Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*					R-1 Program Element (Number/Name) PE 0604558N *I New Design SSN*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	2,306.688	150.442	113.013	120.087	-	120.087	100.116	82.832	88.828	90.507	Continuing	Continuing
1947: *New Design SSN HM&E*	1,400.471	76.040	83.586	82.506	-	82.506	58.059	43.711	48.906	49.793	Continuing	Continuing
1950: *New Design SSN Combat Sys Dev*	859.423	30.667	26.977	34.913	-	34.913	39.342	36.348	37.088	37.823	Continuing	Continuing
3062: *Submarine Multi-Mission Team Trainer*	32.289	7.528	2.450	2.668	-	2.668	2.715	2.773	2.834	2.891	Continuing	Continuing
9999: *Congressional Adds*	14.505	36.207	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	50.712
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 516												

A. Mission Description and Budget Item Justification

The U.S. Navy must maintain a submarine fleet that is of sufficient capability and numbers to defend American interests. The VIRGINIA Class Submarine, formerly the New Attack Submarine (New SSN), is being designed to fulfill this need. It will counter the potential threats of the next century in a multi- mission capable submarine that has the ability to provide covert, sustained combat presence in denied waters. The primary goal of the program is to develop an affordable yet capable submarine by evaluating a broad range of system and technology alternatives, and pursuing cost reduction, producibility improvement, and technical risk management. This Program Element (PE) provides the technology, prototype components, and systems engineering needed to design and construct the VIRGINIA Class Submarine and build its Command, Control, Communications, and Intelligence (C3I) System. This PE directly supports the following VIRGINIA Class Submarine missions: (1) covert strike warfare (STRIKE); (2) anti-submarine warfare (ASW); (3) covert intelligence collection/surveillance (ISR), indication and warning (I&W), and electronic warfare (EW); (4) anti-surface ship warfare (ASUW); (5) special warfare; (6) covert mine warfare; and (7) battle group support.

B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	157.056	113.013	150.700	-	150.700
Current President's Budget	150.442	113.013	120.087	-	120.087
Total Adjustments	-6.614	0.000	-30.613	-	-30.613
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-2.400	0.000			
• SBIR/STTR Transfer	-4.214	0.000			
• Program Adjustments	0.000	0.000	-31.820	-	-31.820

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy					Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*		R-1 Program Element (Number/Name) PE 0604558N *I New Design SSN*			
• Rate/Misc Adjustments	0.000	0.000	1.207	-	1.207

Congressional Add Details ($ in Millions, and Includes General Reductions)

	FY 2016	FY 2017
Project: 9999: *Congressional Adds*		
Congressional Add: *Small Business Technology Insertion*	12.069	0.000
Congressional Add: *New Design SSN SBIR (Cong)*	24.138	0.000
Congressional Add Subtotals for Project: 9999	36.207	0.000
Congressional Add Totals for all Projects	36.207	0.000

Change Summary Explanation

The FY 2016 reprogramming was an adjustment to the program due to under-execution.

The FY 2016 congressional reduction was for SBIR.

The FY 2017 (1947) funding request was increased to support ongoing tasking, specifically the South Dakota Improvement Program.

The FY 2018 (1950) request was reduced by $15.095 million to shift funding to BLI 0942 in support recapitalization of the Naval Foundry Propulsor Center (NFPC) ensuring continued support of Virginia Class Rotors.

The FY 2018 (1947) funding request was reduced by $16.725 million to account for the availability of prior year execution balances.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604558N / *New Design SSN*	Project (Number/Name) 1947 / *New Design SSN HM&E*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1947: *New Design SSN HM&E*	1,400.471	76.040	83.586	82.506	-	82.506	58.059	43.711	48.906	49.793	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 516

A. Mission Description and Budget Item Justification

This project encompasses all the ship system development efforts for the VIRGINIA Class Submarine and the Technology Insertion Program for reducing cost and upgrading performance of future hulls by virtue of improvements in ship systems. Technology development implementation and logistics for developmental items, and VIRGINIA Class test & evaluation are included. The thrust of these efforts will be to develop and apply multiple advanced system technologies which are integrated into the design of the VIRGINIA Class Submarine. Technologies developed in this program will be considered for applicability to the COLUMBIA Program (ORP) for commonality opportunities. New technologies are being transitioned from industry and government research and development programs where doing so offers substantial performance improvement and/or affordability payoffs. Transition opportunities include those from the Defense Advanced Research Projects Agency (DARPA) Sensors & Payloads program and Office of Naval Research (ONR) Future Naval Capabilities Program.

