance, battle space preparation, deterrence, regional sea denial, precision strike, task group support, and ground warfare support. Prototype hardware / software systems are developed to demonstrate technologically promising system concepts in laboratory and at-sea submarine environments. Specifically, the focus of the technology efforts will be APB-A, APB-T, APB-I, tactical control, and Advanced Sonar Arrays. APBs develop and demonstrate improvements to current and future sonar/combat control systems. The Advanced Sonar Arrays program develops and tests new sensors and demonstrates large array configuration. This Project is funded under demonstration and validation, as it develops and integrates hardware for experimental tests related to specific platform applications.

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| Advanced Sonar System Processing | 26.197 | 26.438 | 26.540 | 0.000 | 26.540 |
| *FY 2009 Accomplishments:*<br>APB(A)-07 transitioned to PMS401 for fleet introduction. FY09 APB(A) continued improvements in high frequency active systems, automated vulnerability detectors, and improved tracking and localization, specifically using passive-narrow band sonar for target acoustic state estimation. Primary improvements were delivered for the Wide Aperture Array (WAA), Low Cost Conformal Array (LCCA), and 688 Class sphere array signal processing. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>0223: *Sub Combat System Improvement (ADV)* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| *FY 2010 Plans:*<br>FY10 will focus on improved signal processing to stitch close aboard acoustic coverage to provide 360 degree situational awareness. Work will continue on ranging tools, search space reduction tools, and active systems. Improved Signal processing for the new fat-line towed array will be developed. Efforts will continue to focus on more seamless integration of acoustic and non-acoustic sensor information for tracking and command information.<br><br>*FY 2011 Base Plans:*<br>FY11 will focus on improved signal processing to stitch close aboard acoustic coverage to provide 360 degree situational awareness. Work will continue on ranging tools, search space reduction tools, and active systems. Improved Signal processing for the new fat-line towed array will be developed. Efforts will continue to focus on more seamless integration of acoustic and non-acoustic sensor information for tracking and command information. | | | | | |
| Advanced Tactical Control | 11.000 | 16.000 | 16.000 | 0.000 | 16.000 |
| *FY 2009 Accomplishments:*<br>APB(T)-07 transitioned to PMS425 for fleet introduction. FY09 APB(T) continued improvements in Command Information Management, acoustic and non-acoustic contact association, and the initial steps required to automate combat systems operations, in support of display simplification and work flow streamlining.<br><br>*FY 2010 Plans:*<br>FY10 efforts will continue on improving the tactical commander's ability to manage close in and high density scenarios through advanced target motion analysis, contact management, tactical scene rendering, uncertainty management, and close encounter decision management. Efforts will continue to focus on more seamless integration of acoustic and non acoustic sensor information for tracking and command information. Efforts will begin to focus on improving imaging system's signal processing | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>0223: *Sub Combat System Improvement (ADV)* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| to automate repetitive tasks and develop automated detection, tracking and ranging capabilities. Initial efforts will focus on baselining system performance.<br><br>*FY 2011 Base Plans:*<br>FY11 efforts will continue on improving the tactical commander's ability to manage close in and high density scenarios through advanced target motion analysis, contact management, tactical scene rendering, uncertainty management, and close encounter decision management. Efforts will continue to focus on more seamless integration of acoustic and non acoustic sensor information for tracking and command information. Efforts will begin to focus on improving imaging system's signal processing to automate repetitive tasks and develop automated detection, tracking and ranging capabilities. Initial efforts will focus on baselining system performance. | | | | | |
| Advanced Sensors<br>*FY 2009 Accomplishments:*<br>In FY09, conducted Conformal Acousitc Velocity Sonar (CAVES) Large Vertical Array (LVA) sea test and analysis on 688 platform; developed and tested Rapid Commercial Off the Shelf (COTS) Insertion Next Generation (RCI NextGen) for CAVES LVA sea test; began development of (Light Weight) LW LCCA Advanced Development Model (ADM); continued working with PEO IWS5B to develop surface ship Acoustic Communications (ACOMMS) and resolve encrypted ACOMMS submarine solution. Selected between Twin Line Thin Line (TLTL) and Vector Sensor Towed Array (VSTA) for Advanced Towed Array Technology (ATAT). Additionally, began scoping work and studies on a future submarine sensor design.<br><br>*FY 2010 Plans:*<br>FY10 will support PMS450 with CAVES LVA installation and at-sea test on VIRGINIA platform; finish development of LW LCCA ADM; finish development of encrypted ACOMMS submarine solution; finish LW LCCA development and fabricate ADM; finish development of encrypted ACOMMS submarine solution; and complete Lake Pend Oreille tow tests of TLTL and VSTA arrays. | 8.340 | 8.600 | 8.500 | 0.000 | 8.500 |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>0223: *Sub Combat System Improvement (ADV)* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| *FY 2011 Base Plans:*<br>FY11 will support PMS450 with CAVES LVA installation and at-sea test on VIRGINIA platform; finish development of LW LCCA ADM; finish development of encrypted ACOMMS submarine solution; finish LW LCCA development and fabricate ADM; finish development of encrypted ACOMMS submarine solution; and complete Lake Pend Oreille tow tests of TLTL and VSTA arrays. | | | | | |
| DAWDF<br>*FY 2009 Accomplishments:*<br>Defense Acquisition Workforce Development Fund. | 0.227 | 0.000 | 0.000 | 0.000 | 0.000 |
| Accomplishments/Planned Programs Subtotals | 45.764 | 51.038 | 51.040 | 0.000 | 51.040 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**D. Acquisition Strategy**

Use competitively awarded contracts from Broad Agency Announcement (BAA) solicitations.

**E. Performance Metrics**

- Advanced Processing Build (APB): Deliver at-sea tested submarine capability improvements to PEO Submarines as prescribed by the Fleet every two years. Conduct Milestone Reviews with the Milestone Decision Authority and PEO Submarines prior to delivery.
- Conduct Conformal Acoustic Velocity Sonar (CAVES) sea test 3Q10. CAVES provides significant advantages over existing technology; 2/3 of acquisition and installation costs, 10% of life cycle costs, and less impact on hull structure. CAVES/Wide Aperture Array replacement of Light Weight WAA provides a cost savings of $8M - $13M/ship.
- Conduct Low Cost Conformal Array (LCCA) Advanced Development Model (ADM) sea test 1Q10.
- Deliver Twin Line Thin Line (TLTL) Short Aperture (3X) Array, Vector Sensor Towed Array (VSTA) Short Aperture (3X) Array, TLTL & VSTA (3X) Lake Pend Oreille Test Reports.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | | DATE: February 2010 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>0223: *Sub Combat System Improvement (ADV)* | |

**Product Development ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Product Development | WR | NUWC/Newport RI | 50.591 | 7.058 | Oct 2009 | 10.328 | Oct 2010 | 0.000 | | 10.328 | Continuing | Continuing | Continuing |
| Product Development | WR | NRL DC | 0.446 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 0.446 | 0.446 |
| Product Development | WR | NSWC/Carderock MD | 15.937 | 4.540 | Oct 2009 | 3.700 | Oct 2010 | 0.000 | | 3.700 | Continuing | Continuing | Continuing |
| Product Development | WR | NSWC/Dahlgren VA | 0.490 | 0.050 | Oct 2009 | 0.050 | Oct 2010 | 0.000 | | 0.050 | Continuing | Continuing | Continuing |
| Product Development | WR | ONI DC | 0.045 | 0.850 | Jan 2010 | 0.000 | | 0.000 | | 0.000 | Continuing | Continuing | Continuing |
| Product Development | C/CPAF | NSMA VA | 5.870 | 1.524 | Nov 2009 | 1.500 | Nov 2010 | 0.000 | | 1.500 | Continuing | Continuing | Continuing |
| Product Development | WR | ONR VA | 1.925 | 0.800 | Dec 2009 | 0.800 | Dec 2010 | 0.000 | | 0.800 | Continuing | Continuing | Continuing |
| Product Development | WR | SSC/San Diego CA | 1.403 | 0.050 | Oct 2009 | 0.050 | Oct 2010 | 0.000 | | 0.050 | Continuing | Continuing | Continuing |
| Product Development | WR | COMSUBLANT VA | 0.420 | 0.125 | Oct 2009 | 0.125 | Oct 2010 | 0.000 | | 0.125 | Continuing | Continuing | Continuing |
| Product Development | WR | COMSUBPAC HI | 0.455 | 0.125 | Oct 2009 | 0.125 | Oct 2010 | 0.000 | | 0.125 | Continuing | Continuing | Continuing |
| Product Development | MIPR | U.S. Army/MITRE NJ | 2.800 | 1.795 | Jan 2010 | 0.000 | | 0.000 | | 0.000 | 0.000 | 4.595 | 4.595 |
| Product Development | MIPR | U.S. AFB/MIT Lincoln Labs MA | 7.484 | 2.000 | Jan 2010 | 2.000 | Nov 2010 | 0.000 | | 2.000 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | | DATE: February 2010 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>0223: *Sub Combat System Improvement (ADV)* | |

**Product Development ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Product Development | C/CPFF | PSU/ARL PA | 2.378 | 1.340 | Dec 2009 | 0.250 | Dec 2010 | 0.000 | | 0.250 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | UT/ARL TX | 15.130 | 3.230 | Dec 2009 | 5.500 | Dec 2010 | 0.000 | | 5.500 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | JHU/APL MD | 38.228 | 9.305 | Dec 2009 | 7.100 | Dec 2010 | 0.000 | | 7.100 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | Lockheed Martin VA | 22.956 | 5.800 | Dec 2009 | 5.687 | Dec 2010 | 0.000 | | 5.687 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | Progeny VA | 3.257 | 0.350 | Dec 2009 | 0.350 | Dec 2010 | 0.000 | | 0.350 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | METRON VA | 3.358 | 0.800 | Dec 2009 | 0.800 | Dec 2010 | 0.000 | | 0.800 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | Alion Sciences VA | 1.867 | 1.400 | Jan 2010 | 1.400 | Dec 2010 | 0.000 | | 1.400 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | SEDNA VA | 3.464 | 0.750 | Jan 2010 | 0.500 | Dec 2010 | 0.000 | | 0.500 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | DSR/GD VA | 11.186 | 1.461 | Jan 2010 | 2.500 | Dec 2010 | 0.000 | | 2.500 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | Northrop Grumman VA | 0.400 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 0.400 | 0.400 |
| Product Development | WR | SPAWAR CA | 0.400 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 0.400 | 0.400 |
| Product Development | C/CPFF | SAIC VA | 1.050 | 1.500 | Jan 2010 | 1.500 | Dec 2010 | 0.000 | | 1.500 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>0223: *Sub Combat System Improvement (ADV)* |

**Product Development ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Product Development | C/CPFF | Adaptive Methods<br>VA | 0.400 | 0.300 | Dec 2009 | 0.300 | Dec 2010 | 0.000 | | 0.300 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | AAC<br>NY | 0.375 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 0.375 | 0.375 |
| Product Development | C/CPFF | GA Tech Research Institute<br>GA | 2.416 | 0.300 | Dec 2009 | 0.300 | Dec 2010 | 0.000 | | 0.300 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | Multisensor Science<br>VA | 0.150 | 0.200 | Jan 2010 | 0.200 | Dec 2010 | 0.000 | | 0.200 | Continuing | Continuing | Continuing |
| Product Development | MIPR | U.S. Army Research Lab<br>MD | 1.000 | 0.300 | Dec 2009 | 0.400 | Dec 2010 | 0.000 | | 0.400 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | Chesapeake Science<br>MD | 1.899 | 0.900 | Jan 2010 | 0.900 | Dec 2010 | 0.000 | | 0.900 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | Lockheed Martin<br>NY | 4.614 | 1.900 | Dec 2009 | 3.000 | Dec 2010 | 0.000 | | 3.000 | Continuing | Continuing | Continuing |
| Product Development | C/CPFF | In Depth Engineering<br>VA | 1.440 | 0.610 | Jan 2010 | 0.000 | | 0.000 | | 0.000 | 0.000 | 2.050 | 2.050 |
| | | **Subtotal** | 203.834 | 49.363 | | 49.365 | | 0.000 | | 49.365 | | | |