The FY 2019 and 2020 budget increases over PB 2017 request to rephase material procurement completion efforts, installation planning for the South Dakota Insertion Program (SDIP), initiating new engineering efforts based on OPNAV direction for advanced payload system integration into VIRGINIA Class platforms, and to support a SSN and Block V FOT&E.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: New Design SSN HM&E	56.721	79.595	78.435	0.000	78.435
Articles:	-	-	-	-	-

FY 2016 Accomplishments:

Continued development of prototype systems which will lead to at sea demonstration by execution of SDIP on an SSN to be installed during Post Shakedown Availability (PSA). Completed preliminary design of all necessary systems and subsystem components required to support the installation on SSN. Initiated critical item qualification testing. Conducted risk reduction efforts and refine prototype designs. Initiated procurement of long lead materials to support production of prototype systems. Initiated planning for full scale testing of improvements during post availability period. Transitioned development, material qualification, and prototype manufacturing efforts. Continued development of concepts and technologies for Reduced Total Ownership Cost (RTOC) and integration into VIRGINIA Class technical baseline. Continued to address emergent reliability issues associated with HM&E components. Continued HM&E obsolescence redesign for future ships. Continued transition of products from the Office of Naval Research Manufacturing Technology Program (MANTECH).

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604558N / *New Design SSN*	**Project (Number/Name)** 1947 / *New Design SSN HM&E*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continued the transition of products from the Office of Naval Research (ONR) Future Naval Capability (FNC) Program ***FY 2017 Plans:*** Complete detailed design and risk reduction efforts of SDIP prototype systems. Continue qualification testing of all system subcomponents. Complete detailed installation and arrangement drawings for shipboard demonstration. Oversee expanded design/build efforts between shipbuilder and qualified vendors for material design acceptance, fabrication and qualification. Integrate quality control solutions into component design/ build process. Begin production of all system components and installation fixtures. Continue planning for full scale testing of improvements during post availability period. Transition development, material qualification, and prototyped development efforts for the Improved Advanced Hybrid (IAH) propulsor for planned full scale demonstration. Continue to address emergent reliability issues associated with HM&E components. Continue HM&E obsolescence redesign for future ships. Continue transition of products from the Office of Naval Research Manufacturing Technology Program (MANTECH). Continue the transition of products from the Office of Naval Research (ONR) Future Naval Capability (FNC) Program. ***FY 2018 Base Plans:*** Complete procurement of subsystem components in support of SDIP installation. Complete detailed availability planning for the PSA installation of SDIP changes. Continue planning and design necessary for SDIP technologies insertion into the VIRGINIA Class baseline for new construction hulls. Continue development of HM&E systems concepts, technologies and obsolescence redesign for integration into VIRGINIA Class Block V Technical Baseline. Complete initial efforts and initiate new engineering efforts based on OPNAV direction for advanced payload system integration into VIRGINIA Class platforms. Continue transition of products from the Office of Naval Research Manufacturing Technology Program (MANTECH). Continue the transition of products from the Office of Naval research (ONR) Future Naval Capability (FNC) Program. ***FY 2018 OCO Plans:*** N/A					
Title: TEST AND EVALUATION	19.319	3.991	4.071	0.000	4.071
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Continued work associated with previous test events. This consisted mainly of documenting and testing fixes to deficiencies identified by COTF as well as addressing recommendations from DOT&E. Finished the detailed planning for Block III FOT&E. The testing is required by a regulatory requirement to demonstrate effectiveness of the affordability enhancements that were included in all Block III submarines. The Block III contract included					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604558N / *New Design SSN*	**Project (Number/Name)** 1947 / *New Design SSN HM&E*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