**Remarks**

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>0223: *Sub Combat System Improvement (ADV)* |

**Management Services ($ in Millions)**

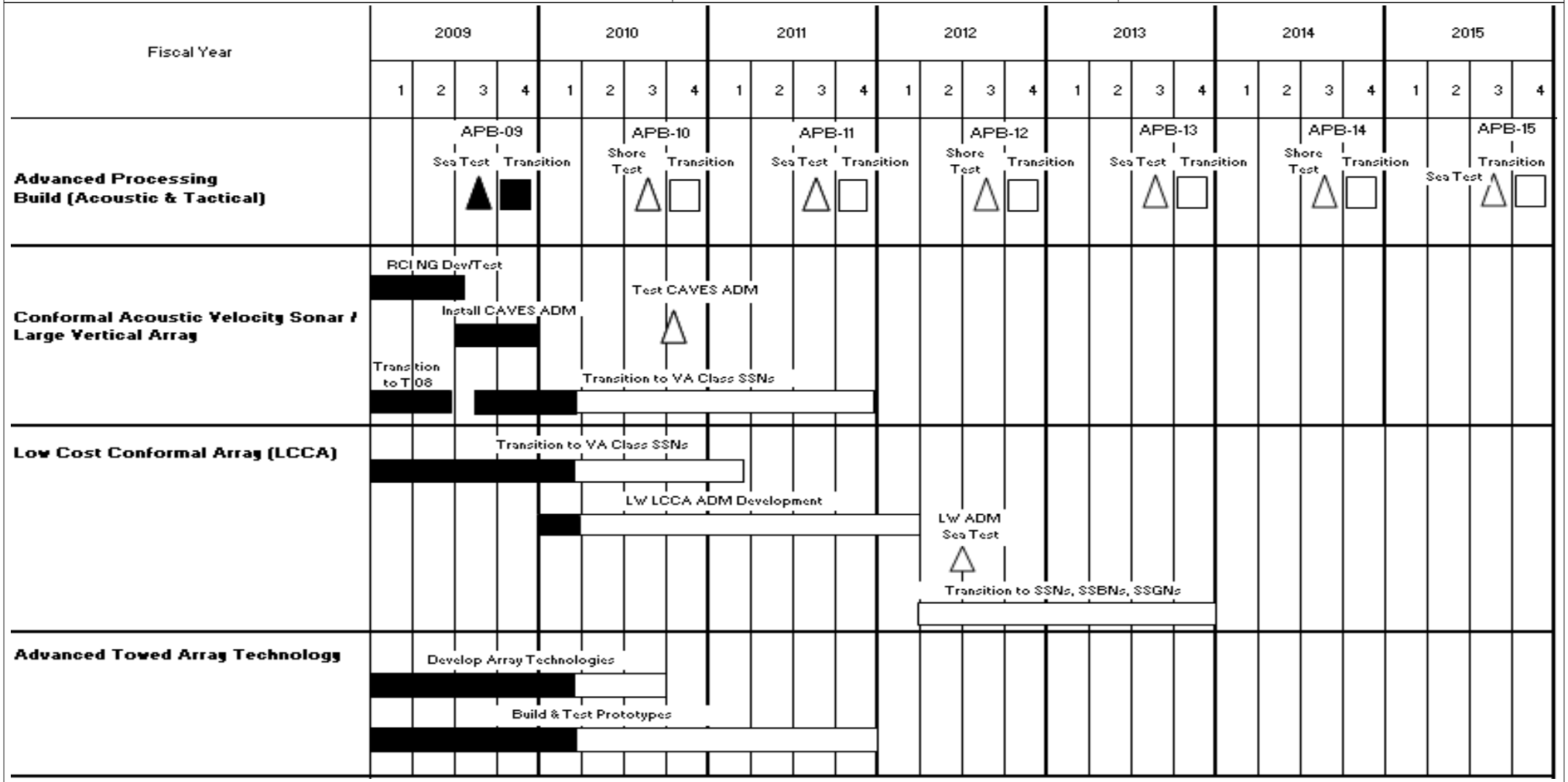
| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Program Management Support | C/CPAF | Stanley and Associates<br>VA | 1.000 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 1.000 | 1.000 |
| Program Management Support | C/CPAF | BAE Systems<br>MD | 5.749 | 1.600 | Jan 2010 | 1.600 | Dec 2010 | 0.000 | | 1.600 | Continuing | Continuing | Continuing |
| Program Management Support | C/CPFF | EG&G<br>VA | 0.950 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 0.950 | 0.950 |
| Travel | WR | NAVSEA PEO IWS5<br>DC | 0.300 | 0.075 | Oct 2009 | 0.075 | Oct 2010 | 0.000 | | 0.075 | Continuing | Continuing | Continuing |
| Acquisition Workforce | Various/ TBD | Not Specified<br>Not Specified | 0.227 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 0.227 | 0.227 |
| | | **Subtotal** | 8.226 | 1.675 | | 1.675 | | 0.000 | | 1.675 | | | |

**Remarks**

| | Total Prior Years Cost | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 212.060 | 51.038 | | 51.040 | | 0.000 | | 51.040 | | | |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>0223: *Sub Combat System Improvement (ADV)* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| **APPROPRIATION/BUDGET ACTIVITY**<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 ITEM NOMENCLATURE**<br>PE 0603561N: *Adv Submarine System Dev* | **PROJECT**<br>0223: *Sub Combat System Improvement (ADV)* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Event** | **Quarter** | **Year** | **Quarter** | **Year** |
| APB-09 Sea Test | 3 | 2009 | 3 | 2009 |
| Transition APB-09 to ARCI/BYG-1 | 4 | 2009 | 4 | 2009 |
| APB-10 Shore Test | 3 | 2010 | 3 | 2010 |
| Transition APB-10 to ARCI/BYG-1 | 4 | 2010 | 4 | 2010 |
| APB-11 Sea Test | 3 | 2011 | 3 | 2011 |
| Transition APB-11 to ARCI/BYG-1 | 4 | 2011 | 4 | 2011 |
| APB-12 Shore Test | 3 | 2012 | 3 | 2012 |
| Transition APB-12 to ARCI/BYG-1 | 4 | 2012 | 4 | 2012 |
| APB-13 Sea Test | 3 | 2013 | 3 | 2013 |
| Transition APB-13 to ARCI/BYG-1 | 4 | 2013 | 4 | 2013 |
| APB-14 Shore Test | 3 | 2014 | 3 | 2014 |
| Transition APB-14 to ARCI/BYG-1 | 4 | 2014 | 4 | 2014 |
| APB-15 Sea Test | 3 | 2015 | 3 | 2015 |
| Transition APB-15 to ARCI/BYG-1 | 4 | 2015 | 4 | 2015 |
| Develop and Test RCI Next Gen | 1 | 2009 | 3 | 2009 |
| Install ADM Array | 3 | 2009 | 4 | 2009 |
| Test ADM array | 4 | 2010 | 4 | 2010 |
| Transition to T108 | 1 | 2009 | 2 | 2009 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>0223: *Sub Combat System Improvement (ADV)* |

| | Start | | End | |
|---|---|---|---|---|
| Event | Quarter | Year | Quarter | Year |
| Transition to VA Class SSNs (CAVES/LVA) | 3 | 2009 | 4 | 2011 |
| Transition to VA Class SSNs (LCCA) | 1 | 2009 | 4 | 2011 |
| Lightweight LCCA ADM Development | 1 | 2010 | 1 | 2012 |
| Lightweight ADM Sea Test | 2 | 2012 | 3 | 2012 |
| Transition to SSNs, SSBNs, SSGNs | 2 | 2012 | 4 | 2013 |
| Develop TLTL/VSTA Array Technologies | 1 | 2009 | 3 | 2010 |
| Build & Test Prototype TLTL/VSTA Arrays | 1 | 2009 | 4 | 2011 |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | | DATE: February 2010 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>2033: *Adv Submarine System Development* | |

| COST ($ in Millions) | FY 2009 Actual | FY 2010 Estimate | FY 2011 Base Estimate | FY 2011 OCO Estimate | FY 2011 Total Estimate | FY 2012 Estimate | FY 2013 Estimate | FY 2014 Estimate | FY 2015 Estimate | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2033: *Adv Submarine System Development* | 61.044 | 72.301 | 42.515 | 0.000 | 42.515 | 37.230 | 34.525 | 36.632 | 37.384 | Continuing | Continuing |
| Quantity of RDT&E Articles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |

**A. Mission Description and Budget Item Justification**

The Advanced Submarine Systems Development (ASSD) Program is a non-acquisition program that develops, matures, and transitions HM&E technologies from S&T to operational platforms, develops and demonstrates submarine design and naval architecture products destined for backfit, forward fit, and/or future submarines, and operates unique R&D experimentation, modeling, and simulation facilities to enhance submarine stealth, maneuverability, capability and affordability. The program is structured to support near term technology insertion to achieve VIRGINIA Class cost reduction and influence future submarine concepts and core technologies. In support of Sea Power 21, Sea Trial experimentation supports the naval enterprises in identifying and prototyping capabilities and technologies that support the warfighter. Focus is on the USE, the NNFE, NECE, SWE, and SOFE. In addition to enterprise support, experimentation may identify, develop, integrate, and test Intelligence, Surveillance, and Reconnaissance (ISR) technologies and develop littoral precision strike capabilities. Experimentation and demonstration is conducted in a joint warfighting context with other services, (i.e. the U.S. Marines, U.S. Army, and the U.S. Air Force), to enable early assessment of warfighting capabilities, and to contribute to better technology selection decisions for potential incremental development. This program also supports Information Exchange Programs and joint Project Arrangements with the United Kingdom, Canada, and Australia.

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| Payloads and Sensors/Subtotal Cost | 22.248 | 27.241 | 8.285 | 0.000 | 8.285 |
| Develop promising advanced technologies and/or concepts capable of revolutionizing submarine design, reducing cost, improving payload flexibility, increasing capability, reducing weight and space requirements, exploring alternative payload launch mechanisms, increasing reliability with concomitant decreases in required maintenance, and improving material strength. Develop payload demonstrations targeted at improving flexible ocean interface, ISR requirements, and payload and launch retrieval methods from undersea platforms. Conduct Navy and joint SEA TRIALS that take the demonstrations to | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>2033: *Adv Submarine System Development* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| the Fleet in order to assess the operational value of the technologies and systems under consideration. The SEA TRIALS/experiments support examination and assessment of potential new Fleet capabilities based on the Sea Power 21 Pillars of SEA SHIELD, SEA BASING, SEA STRIKE, and FORCENET.<br><br>*FY 2009 Accomplishments:*<br>FY09 Accomplishments include: For Small Missile Encapsulation (SME) redesigned and rebuilt test assets and completed the static underwater encapsulation tests at Aberdeen Test Center (ATC). Assessed, refurbished, and tested the equipment necessary for testing the capsule at periscope depth speeds at San Clemente Island (SCI) (Translation Testing). For Water Piercing Missile Launcher (WPML) conducted additional fly-out test from a moving submerged translator at higher cross current. Matured development and tested a new launcher design with its own method of gas generation to aid water piercing. Developed, tested, and transitioned ISR technologies to support Irregular Warfare (NIWO). Supported SSGN participation in exercise TALISMAN SABER 2009.<br><br>*FY 2010 Plans:*<br>FY10 Planned Accomplishments include: For SME conduct translation testing, complete analysis and provide report. Definitize WPML unique launcher design with gas generation and continue system engineering and safety tasks related to submarine integration. Develop, test, and transition ISR technologies to support irregular warfare. Provide SEA STALKER Unmanned Underwater Vehicle (UUV) capability to subsurface platform (SSGN) by developing and testing the integration between the UUV and launching system. Conduct planning and technology risk reduction for TRIDENT WARRIOR 2010.<br><br>*FY 2011 Base Plans:*<br>FY11 Planned Accomplishments include: Document results of WPML project. Commence advanced Towed Array Handler Development. Develop, test, and transition ISR technologies to support irregular warfare. Conduct SSGN exercise demonstrating an integrated Joint ISR architecture, persistent ISR, and advanced networking capability to the Joint Force and localized commanders in real time. This | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>2033: *Adv Submarine System Development* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| experiment will include SSGN integration with autonomous vehicles to support Theater Commander's requirements. | | | | | |
| Acquisition Workforce<br>DAWDF<br><br>*FY 2009 Accomplishments:*<br>N/A | 0.293 | 0.000 | 0.000 | 0.000 | 0.000 |
| Stealth/Subtotal Cost<br>Develop technologies and tools to increase the safety of submarines by recognizing and mitigating sources of noise, ensuring that submarines can penetrate contested waters by reduced acoustic observables, and remaining undetected in the littorals. Develop technologies and Tactics, Techniques, and Procedures (TTPs) that will be integrated with existing naval assets to develop new or enhance existing warfighting concepts. Operate the Large Scale Vehicle (LSV 2) and the Intermediate Scale Measurement System (ISMS) to conduct large model experiments for submarines focusing on stealth, maneuvering and control, affordability, and operational effectiveness.<br><br>*FY 2009 Accomplishments:*<br>FY09 Accomplishments include: Continued LSV operations and maintained LSV and ISMS test ranges. Developed and coordinated integrated program plan with ONR and PMS450 to execute research and development related to flow-noise, future sonar concepts and structural acoustics. Performed concept design and fabrication of scale model Integrated Bow Conformal (IBC) structure utilizing newly developed castable polyurethane materials. Completed hydrostatic pressure testing of conformal array test articles using newly developed materials. Completed qualification testing on new conformal array material. Completed literature search to provide basis for development of multipurpose hull treatment materials for future platforms. Obtained relative full-scale data to support | 16.292 | 19.617 | 25.100 | 0.000 | 25.100 |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>2033: *Adv Submarine System Development* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| validation of modeling and analysis approaches related to Alternating Current (AC) Electromagnetic Signatures. Conducted full scale baseline signature measurement trials.<br><br>*FY 2010 Plans:*<br>FY10 Planned Accomplishments include: Conduct LSV operations and maintain LSV and ISMS test ranges. Obtain relative full scale data to support validation of modeling techniques related to AC Signature propagation. Execute research and development related to flow-noise, future sonar concepts, and structural acoustics for ONR, PMS450, and future submarine programs. Complete manufacturing studies on new castable polyurethane materials to support future conformal array applications. Develop Tactical, Technical Procedures (TTP) for and testing. Continue conducting full scale baseline signature measurement trials.<br><br>*FY 2011 Base Plans:*<br>FY11 Planned Accomplishments include: Conduct LSV operations and maintain LSV and ISMS test ranges. Support PMS 450 Future Sail Hydrodynamic development and assessment. Support OHIO Class SSBN replacement design development. Maintaining the ISMS range to conduct PMS 401 Towed Array calibration and testing, PMS 450 Payload Bay/Large Aperture Bow Array testing for target strength and structural acoustics and ONR Large UUV testing. Performing a refresh of major ISMS systems. Continue conducting full scale baseline signature measurement trials. | | | | | |
| Total Ownership/Affordability/Subtotal Cost<br><br>Demonstrate technologies with potential to reduce total life cycle costs of the system by providing reduced construction costs, commonality of interfaces, longer life of parts, and/or lower maintenance requirements.<br><br>*FY 2009 Accomplishments:*<br>FY09 Accomplishments include: Completed qualification testing on 10,000 and 20,000 in-lb 3-position rotary Electric Actuation System (EAS) ADMs. Planned and scheduled the at-sea bow | 5.237 | 11.100 | 4.930 | 0.000 | 4.930 |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>2033: *Adv Submarine System Development* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| plane electric actuator Operation Alteration (OPALT). Initiated Temporary Alteration (TEMPALT) planning to demonstrate rotary EAS on an operational submarine. Continued Electric Actuation of Universal Modular Mast (UUM) design, Interface Control Drawings (ICDs), and initiated OPALT planning. Completed CO2 scrubber sorbent material performance testing. Completed design and construction of a 1/10 th capacity CO2 scrubber test unit for lab evaluation. Completed design of sorbent test cubes for shipboard testing. Updated Business Case Analysis (BCA) for the new CO2 removal system. Conducted pop up and Intermediate Scale Measurement System tests to assess damping configuration. Completed report trial of two SSN-688 class platforms with modified Main Ballast Tank (MBT) damping configurations to support reduction in maintenance requirements. Completed summary report on Modular Integrated Deck Structure (MIDS) testing and associated analysis. Completed functional requirements for Control Surfaces. Initiated functional requirements for external applications, and completed BCA, ICDs, arrangement studies and concept designs for replacing external hydraulic actuators with electric systems.<br><br>*FY 2010 Plans:*<br>FY10 Planned Accomplishments include: Fabricate design, perform T&E and complete OPALT Technical Data Package (TDP) for bow plane electric control surface actuation demonstrator. Complete OPALT TDP for an at-sea demonstration of rotary and UMM EAS. Complete functional requirements for external electric actuation systems. Complete functional requirements for External Electric Actuation Systems. Evaluate external EAS concept design and complete preliminary design of a high risk application. Complete VA Class BCA for the new CO2 scrubber prototype system. Build and lab test CO2 scrubber sorbent test cubes. Complete TEMPALT TDP and install test cubes for shipboard testing. Initiate design of full capacity CO2 scrubber breadboard system. Complete MBT Damping trial report on SSN-688I platform with modified configuration.<br>Conduct assessment of life cycle maintenance cost reduction opportunities of in-service submarines to reduce current and future submarine maintenance cost. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>2033: *Adv Submarine System Development* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| *FY 2011 Base Plans:*<br>FY 11 Planned Accomplishments include: Install OPALT to demonstrate bow plane electric actuation. Install TEMPALT to demonstrate a rotary EAS at sea. Build CO2 Scrubber prototype, manufacture sorbent material and perform material testing. | | | | | |
| Advanced Propulsion/Ship Concept Developments/Subtotal Cost | 16.974 | 14.343 | 4.200 | 0.000 | 4.200 |
| Overcome selected technological barriers expected to have significant impact on submarine hull, mechanical, and electrical (HM&E) systems to enable design options for a submarine with VIRGINIA Class capability in three technical areas: Shaftless Propulsion, External Weapon Stow and Launch, and Radical Ship HM&E Infrastructure Reduction.<br>Develop submarine alternative propulsion and stern configurations with potential to significantly reduce submarine acquisition cost. Demonstrate critical performance parameters via Appropriate Scale Demonstrators in realistic environmental conditions. Evaluate integration of technologies and approaches for cost reduction in future nuclear submarines. Develop understanding of ship concept studies and submarine cost drivers and model analysis. Develop and demonstrate technologies for a future SSBN in areas of hull and platform technologies, propulsors, ship control, electric actuation, sensors, and self defense. This work will apply to future submarine designs and the long-lead concept work on the next undersea strategic deterrent platform. Conduct concept studies and mission utility studies for variant submarine designs, including VIRGINIA derivatives.<br><br>*FY 2009 Accomplishments:*<br>FY09 Accomplishments include: Conducted Tango Bravo (TB) demonstrations and acoustic modeling to reduce risk of proceeding to TB Shaftless Propulsion phase 3. Completed External Weapons final report. Continued concept studies to support Sea Based Strategic Deterrent (SBSD) Analysis of Alternatives (AoA), requirements development and R&D planning. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>2033: *Adv Submarine System Development* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| Completed detail design of the TB X-Planes electric actuator and ship control system modifications. Completed performance requirements, OPALT planning and procure long lead material for bow plane control surface electric actuator demonstration on SSN 774.<br><br>*FY 2010 Plans:*<br>FY10 Planned Accomplishments: Continue partnership with DARPA on TB project. Continue demonstration and performance testing of TB Shaftless Propulsion prototype. Perform motor structural acoustic design and testing.<br><br>*FY 2011 Base Plans:*<br>FY11 Planned Accomplishments include: Complete TB Shaftless Propulsion project. | | | | | |
| Accomplishments/Planned Programs Subtotals | 61.044 | 72.301 | 42.515 | 0.000 | 42.515 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**D. Acquisition Strategy**

F2033: Sole source Concept Formulation Study contracts with General Dynamics Electric Boat (EB) and Northrop Grumman Shipbuilding (NGSB).

**E. Performance Metrics**

Complete prototype design effort of a representative first generation WPML launcher to include down selected gas generator feature to aid the water piercing effort as a low cost high performance alternative to other missile launch systems.
-To enable transition of a minimum of three technology challenge solutions supporting emergent war fighter needs.
-Sustain critical one of a kind national R&D hydro acoustic infrastructure enabling the design and assessment of VIRGINIA Class Block IV cost reduction and the OHIO Replacement Program design for affordability.
-Refine the design a prototypical Advanced CO2 system based upon at-sea testing of new solid sorbent material to remove the entire amine system from future submarines.