significant changes, including redesigning the bow section to contain a Large Aperture Bow (LAB) Array instead of a sonar sphere and two VIRGINIA Payload Tubes (VPT) instead of twelve Vertical Launch System (VLS) tubes. The VIRGINIA Class Mission Areas that will be tested in FY17 are Strike Warfare, Anti-Submarine Warfare, Anti-Surface Warfare, Intelligence, Surveillance, Reconnaissance and Cybersecurity. Purchased materials (including Exercise Torpedoes) and secured test ranges to complete Mission Area testing. Prepared for Strike testing that is necessary to support Cruise Missile Material Certification. The program will launch two missiles during the test event. The Flight Test will certify Block III submarines to load and shoot Tomahawk Missiles. Started development of the Block V with VIRGINIA Payload Module (VPM) Test and Evaluation Master Plan (TEMP) 1425 Rev. H by defining scope of required testing.					
FY 2017 Plans: Continue work associated with previous test events. This consists mainly of documenting and testing fixes to deficiencies identified by COTF as well as addressing recommendations from DOT&E. Complete Block III FOT&E (will consist of scenarios that require operations in deep water, littoral, and high contact density OPAREAS). The testing is required by a regulatory requirement to demonstrate effectiveness of the affordability enhancements that were included in all Block III. The Block III contract included significant changes, including redesigning the bow section to contain a Large Aperture Bow (LAB) Array instead of a sonar sphere and two VPTs instead of twelve VLS tubes. The VIRGINIA Class Mission Areas that will be tested in FY17 are Strike Warfare (which will consist of the operational flight test of two (2) Tomahawk Missiles), Anti-Submarine and Anti-Surface Warfare (which will consist of the operational firing of sixteen (16) exercise torpedoes, their recovery, along with associated environmental monitoring and countermeasure use), Intelligence, Surveillance, Reconnaissance (which will consist of comparison of the ship's ability to track contacts in a high contact density environment with shore radar data to compare with ship's data) and Cybersecurity (consisting of off hull and on hull penetration testing using Naval Information and Operations Command (NIOC) team to perform the cooperative, penetration and adversarial assessment testing) shore to ship, as well as ship to shore testing. Complete all post-test analysis and publish required reports prior to the first Block III submarine commencing deployed operations. Complete development of the Block V with VPM TEMP 1425 Rev. H and submit for signature. Procure required equipment and commence cable installation to support establishment of an Underwater Electro-Magnetic Range in PACFLT to support VIRGINIA Class submarines home ported in Pearl Harbor.					
FY 2018 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604558N / *New Design SSN*	**Project (Number/Name)** 1947 / *New Design SSN HM&E*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continue work associated with previous test events. This consists mainly of documenting and testing fixes to deficiencies identified by COTF as well as addressing recommendations from DOT&E. In addition commence initial efforts to develop DOT&E for Block V. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	76.040	83.586	82.506	0.000	82.506

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• SCN/2013: *Virginia Class Submarine*	5,318.210	4,955.219	5,225.911	-	5,225.911	7,181.369	7,209.343	6,534.775	5,263.896	48,161.837	150,856.478
• OMN/0204283N: *Sub Ops & Safety*	31.500	22.984	25.247	-	25.247	26.606	27.164	27.900	28.459	Continuing	Continuing
• OPN/0942: *Virginia Class Support Equipment*	35.747	66.838	46.610	-	46.610	68.388	29.751	24.422	24.103	Continuing	Continuing
• RDTEN/0604580N: *(U)Virginia Payload Module (VPM)*	162.168	97.920	72.861	-	72.861	0.000	0.000	0.000	0.000	0.000	496.454

Remarks

D. Acquisition Strategy

The VIRGINIA Class Submarine Program has implemented Integrated Product and Process Development (IPPD). The traditional distinct phasing of the design process has been replaced with the continuous concurrent engineering IPPD process. The IPPD approach has facilitated a smoother transition from design to manufacturing and has reduced the number of changes typically encountered during construction of the lead and early follow-on ships. In September 1997, Congress passed a law allowing Electric Boat (EB) and Northrop Grumman Newport News (NGNN), now Huntington Ingalls Industries (HII), to team for production of the first four VIRGINIA Class Submarines. Under the teaming agreement, EB remained the design yard for the VIRGINIA Class Submarine and HII became a part of the IPPD process. The Program Office is managing two Multi-Year Procurement (MYP) contracts. The first is for the Block III (FY09-13) ships. The second is for the Block IV (FY14-18) ships awarded April 2014. All Block I & II ships (SSNs 774-783) have been delivered. The first three Block III ships, SSN 784 SSN 785 and SSN 786, delivered in August 2014, June 2015 and August 2016 respectively, with the remaining five ships awarded and under construction. The first eight Block IV ships are awarded and under construction, with the remaining two to be authorized and appropriated in FY 2018. The program is currently planning for the fourth MYP (Block V) contract that will reflect 10 SSNs (FY19-23) and is anticipated to award in Early FY 2019.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604558N / *New Design SSN*	**Project (Number/Name)** 1947 / *New Design SSN HM&E*

E. Performance Metrics

Successful completion of Final Operational Test and Evaluation (FOT&E) for Block III modifications. SDIP design completion.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604558N / *New Design SSN*	Project (Number/Name) 1947 / *New Design SSN HM&E*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Component Development	WR	NSWC : Carderock, MD	240.467	12.162	Nov 2015	6.000	Nov 2016	5.960	Nov 2017	-		5.960	Continuing	Continuing	Continuing
Component Development	WR	NUWC : Newport, RI	111.232	3.793	Nov 2015	2.840	Nov 2016	1.599	Nov 2017	-		1.599	Continuing	Continuing	Continuing
Component Development	WR	NRL : Washington, DC	7.018	1.282	Nov 2015	0.230	Nov 2016	0.370	Nov 2017	-		0.370	Continuing	Continuing	Continuing
Component Development	C/CPFF	Electric Boat : Groton, CT	751.709	32.447	Nov 2015	70.525	Nov 2016	68.201	Nov 2017	-		68.201	Continuing	Continuing	Continuing
Component Development	SS/CPFF	Applied Research Laboratory : Penn State University	23.071	1.117	Dec 2015	0.000		1.085	Dec 2017	-		1.085	Continuing	Continuing	Continuing
Component Development	SS/FP	National Shipbuilding Research Program : Not Specified	3.845	0.894	Mar 2016	0.000		0.500	Mar 2018	-		0.500	Continuing	Continuing	Continuing
Component Development	Various	Miscellaneous : Not Specified	18.924	5.027	Dec 2015	0.000		0.720	Dec 2017	-		0.720	Continuing	Continuing	Continuing
		Subtotal	1,156.266	56.722		79.595		78.435		-		78.435	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation - DT&E	WR	NSWC : Carderock, MD	92.648	0.370	Nov 2015	0.190	Nov 2016	0.153	Nov 2017	-		0.153	Continuing	Continuing	Continuing
Test and Evaluation - LFT&E	WR	NSWC : Carderock, MD	3.047	0.850	Nov 2015	0.850	Nov 2016	0.000		-		0.000	1.700	6.447	-
Test and Evaluation - DT&E	WR	NUWC : Newport, RI	126.752	10.603	Nov 2015	0.300	Nov 2016	1.157	Nov 2017	-		1.157	Continuing	Continuing	Continuing
Test and Evaluation - OT&E	PO	COMOPTEVFOR : Norfolk, VA	16.813	0.670	Nov 2015	0.690	Nov 2016	0.711	Nov 2017	-		0.711	Continuing	Continuing	Continuing
Test and Evaluation - LFT&E	C/CPFF	Electric Boat : Groton, CT	1.745	0.125	Dec 2015	0.250	Dec 2016	0.250	Dec 2017	-		0.250	Continuing	Continuing	Continuing
Test and Evaluation - DT&E	WR	PMA 280 : Pax River, MD	3.200	2.538	Dec 2015	0.000		0.000		-		0.000	0.000	5.738	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604558N / *New Design SSN*	Project (Number/Name) 1947 / *New Design SSN HM&E*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation - DT&E	C/CPFF	NUWC : Newport, RI - CORE Team	0.000	4.162	May 2016	1.711	Dec 2016	1.800	Jan 2018	-		1.800	0.000	7.673	-
		Subtotal	244.205	19.318		3.991		4.071		-		4.071	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1,400.471	76.040		83.586		82.506		-		82.506	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604558N / *New Design SSN*	**Project (Number/Name)** 1947 / *New Design SSN HM&E*