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| **APPROPRIATION/BUDGET ACTIVITY**<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 ITEM NOMENCLATURE**<br>PE 0603561N: *Adv Submarine System Dev* | **PROJECT**<br>2033: *Adv Submarine System Development* |

-Install and test three at-sea demonstrations for electric actuation of critical ship control and ship system operation components in support of the OHIO Replacement Program and follow-on VIRGINIA Class Block Upgrades.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>2033: *Adv Submarine System Development* |

**Product Development ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Product Development | SS/CPFF | NGSB<br>Newport News, VA | 2.082 | 1.000 | Dec 2009 | 0.904 | Oct 2010 | 0.000 | | 0.904 | Continuing | Continuing | Continuing |
| Product Development | WR | NSWC<br>Dahlgren, VA | 1.321 | 3.920 | Nov 2009 | 0.000 | | 0.000 | | 0.000 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | Kollmorgen<br>N. Hampton, MA | 1.000 | 0.100 | Mar 2010 | 0.000 | | 0.000 | | 0.000 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | Oceaneering<br>Chesapeake, VA | 0.000 | 1.900 | Jan 2010 | 0.000 | | 0.000 | | 0.000 | 0.000 | 1.900 | 1.900 |
| Product Development | SS/CPFF | Boeing<br>St. Louis, MO | 0.000 | 0.925 | Mar 2010 | 0.000 | | 0.000 | | 0.000 | 0.000 | 0.925 | 0.925 |
| Product Development | SS/CPFF | EB<br>Groton, CT | 10.327 | 19.390 | Oct 2009 | 17.848 | Oct 2010 | 0.000 | | 17.848 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | Raytheon<br>Portsmouth, RI | 14.517 | 1.517 | Feb 2010 | 0.000 | | 0.000 | | 0.000 | Continuing | Continuing | Continuing |
| Product Development | WR | NSWC<br>Bethesda, MD | 42.765 | 18.094 | Oct 2009 | 9.833 | Oct 2010 | 0.000 | | 9.833 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | ARL/PSU<br>State College, PA | 2.887 | 1.500 | Dec 2009 | 0.970 | Dec 2010 | 0.000 | | 0.970 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | UT/ARL<br>Austin, TX | 6.050 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 6.050 | 6.050 |
| Product Development | SS/CPFF | JHU/APL<br>Laurel, MD | 15.054 | 0.540 | Apr 2010 | 0.000 | | 0.000 | | 0.000 | Continuing | Continuing | Continuing |
| Product Development | C/Various | Various<br>Various | 21.582 | 7.907 | Jan 2010 | 3.230 | Oct 2010 | 0.000 | | 3.230 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>2033: *Adv Submarine System Development* |

**Product Development ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Product Development | WR | NUWC<br>Newport, RI | 43.636 | 2.398 | Oct 2009 | 1.300 | Oct 2010 | 0.000 | | 1.300 | Continuing | Continuing | Continuing |
| Product Development | WR | ONR<br>Arlington, VA | 8.066 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 8.066 | 8.066 |
| Product Development | SS/CPFF | Lockheed Martin<br>Bethesda, MD | 8.934 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 8.934 | 8.934 |
| Product Development | WR | SPAWAR<br>San Diego, CA | 5.850 | 0.000 | | 0.000 | | 0.000 | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 184.071 | 59.191 | | 34.085 | | 0.000 | | 34.085 | | | |

**Remarks**

Various/VAR is used to group multiple activities with small funding levels and when multiple award dates are planned.

**Support ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Contractor Engineering Support | SS/CPFF | Various<br>Various | 6.062 | 1.450 | Oct 2009 | 0.895 | Oct 2010 | 0.000 | | 0.895 | Continuing | Continuing | Continuing |
| Government Engineering Support | WR | Various<br>Various | 2.829 | 1.189 | Oct 2009 | 0.510 | Oct 2010 | 0.000 | | 0.510 | Continuing | Continuing | Continuing |
| Travel | WR | NAVSEA HQ<br>Not Specified | 0.319 | 0.090 | Oct 2009 | 0.080 | Oct 2010 | 0.000 | | 0.080 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>2033: *Adv Submarine System Development* |

**Support ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Acquisition Workforce | C/TBD | Not Specified<br>Not Specified | 0.293 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 0.293 | 0.293 |
| | | Subtotal | 9.503 | 2.729 | | 1.485 | | 0.000 | | 1.485 | | | |

**Remarks**

Various/VAR is used to group multiple activities with small funding levels and when multiple award dates are planned.

**Test and Evaluation ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Developmental Test & Evaluation | SS/CPFF | EB<br>Groton, CT | 2.371 | 2.256 | Oct 2009 | 1.376 | Oct 2010 | 0.000 | | 1.376 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | SS/CPFF | Raytheon<br>Portsmouth, VA | 8.104 | 1.000 | Feb 2010 | 0.000 | | 0.000 | | 0.000 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | WR | NAVAIR<br>Patuxent, MD | 2.593 | 0.000 | | 0.000 | | 0.000 | | 0.000 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | C/Various | Various<br>Various | 2.664 | 2.572 | Nov 2009 | 2.297 | Oct 2010 | 0.000 | | 2.297 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | WR | NUWC<br>Newport, RI | 1.402 | 0.970 | Oct 2009 | 0.760 | Oct 2010 | 0.000 | | 0.760 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | WR | NSWC<br>Carderock, MD | 5.167 | 2.500 | Oct 2009 | 2.512 | Oct 2010 | 0.000 | | 2.512 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>2033: *Adv Submarine System Development* |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | FY 2010 Cost | FY 2010 Award Date | FY 2011 Base Cost | FY 2011 Base Award Date | FY 2011 OCO Cost | FY 2011 OCO Award Date | FY 2011 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Developmental Test & Evaluation | SS/CPFF | NGSB Newport News, VA | 0.000 | 0.783 | Oct 2009 | 0.000 | | 0.000 | | 0.000 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | SS/CPFF | JHU/ARL Laurel, MD | 0.005 | 0.300 | Apr 2010 | 0.000 | | 0.000 | | 0.000 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | SS/CPFF | ARL/PSU State College, PA | 0.720 | 0.000 | Dec 2009 | 0.000 | | 0.000 | | 0.000 | Continuing | Continuing | Continuing |
| Developmental Test & Evaluation | WR | NSWC Dahlgren, VA | 1.320 | 0.000 | Nov 2009 | 0.000 | | 0.000 | | 0.000 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 24.346 | 10.381 | | 6.945 | | 0.000 | | 6.945 | | | |

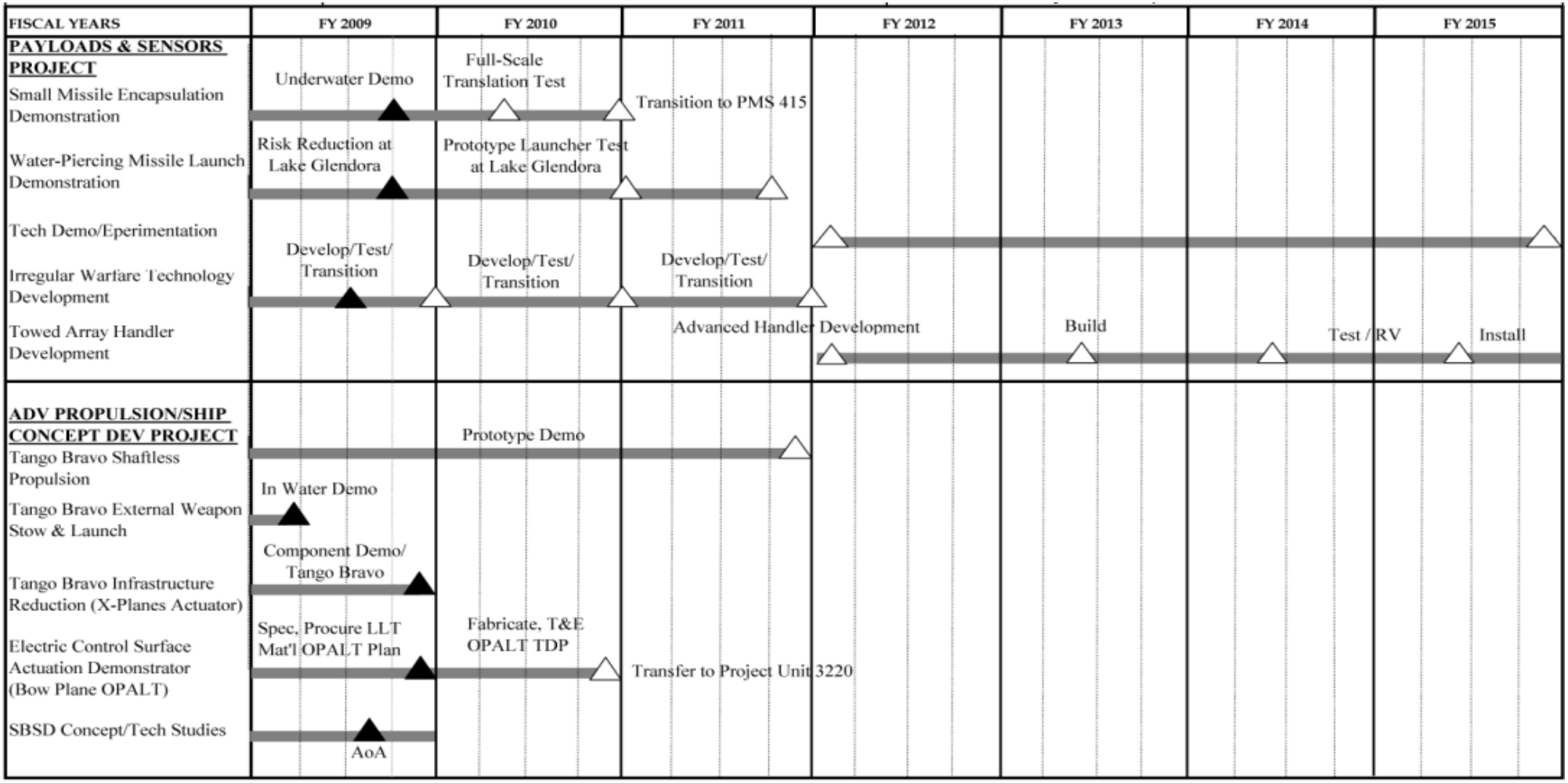
**Remarks**

Various/VAR is used to group multiple activities with small funding levels and when multiple award dates are planned.

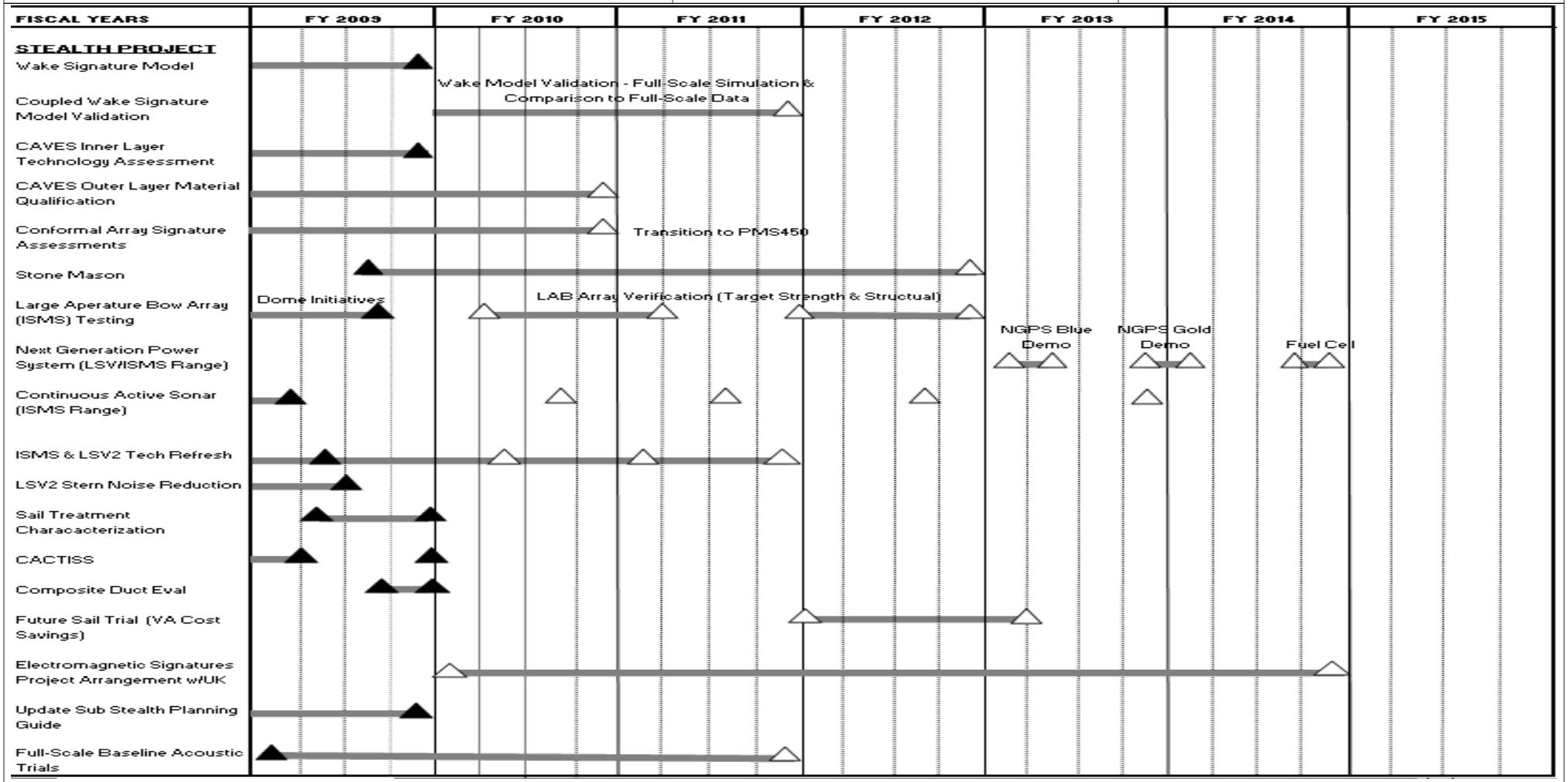
| | Total Prior Years Cost | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 217.920 | 72.301 | | 42.515 | | 0.000 | | 42.515 | | | |

**Remarks**

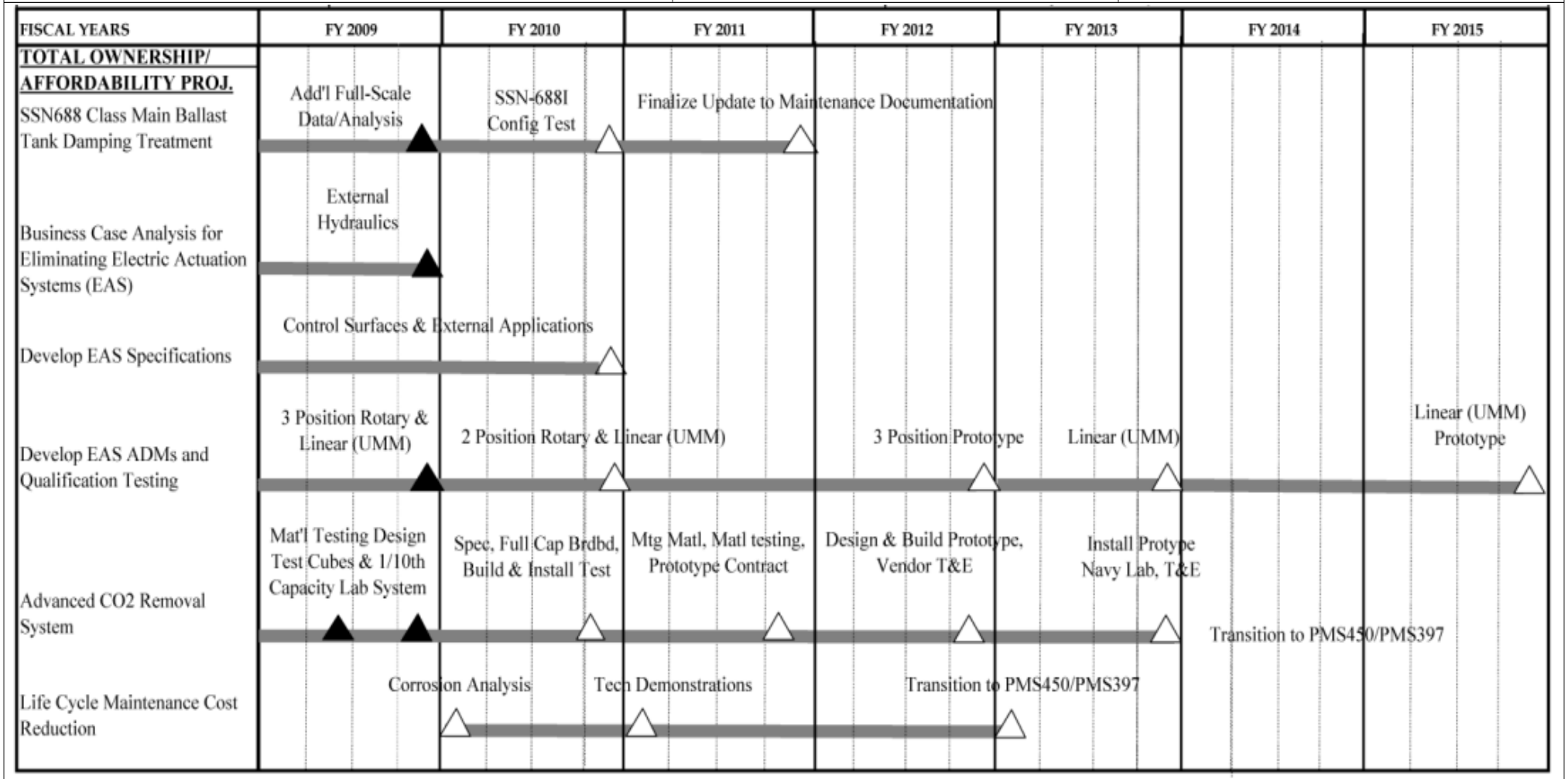
| Exhibit R-4, RDT&E Schedule Profile: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| **APPROPRIATION/BUDGET ACTIVITY**<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 ITEM NOMENCLATURE**<br>PE 0603561N: *Adv Submarine System Dev* | **PROJECT**<br>2033: *Adv Submarine System Development* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| **APPROPRIATION/BUDGET ACTIVITY**<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 ITEM NOMENCLATURE**<br>PE 0603561N: *Adv Submarine System Dev* | **PROJECT**<br>2033: *Adv Submarine System Development* |



| Exhibit R-4, RDT&E Schedule Profile: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>2033: *Adv Submarine System Development* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| **APPROPRIATION/BUDGET ACTIVITY**<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 ITEM NOMENCLATURE**<br>PE 0603561N: *Adv Submarine System Dev* | **PROJECT**<br>2033: *Adv Submarine System Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Event** | **Quarter** | **Year** | **Quarter** | **Year** |
| Small Missile Encapsulation Demo (Underwater Demo) | 4 | 2009 | 4 | 2009 |
| Small Missile Encapsulation Full-Scale Translation Testing | 2 | 2010 | 2 | 2010 |
| Water Piercing Missile Launch Prep & Demo | 1 | 2009 | 3 | 2011 |
| Technology Demonstration (Experimentation) | 1 | 2012 | 4 | 2015 |
| Irregular Warfare Technology Development | 1 | 2009 | 4 | 2011 |
| Towed Array Handling | 1 | 2012 | 4 | 2015 |
| Tango Bravo Shaftless Propulsion | 1 | 2009 | 4 | 2011 |
| Tango Bravo External Weapon Stow & Launch | 1 | 2009 | 1 | 2009 |
| Tango Bravo Infrastructure Reduction | 1 | 2009 | 4 | 2009 |
| Electric Control Surface Actuation Demo | 1 | 2009 | 4 | 2009 |
| SBSD Concept/Tech Studies | 1 | 2009 | 4 | 2009 |
| Wake Signature Model | 1 | 2009 | 4 | 2009 |
| Coupled Wake Signature Model Validation | 1 | 2010 | 4 | 2011 |
| CAVES Inner Layer Technology Assessment | 1 | 2009 | 4 | 2009 |
| CAVES Outer-Layer Material Qualification | 1 | 2009 | 4 | 2010 |
| Conformal Array Signature Assessment | 1 | 2009 | 4 | 2010 |
| Stone Mason | 3 | 2009 | 4 | 2012 |
| Large Aperture Bow Array Testing | 1 | 2009 | 4 | 2012 |

| Exhibit R-4A, RDT&E Schedule Details: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| **APPROPRIATION/BUDGET ACTIVITY**<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 ITEM NOMENCLATURE**<br>PE 0603561N: *Adv Submarine System Dev* | **PROJECT**<br>2033: *Adv Submarine System Development* |

| | Start | | End | |
|---|---|---|---|---|
| **Event** | **Quarter** | **Year** | **Quarter** | **Year** |
| Next Generation Power System Assessment | 1 | 2013 | 3 | 2014 |
| Continuous Active Sonar Assessment | 1 | 2009 | 4 | 2013 |
| LSV2 & ISMS Technology refresh | 2 | 2009 | 4 | 2011 |
| LSV2 Stern Noise Reduction | 1 | 2009 | 2 | 2009 |
| Sail Treatment Characterization | 2 | 2009 | 4 | 2009 |
| CACTISS | 1 | 2009 | 4 | 2009 |
| Composite Duct Eval, LSV2 (VA Cost Savings) | 3 | 2009 | 4 | 2009 |
| Future Sail Trial | 1 | 2012 | 1 | 2013 |
| Electromagnetic Signatures Project Arrangement (PA) w/UK | 1 | 2010 | 4 | 2014 |
| Update Submarine Stealth Planning Guide (SPG) | 1 | 2009 | 4 | 2009 |
| Full-Scale Baseline Acoustic Trails | 1 | 2009 | 4 | 2011 |
| SSN-688 Class Main Ballast Tank Damping Treatment | 1 | 2009 | 4 | 2011 |
| Business Case Analysis for EAS | 1 | 2009 | 4 | 2009 |
| Develop EAS Specifications | 1 | 2009 | 2 | 2010 |
| Develop EAS ADM's and Qualification Testing | 1 | 2009 | 4 | 2015 |
| Advanced CO2 Removal System | 1 | 2009 | 4 | 2013 |
| Life Cycle Maintenance Cost Reduction | 1 | 2010 | 1 | 2013 |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | | DATE: February 2010 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3197: *Undersea Superiority* | |

| COST ($ in Millions) | FY 2009 Actual | FY 2010 Estimate | FY 2011 Base Estimate | FY 2011 OCO Estimate | FY 2011 Total Estimate | FY 2012 Estimate | FY 2013 Estimate | FY 2014 Estimate | FY 2015 Estimate | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3197: *Undersea Superiority* | 35.631 | 32.176 | 21.983 | 0.000 | 21.983 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 89.790 |
| Quantity of RDT&E Articles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |

**A. Mission Description and Budget Item Justification**

Project Unit 3197: This Project supports Navy Undersea Superiority through the application of advanced development and testing of organic and offboard sonar and tactical control systems. This Project transitions technologies developed by Navy technology bases, the private sector, ONR, Future Naval Capabilities, and DARPA. This non-acquisition Project addresses technology challenges to improve Anti Submarine Warfare (ASW) in littoral and open ocean environments for a variety of operational missions by relevant tactical ASW capabilities. Prototype hardware / software systems are developed to demonstrate technologically promising system concepts in laboratory and at-sea submarine environments. Technologies are selected by the CNO ASW Initiative which was established to support the CNO vision to "fundamentally change the way ASW is currently conducted to render the enemy submarine irrelevant against US and coalition forces". It matures promising undersea warfare technologies via an incremental development methodology, establishes military utility through sea testing and self assessment, and supports transition to production as merited by results.