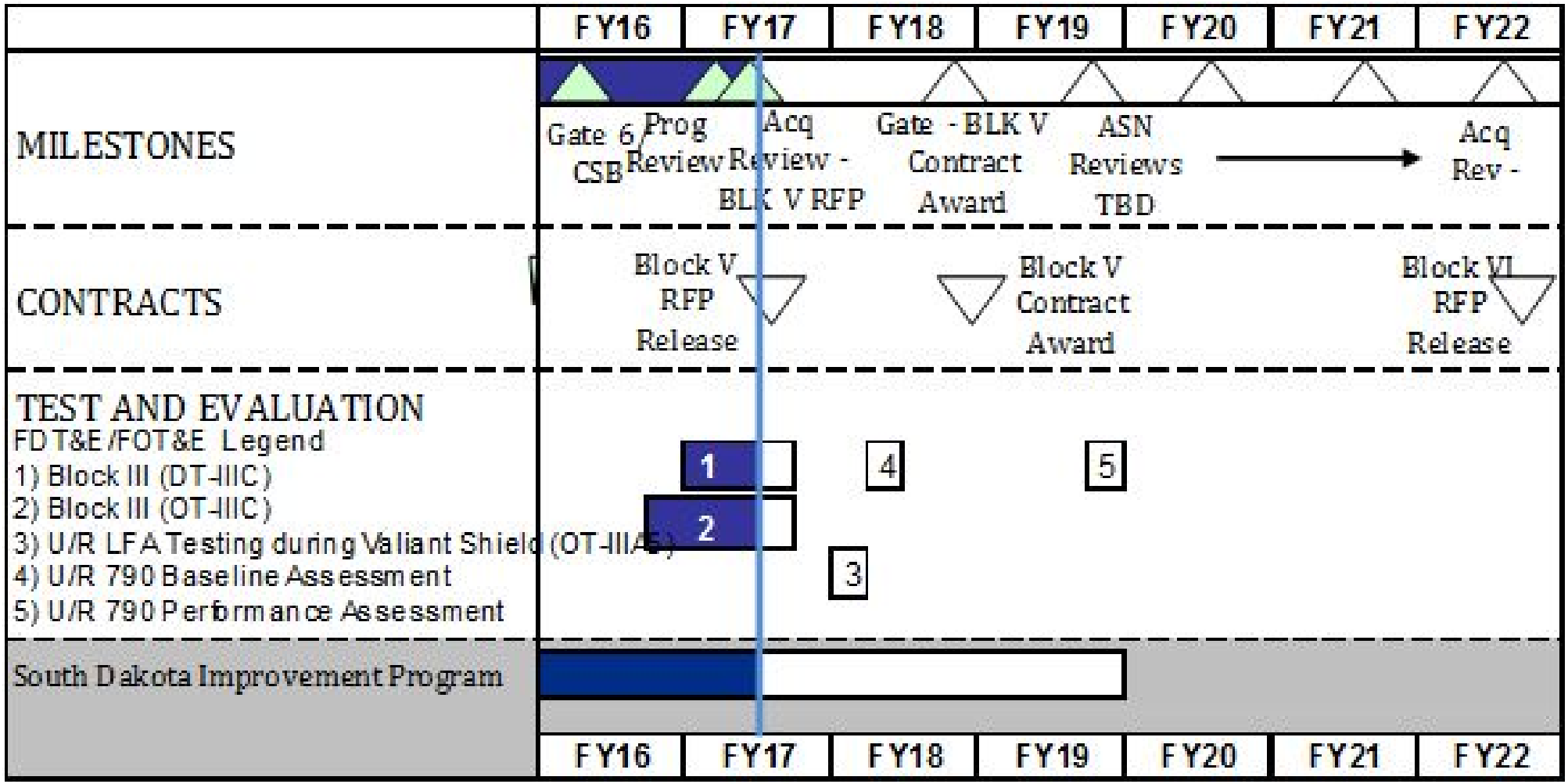

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604558N / *New Design SSN*	**Project (Number/Name)** 1947 / *New Design SSN HM&E*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1947				
MILESTONE: Gate 6 CSB	2	2016	2	2016
MILESTONE: Prog Review	1	2017	1	2017
MILESTONE: Acquisition Review - BLK V RFP	2	2017	2	2017
MILESTONE: Gate - BLK V Contract Award	4	2018	4	2018
MILESTONE: ASN Reviews (annual) (TBD)	4	2019	4	2022
CONTRACTS: Block V RFP Release	3	2017	3	2017
CONTRACTS: Block V Contract Award	4	2018	4	2018
CONTRACTS: Block VI RFP Release	4	2022	4	2022
TEST & EVALUATION: Block III (DT-IIIC)	4	2016	3	2017
TEST & EVALUATION: Block III (OT-IIIC)	2	2016	3	2017
TEST & EVALUATION: U/R LFA Testing during Valiant Shield (OT-IIIAS)	1	2018	2	2018
TEST & EVALUATION: U/R 790 Baseline Assessment	2	2018	3	2018
TEST & EVALUATION: U/R 790 Performance Assessment	3	2019	4	2019
SOUTH DAKOTA Improvement Program	1	2016	4	2019

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604558N / *New Design SSN*	Project (Number/Name) 1950 / *New Design SSN Combat Sys Dev*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1950: *New Design SSN Combat Sys Dev*	859.423	30.667	26.977	34.913	-	34.913	39.342	36.348	37.088	37.823	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 516

A. Mission Description and Budget Item Justification

This project provides the engineering development required to outfit each ship of the VIRGINIA Class Submarine with a combat system which satisfies ORD requirements in all 7 mission areas, namely; ASW, STRIKE, ISR, Covert Mine Warfare, Battle Group Support, ASUW, and Special Warfare. The fully integrated combat system, otherwise referred to as the Non-Propulsion Electronics System (NPES), is composed of a collection of functional sub-systems, such as sonar, navigation, exterior communications, weapons launch, Large Vertical Array, Submarine Warfare Federated Tactical System (SWFTS) virtualization, Electronic Warfare Next Generation Architecture, etc., which evolve over the life of the program due to either competitive selection of new suppliers, component obsolescence replacement, increased technical performance, or improvements in reliability. Non-recurring engineering activity is needed to perform platform integration of the components, software modification to accommodate electronic data exchange, unique submarine environment qualification and update of all logistics products.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: C3I Systems Engineering	12.183	12.695	14.587	0.000	14.587