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| Undersea Superiority | 35.453 | 32.176 | 21.983 | 0.000 | 21.983 |
| *FY 2009 Accomplishments:*<br>FY09 awarded development contracts for Deep Water Active Detection System (DWADS) and Reliable Acoustic Path (RAP) Line Array system, and conducted at-sea experiments of both. Continued support to Deployable Autonomous Distributed System (DADS) and completed Shallow Water Acoustic Performance study.<br><br>*FY 2010 Plans:*<br>FY10 will continue development of DWADS to include integration, prototyping, land based and at-sea testing of ADMs and conduct of Military Utility Assessments (MUAs). Development of Distributed | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3197: *Undersea Superiority* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| Netted Sensors Control and Communications capabilities will be included in DWADS and RAP efforts. Continue studies, analysis and assessments of potential transformational ASW technologies. Initiate planning for development of new technologies resulting from aforementioned studies.<br><br>*FY 2011 Base Plans:*<br>FY11 will continue development of DWADS to include integration, prototyping, land based and at-sea testing of ADMs and conduct of Military Utility Assessments (MUAs). Development of Distributed Netted Sensors Control and Communications capabilities will be included in DWADS and RAP efforts. Continue studies, analysis and assessments of potential transformational ASW technologies. Initiate planning for development of new technologies resulting from aforementioned studies. | | | | | |
| DAWDF<br>*FY 2009 Accomplishments:*<br>Defense Acquisition Workforce Development Fund. | 0.178 | 0.000 | 0.000 | 0.000 | 0.000 |
| Accomplishments/Planned Programs Subtotals | 35.631 | 32.176 | 21.983 | 0.000 | 21.983 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**D. Acquisition Strategy**

Use competitively awarded contracts from BAA solicitations.

**E. Performance Metrics**

- Reliable Acoustic Path Vertical Line Array (RAP VLA) provides detection of quiet diesel submarines at ranges 3 to 7 times water depth. Continue RAP VLA development and conduct a Deep Digital Array sea test and an Engineering Integration test in FY10.
- Deep Water Active Detection System (DWADS) - participate in Distributed Netted System (DNS) 10-1 Prototype testing in Convergence Zone and Valiant Shield 10 with Integrated Units in FY10.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | | DATE: February 2010 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3197: *Undersea Superiority* | |

**Product Development ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Product Development | WR | ONR<br>VA | 0.000 | 0.000 | | 1.064 | Nov 2010 | 0.000 | | 1.064 | 0.000 | 1.064 | 1.064 |
| Product Development | WR | NUWC/Newport<br>RI | 1.220 | 0.000 | Oct 2009 | 0.800 | Oct 2010 | 0.000 | | 0.800 | 0.000 | 2.020 | 2.020 |
| Product Development | WR | Marine Acoustics Inc.<br>NC | 0.188 | 0.175 | Jan 2010 | 1.000 | Dec 2010 | 0.000 | | 1.000 | 0.000 | 1.363 | 1.363 |
| Product Development | MIPR | U.S. AFB/MIT Lincoln Labs<br>MA | 0.000 | 1.200 | Nov 2009 | 0.600 | Nov 2010 | 0.000 | | 0.600 | 0.000 | 1.800 | 1.800 |
| Product Development | C/CPFF | JHU/APL<br>MD | 2.050 | 5.462 | Dec 2009 | 3.500 | Dec 2010 | 0.000 | | 3.500 | 0.000 | 11.012 | 11.012 |
| Product Development | C/CPFF | Lockheed Martin<br>VA | 2.531 | 7.444 | Dec 2009 | 5.500 | Dec 2010 | 0.000 | | 5.500 | 0.000 | 15.475 | 15.475 |
| Product Development | C/CPFF | SAIC<br>VA | 0.000 | 0.000 | | 0.200 | Dec 2010 | 0.000 | | 0.200 | 0.000 | 0.200 | 0.200 |
| Product Development | C/CPFF | Lockheed Martin<br>CA | 11.886 | 12.611 | Dec 2009 | 0.000 | | 0.000 | | 0.000 | 0.000 | 24.497 | 24.497 |
| Product Development | C/CPFF | In Depth Engineering<br>VA | 0.900 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 0.900 | 0.900 |
| Product Development | C/CPFF | Scientific Solutions Inc<br>NH | 0.500 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 0.500 | 0.500 |
| Product Development | WR | Naval Research Lab | 0.885 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 0.885 | 0.885 |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3197: *Undersea Superiority* |

**Product Development ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| | | DC | | | | | | | | | | | |
| | | Subtotal | 20.160 | 26.892 | | 12.664 | | 0.000 | | 12.664 | 0.000 | 59.716 | 59.716 |

**Remarks**

**Test and Evaluation ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Test and Evaluation | WR | SPAWAR, San Diego CA | 1.600 | 0.000 | | 0.250 | Oct 2010 | 0.000 | | 0.250 | 0.000 | 1.850 | 1.850 |
| Test and Evaluation | WR | NUWC/Newport RI | 2.922 | 2.735 | Oct 2009 | 1.800 | Oct 2010 | 0.000 | | 1.800 | 0.000 | 7.457 | 7.457 |
| Test and Evaluation | C/CPFF | JHU/APL MD | 5.080 | 0.500 | Dec 2009 | 1.200 | Dec 2010 | 0.000 | | 1.200 | 0.000 | 6.780 | 6.780 |
| Test and Evaluation | C/CPFF | UT/ARL TX | 1.650 | 0.750 | Dec 2009 | 4.000 | Dec 2010 | 0.000 | | 4.000 | 0.000 | 6.400 | 6.400 |
| Test and Evaluation | MIPR | U.S. AFB/MIT Lincoln Labs MA | 0.000 | 0.150 | Dec 2009 | 0.100 | Dec 2010 | 0.000 | | 0.100 | 0.000 | 0.250 | 0.250 |
| Test and Evaluation | WR | Various Various | 3.724 | 0.689 | Jan 2010 | 1.509 | Dec 2010 | 0.000 | | 1.509 | 0.000 | 5.922 | 5.922 |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3197: *Undersea Superiority* |

**Test and Evaluation ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| | | Subtotal | 14.976 | 4.824 | | 8.859 | | 0.000 | | 8.859 | 0.000 | 28.659 | 28.659 |

**Remarks**

**Management Services ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Program Management Support | C/CPAF | BAE SYSTEMS MD | 0.400 | 0.400 | Dec 2009 | 0.400 | Dec 2010 | 0.000 | | 0.400 | 0.000 | 1.200 | 1.200 |
| Travel | WR | NAVSEA PEO IWS5 DC | 0.010 | 0.060 | Oct 2009 | 0.060 | Oct 2010 | 0.000 | | 0.060 | 0.000 | 0.130 | 0.130 |
| DAWDF | C/TBD | TBD TBD | 0.178 | 0.000 | | 0.000 | | 0.000 | | 0.000 | 0.000 | 0.178 | 0.178 |
| | | Subtotal | 0.588 | 0.460 | | 0.460 | | 0.000 | | 0.460 | 0.000 | 1.508 | 1.508 |

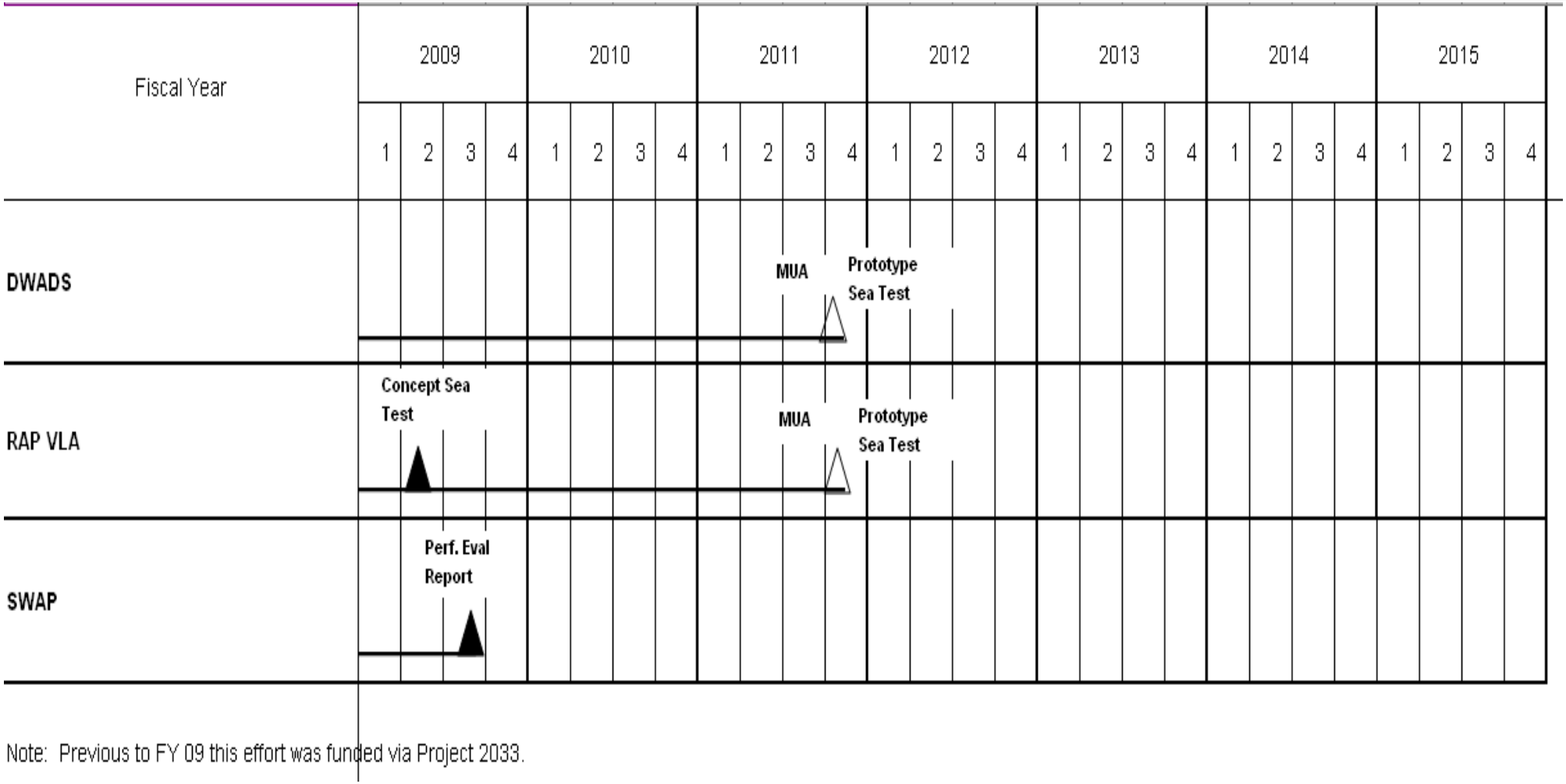
**Remarks**

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | | DATE: February 2010 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3197: *Undersea Superiority* | |

| | Total Prior Years Cost | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Project Cost Totals | 35.724 | 32.176 | | 21.983 | | 0.000 | | 21.983 | 0.000 | 89.883 | 89.883 |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3197: *Undersea Superiority* |




Note: Previous to FY 09 this effort was funded via Project 2033.

| Exhibit R-4A, RDT&E Schedule Details: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| **APPROPRIATION/BUDGET ACTIVITY**<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 ITEM NOMENCLATURE**<br>PE 0603561N: *Adv Submarine System Dev* | **PROJECT**<br>3197: *Undersea Superiority* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Event** | **Quarter** | **Year** | **Quarter** | **Year** |
| DWADS Military Utility Assessment (MUA) | 3 | 2011 | 3 | 2011 |
| DWADS Fully Functional Prototype Sea Test | 4 | 2011 | 4 | 2011 |
| RAP VLA Proof of Concept Sea Test | 2 | 2009 | 2 | 2009 |
| RAP VLA Military Utility Assessment (MUA) | 3 | 2011 | 3 | 2011 |
| RAP VLA Fully Functional Prototype Sea Test | 4 | 2011 | 4 | 2011 |
| SWAP Performance Evaluation Report | 3 | 2009 | 3 | 2009 |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | | DATE: February 2010 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3220: *SBSD Advanced Submarine System Development* | |

| COST ($ in Millions) | FY 2009 Actual | FY 2010 Estimate | FY 2011 Base Estimate | FY 2011 OCO Estimate | FY 2011 Total Estimate | FY 2012 Estimate | FY 2013 Estimate | FY 2014 Estimate | FY 2015 Estimate | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3220: *SBSD Advanced Submarine System Development* | 0.000 | 385.910 | 493.028 | 0.000 | 493.028 | 755.902 | 830.832 | 1,044.448 | 597.299 | Continuing | Continuing |
| Quantity of RDT&E Articles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |

**A. Mission Description and Budget Item Justification**

The SBSD Advanced Submarine System Development program funding requests supports the necessary design, systems engineering, prototyping, and vendor qualification activities needed to execute the schedule for Common Missile Compartment (CMC) design, and whole ship design and component development technologies for the next generation ballistic
missile submarine. The U.S. RDT&E program supports cooperation with the UK to maintain its strategic deterrent, continuing over 46 years of cooperation under the Polaris Sales Agreement.

The following key activities are imperative for a successful ship acquisition to replace the OHIO Class SSBNs:
1. Design and development of a missile compartment, the launch system and the strategic support systems to meet US strategic requirements in accordance with the President's direction (NOV 06) to support the replacement of the United Kingdom (UK) strategic deterrent, the VANGUARD Class SSBN. UK Secretary of State John Hutton's letter dated
February 2009, confirmed continued UK support for the CMC Program. US Secretary of Defense Gates response dated May 09, confirmed joint US/UK CMC design efforts.

2. AOA analysis was completed May 09 along with final out brief to OSD. The final AOA Report completed in September 2009. OSD's PA&E AOA Sufficiency Review Letter was signed December 2009.

3. Concept and System Definition for remaining portions of the ship in order to maintain US synchronization with the missile compartment design efforts to provide a balanced and integrated US submarine design within US schedule requirements.

4. Development of advanced submarine platform technologies to provide capabilities needed to enhance platform operational effectiveness and minimize life cycle cost over its service life.

**B. Accomplishments/Planned Program ($ in Millions)**

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3220: *SBSD Advanced Submarine System Development* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| SBSD Advanced Submarine System Development | 0.000 | 385.910 | 493.028 | 0.000 | 493.028 |

SBSD Concept and System Definition and Prototyping
The SBSD program supports design, systems engineering, prototyping, and vendor qualification activities needed to develop the CMC design and the OHIO Replacement whole ship design and component development. SBSD design work is necessary for decisions on missile tube hull insert casting manufacturing in FY 2010 and missile compartment construction strategy in FY 2011. The design timelines are templated on the successful approach proven on VIRGINIA, adjusted for the additional complexity of a missile compartment and strategic weapons systems. The SBSD program will leverage off the demonstrated results from the VIRGINIA class program, resulting in a mature CMC design prior to construction to minimizes risk of design rework, schedule overruns and potential cost growth.

Additional efforts are directed to technologies requiring significant development times and those technologies with early design impacts. These include propulsor development, ship control (e.g., control surfaces), and ship signatures. These technologies are critical to understanding stealth capabilities for a ship class that will be in service until 2080.

Activities planned for FY10 and FY11 include the design of a missile compartment to satisfy both the U.S. and UK Navy's requirements, efforts to mature advanced technologies and development of a new launcher system providing adaptability and flexibility throughout the ship's life. Ship development efforts include important pre-construction activities such as studies of ship requirements, investigation of technology options, improvement and validation of performance prediction tools, and improvement of design tools. Platform technology development will address technologies that must be mature to support start of ship design such as the propulsor, electric actuation, maneuvering/ship control and signatures.

*FY 2010 Plans:*
FY10 Planned Accomplishments:

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3220: *SBSD Advanced Submarine System Development* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| - Development of CMC related sections of the ship specification<br>- Development of drawings for qualification missile quad pack design<br>- Development of CMC system diagrams<br>- Procurement and manufacturing of critical casting and manufacturing prototypes validating planned missile compartment production techniques<br>- Concept and design work on a missile tube test facility, test stand, and refurbishment of a test vehicle needed to support underwater launch system prototype and qualifications<br>- Initial systems engineering<br>- Definition of required CMC testing during the build cycle<br>- Development of propulsor technologies<br>- Development of ship control technologies (e.g., control surfaces)<br>- Definition and development of ship signatures parameters and technologies<br><br>*FY 2011 Base Plans:*<br>FY 11 Planned Accomplishments include continuation of FY10 efforts and the following new efforts:<br>- Complete Launcher Test Stand Design<br>- Complete Surface Launch Test Vehicle Design<br>- Complete Prototype Launcher Design<br>- Complete Launch Test Facility Design<br>- Systems Engineering and Integration Requirements Development<br>- Missile Tube design<br>- Common Missile Compartment design<br>- Updated Integrated Master schedule<br>- CMC Build strategy down select<br>- Missile tube / Strategic Weapon System Support vendor qualifications<br>- Product Model Development<br>- Development of Signature Management Tools and Techniques for Propulsor Structural Acoustics<br>- Development of Design Guidance and Interface Control Requirements | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3220: *SBSD Advanced Submarine System Development* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| - Systems Engineering of Propulsor/Shaft/Stern/Engine Room<br>- Hardware Manufacturing for Large Scale Vehicle Models<br>- Planning and Preparations for Large Scale Vehicle Model Trials<br>- Hydrodynamic Studies for Propulsor Inflow<br>- Design Tool Development<br>- Flow Noise Design Feature Component Test and Analysis<br>- Planning and Preparations for Pressure Hull Confirmation Models<br>- Planning and Preparations for Shock Design and Qualification Process<br>- Implementation of a Component Development Management Process at the Shipbuilder | | | | | |
| Accomplishments/Planned Programs Subtotals | 0.000 | 385.910 | 493.028 | 0.000 | 493.028 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**D. Acquisition Strategy**

The OHIO Class replacement will use a variety of acquisition strategies. The missile compartment must be designed and developed earlier than other parts of the ship in order to support the expressed intent of the President to support the UK in development of its own Successor SSBN program. It also preserves the potential for a common US-UK missile compartment, which would maximize the benefit of the ongoing US-UK partnership in strategic deterrence. Concept and System Definition efforts will be performed primarily by the US submarine shipyards. R&D efforts will be performed by Navy laboratories, shipyards, private industry, and University Affiliated Research Centers.

**E. Performance Metrics**

Successful completion of Launcher Test Stand Design, Launcher Test Vehicle Design, Prototype Launcher Design, Launch Test Facility Design, and updated Integrated Master Schedule, and CMC build strategy down select. Development of Signature Management Tools, Techniques for Propulsor Structural Acoustics, and Design Guidance and Interface Control Requirements.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | | DATE: February 2010 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3220: *SBSD Advanced Submarine System Development* | |

**Product Development ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Product Development | SS/CPFF | Ship Design Contractor Not Specified | 0.000 | 30.000 | Jan 2010 | 47.600 | Jan 2011 | 0.000 | | 47.600 | Continuing | Continuing | Continuing |
| Product Development | WR | NSWC Carderock, MD | 0.000 | 25.000 | Jan 2010 | 73.539 | Oct 2010 | 0.000 | | 73.539 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | ARL Penn State University State College, PA | 0.000 | 2.000 | Feb 2010 | 1.572 | Nov 2010 | 0.000 | | 1.572 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | EB Groton, CT | 0.000 | 32.500 | Jan 2010 | 7.439 | Oct 2010 | 0.000 | | 7.439 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | NGSB Newport News, VA | 0.000 | 26.700 | Jan 2010 | 1.829 | Oct 2010 | 0.000 | | 1.829 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | NGMS Sunnyvale, CA | 0.000 | 55.000 | Feb 2010 | 40.402 | Nov 2010 | 0.000 | | 40.402 | Continuing | Continuing | Continuing |
| Product Development | WR | NUWC Newport, RI | 0.000 | 4.000 | Jan 2010 | 18.275 | Oct 2010 | 0.000 | | 18.275 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | Missile Comp Design Contractor-EB Groton, CT | 0.000 | 128.393 | Jan 2010 | 148.895 | Jan 2011 | 0.000 | | 148.895 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | JHU/APL Laurel, MD | 0.000 | 4.500 | Mar 2010 | 2.918 | Dec 2010 | 0.000 | | 2.918 | Continuing | Continuing | Continuing |
| Product Development | SS/CPIF | Missile Launch System Contractor | 0.000 | 35.000 | Apr 2010 | 0.000 | | 0.000 | | 0.000 | Continuing | Continuing | Continuing |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3220: *SBSD Advanced Submarine System Development* |

**Product Development ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| | | Not Specified | | | | | | | | | | | |
| Product Development | SS/CPFF | Draper Labs<br>Cambridge, MA | 0.000 | 5.000 | Mar 2010 | 4.669 | Dec 2010 | 0.000 | | 4.669 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | LMFS<br>MD | 0.000 | 15.000 | Mar 2010 | 5.597 | Dec 2010 | 0.000 | | 5.597 | Continuing | Continuing | Continuing |
| Product Development | Various/<br>Various | Various<br>VAR | 0.000 | 2.517 | Jan 2010 | 0.654 | Oct 2010 | 0.000 | | 0.654 | Continuing | Continuing | Continuing |
| Product Development | Various/<br>Various | Propulsor Technology<br>VAR | 0.000 | 0.000 | | 1.572 | Dec 2010 | 0.000 | | 1.572 | Continuing | Continuing | Continuing |
| Product Development | PO | NOTU<br>FL | 0.000 | 0.000 | | 52.506 | Oct 2010 | 0.000 | | 52.506 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | LMMSC<br>CA | 0.000 | 0.000 | | 28.862 | Oct 2010 | 0.000 | | 28.862 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | GDAIS<br>VA | 0.000 | 0.000 | | 13.039 | Oct 2010 | 0.000 | | 13.039 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | IEC<br>VA | 0.000 | 0.000 | | 2.801 | Oct 2010 | 0.000 | | 2.801 | Continuing | Continuing | Continuing |
| Product Development | WR | NSWC<br>VA | 0.000 | 0.000 | | 3.729 | Oct 2010 | 0.000 | | 3.729 | Continuing | Continuing | Continuing |
| Product Development | SS/CPFF | BAE<br>MD | 0.000 | 0.000 | | 6.546 | Oct 2010 | 0.000 | | 6.546 | Continuing | Continuing | Continuing |
| Product Development | Various/<br>Various | SSP<br>VAR | 0.000 | 0.000 | | 2.321 | | 0.000 | | 2.321 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 365.610 | | 464.765 | | 0.000 | | 464.765 | | | |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | | DATE: February 2010 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3220: *SBSD Advanced Submarine System Development* | |

**Product Development ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |

**Remarks**

Note: Various is used for multiple activities with different award dates

**Test and Evaluation ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Contractor Test and Evaluation Support | C/Various | Various Not Specified | 0.000 | 1.000 | Apr 2010 | 1.100 | Apr 2011 | 0.000 | | 1.100 | Continuing | Continuing | Continuing |
| Government Test and Evaluation Support | WR | Various Not Specified | 0.000 | 1.000 | Jan 2010 | 1.810 | Oct 2010 | 0.000 | | 1.810 | Continuing | Continuing | Continuing |
| Travel | WR | NAVSEA HQ Not Specified | 0.000 | 0.100 | Jan 2010 | 0.150 | Jan 2010 | 0.000 | | 0.150 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 2.100 | | 3.060 | | 0.000 | | 3.060 | | | |

**Remarks**

Note: Various is used for multiple activities with different award dates

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3220: *SBSD Advanced Submarine System Development* |

**Management Services ($ in Millions)**

| | | | | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Total Prior Years Cost | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Contractor Management Support | C/Various | Various<br>Not Specified | 0.000 | 8.000 | Jan 2010 | 14.115 | Oct 2010 | 0.000 | | 14.115 | Continuing | Continuing | Continuing |
| Government Management Support | WR | Various<br>Not Specified | 0.000 | 10.000 | Jan 2010 | 10.838 | Oct 2010 | 0.000 | | 10.838 | Continuing | Continuing | Continuing |
| Travel | WR | NAVSEA HQ<br>Not Specified | 0.000 | 0.200 | Jan 2010 | 0.250 | Jan 2011 | 0.000 | | 0.250 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 0.000 | 18.200 | | 25.203 | | 0.000 | | 25.203 | | | |

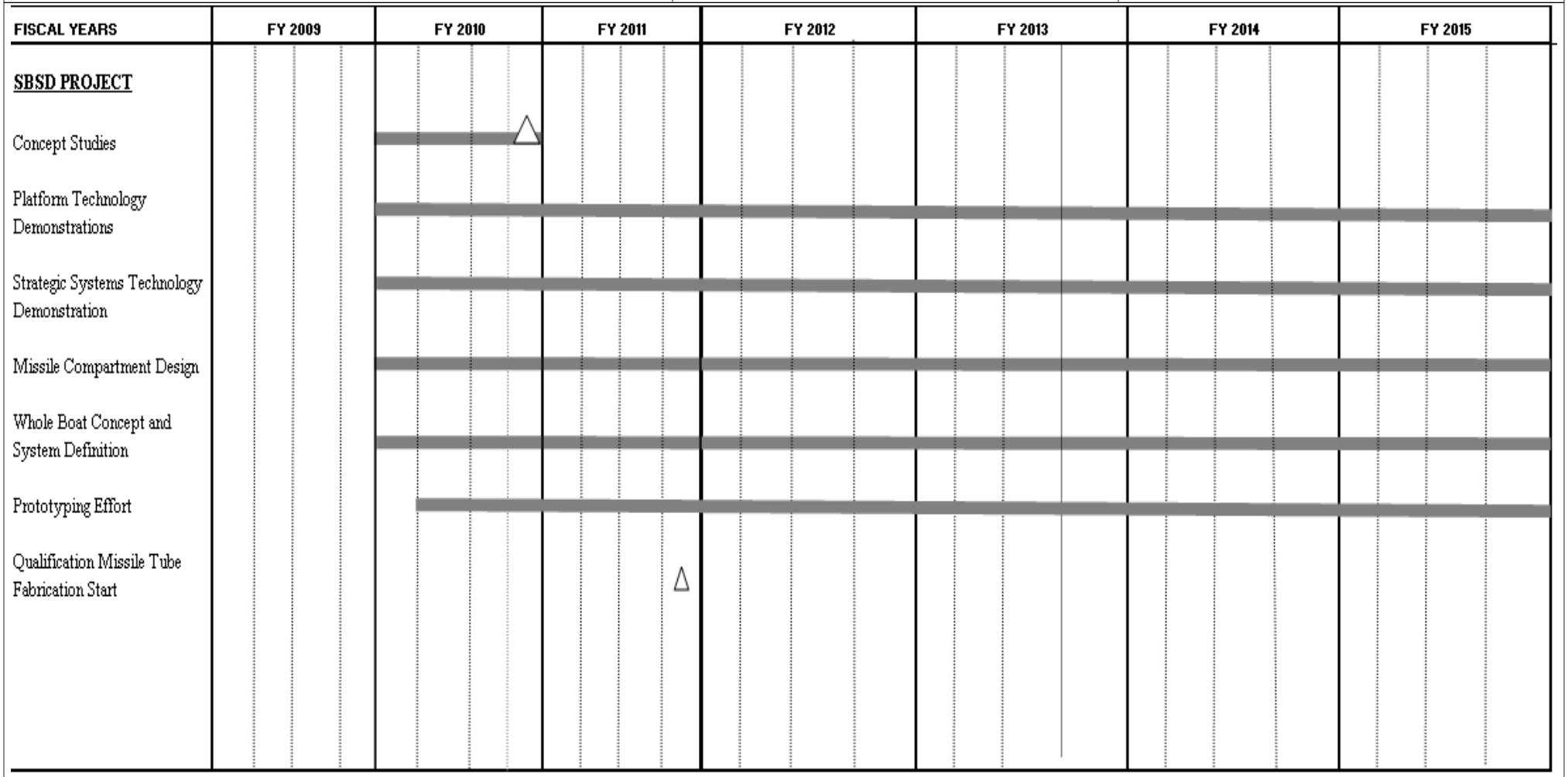
**Remarks**

Note: Various is used for multiple activities with different award dates

| | Total Prior Years Cost | FY 2010 | | FY 2011 Base | | FY 2011 OCO | | FY 2011 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | 385.910 | | 493.028 | | 0.000 | | 493.028 | | | |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>3220: *SBSD Advanced Submarine System Development* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| **APPROPRIATION/BUDGET ACTIVITY**<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 ITEM NOMENCLATURE**<br>PE 0603561N: *Adv Submarine System Dev* | **PROJECT**<br>3220: *SBSD Advanced Submarine System Development* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Event** | **Quarter** | **Year** | **Quarter** | **Year** |
| Concept Studies | 1 | 2010 | 4 | 2010 |
| Platform Technology Demonstrations | 1 | 2010 | 4 | 2015 |
| Strategic Systems Technology Demonstrations | 1 | 2010 | 4 | 2015 |
| Missile Compartment Design | 1 | 2010 | 4 | 2015 |
| Whole Boat Concept and System Definition | 1 | 2010 | 4 | 2015 |
| Prototyping Effort | 2 | 2010 | 4 | 2015 |
| Qualification Missile Tube Fabrication Start | 4 | 2011 | 4 | 2011 |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | | DATE: February 2010 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>9999: *Congressional Adds* | |

| COST ($ in Millions) | FY 2009 Actual | FY 2010 Estimate | FY 2011 Base Estimate | FY 2011 OCO Estimate | FY 2011 Total Estimate | FY 2012 Estimate | FY 2013 Estimate | FY 2014 Estimate | FY 2015 Estimate | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9999: *Congressional Adds* | 11.344 | 7.967 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 73.206 |
| Quantity of RDT&E Articles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |

**A. Mission Description and Budget Item Justification**

Congressional Add Projects.

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 |
|---|---|---|
| Congressional Add: Fiber Optic Conformal Acoustic Velocity Sensor (FO<br>*FY 2009 Accomplishments:*<br>Funds will be used to accelerate development of Fiber Optic Conformal Acoustic Velocity Sensor (FOCAVES) technology for the next generation SSN (Virginia Block IV) and the follow-on Strategic Based Sea Deterrent (next generation Ballistic Missile Submarine). | 1.995 | 0.000 |
| Congressional Add: Organic Submarine ISRT Demonstration (IRST OSAID)<br>*FY 2010 Plans:*<br>(PMS-425) Working with NAVSEA/NUWC, the purpose of this program is to design, build, and test an encapsulated UAV, about the size of a sonobuoy, which egresses from the submarine from the downward facing Trash Disposal Unit common on all submarines. This funding will allow for a full scale submerged capsule. | 0.000 | 2.390 |
| Congressional Add: SSBN(X) Systems Development | 0.000 | 1.992 |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>9999: *Congressional Adds* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 |
|---|---|---|
| *FY 2010 Plans:*<br>The FY10 Congressional plus-up for SSBN(X) Systems Development will execute concept studies to narrow the design space, execute technology trade-off studies, and execute research and development for selected submarine technologies. This plus-up will be executed by the submarine design industrial base for the timely development of technology options and will reduce the risk of their successful insertion into the OHIO Replacement design. | | |
| Congressional Add: Underwater Explosion Modeling for Non-Pressure Hull Fairing<br>*FY 2010 Plans:*<br>The FY10 Congressional plus-up for Underwater Explosion Modeling for Non-Pressure Hull Fairing will allow execution of underwater shock (UNDEX) modeling & simulation of composite non-pressure hull (NPH) structures, to enhance UNDEX survivability of lightweight/low cost composite fairing structures for application to US Navy Ohio Class Replacement. | 0.000 | 1.992 |
| Congressional Add: Large Displacement UUV At Sea Launch and Recovery<br>*FY 2009 Accomplishments:*<br>Funding will be used to define, document and provide interfaces, modular support equipment, and launch & recovery documentation for rapid affordable integration of Large Displacement UUVs and undersea payloads into SSGN Large Tubes. Land based facilities and in-water tests will be executed to demonstrate modular integration techniques and procedures. Payload interfaces and modular integration approach will maximize compatibility for potential use on other submarine classes. | 1.690 | 0.000 |
| Congressional Add: LOW COST - LASER MODULE ASSEMBLY FOR THE NAVY'S AC | 1.596 | 0.000 |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>9999: *Congressional Adds* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 |
|---|---|---|
| *FY 2009 Accomplishments:*<br>Funds will be used to develop and evaluate promising laser interrogation technologies for a common towed array fiber optic receiver that is lower cost, more insensitive to vibration, and more reliable than in current underwater fiber optic acoustic sensor systems. Service needs lower cost, more insensitive to vibration, and more reliable laser<br>solutions for fiber optic towed array receivers. | | |
| Congressional Add: UNDERSEA MISSILE LAUNCH STUDY (ULMS)<br>*FY 2009 Accomplishments:*<br>This funding will used to conduct concept studies for a follow-on platform to the OHIO Class submarine and to perform analyses and trade studies to identify necessary R&D to begin in FY09 and beyond. | 3.190 | 0.000 |
| Congressional Add: Acoustic Research Detachment Large Scale Vehicles<br>*FY 2009 Accomplishments:*<br>This funding facilitates the installation of a new fiber optic cable to provide for remote data collection and recording, remote vehicle command and control, and reduced deployment costs. | 0.479 | 0.000 |
| Congressional Add: Submarine Fatline Vector Sensor Towed Array<br>*FY 2009 Accomplishments:*<br>Funds will be used to support the Navy's Sea Power 21 ASW mission objectives via the development and demonstration of a VSTA which will provide improved gain and better Target Motion Analysis (TMA). Improvements will include steering in the direction of interfering sources, and instantaneously resolving right-left ambiguity of a single line array without the need for ship maneuvering. | 0.798 | 1.593 |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>1319: *Research, Development, Test & Evaluation, Navy*<br>BA 4: *Advanced Component Development & Prototypes (ACD&P)* | R-1 ITEM NOMENCLATURE<br>PE 0603561N: *Adv Submarine System Dev* | PROJECT<br>9999: *Congressional Adds* |

**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 |
|---|---|---|
| *FY 2010 Plans:*<br>Funds will be used to continue development and demonstration of a VSTA and improve upon gain and Target<br>Motion Analysis. | | |
| Congressional Add: Submarine Littoral Defense System<br>*FY 2009 Accomplishments:*<br>This funding will be used to conduct as much of the test objectives as possible in the following priority: Translation Testing, End-to-End System Demonstration, and Surface Target testing using AIM-9X Block II will Lock-On After Launch (LOAL) functionality. | 1.596 | 0.000 |
| Congressional Adds Subtotals | 11.344 | 7.967 |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**D. Acquisition Strategy**

N/A

**E. Performance Metrics**

Congressional Add Projects.