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Completed critical design of the BPS-17 Radar and initiated qualification testing. Initiated preliminary sub-system design for the replacement inertial navigation system targeted for inclusion in the Blk IV contract ship deliveries. Continued preliminary design for the South Dakota Improvement Program (SDIP).					
FY 2017 Plans: Conduct testing of the SSN792 BPS-17 Radar system installed at the shipbuilding off-hull and assembly test site. Continue critical sub-system design of the replacement inertial navigation system targeted for inclusion in the Blk IV contract commencing with SSN798. Initiate SDIP design, and develop FY18/FY19 plans and contracts to complete Test and Integration, test fixture development, upgrade of the data recording server, and maintenance strategy/ILS product development for this equipment.					
FY 2018 Base Plans: Initiate full-ship integration testing of the SSN792 BPS-17 Radar system dockside. Continue SDIP design, specific activities include hardware/software integration, Environmental Qualification Test and System Design Certification Test. Test fixture development, and ILS product development for this equipment. Develop Next					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604558N / *New Design SSN*	**Project (Number/Name)** 1950 / *New Design SSN Combat Sys Dev*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Generation Architecture-Electronic Warfare System (NGA-EW) for the VA Class replacement of the obsolete AN/BLQ-10A. Funds development of the ISR mission dependent efforts required to deliver EW NGA capability programmed for BLK IV mid-block insertion. ***FY 2018 OCO Plans:*** N/A					
Title: Sonar Combat Control and Architecture Subsystems ***Articles:*** ***Description:*** Continued the development of S/CC/A System Improvements to maintain VIRGINIA Class Commonality to backfit fleet. ***FY 2016 Accomplishments:*** Continued the development and C3I system level integration of the TI14/APB13 configuration slated for the last 4 hulls of the Block III contract (SSN788-791). Continued the multi-year migration of the interface software from Common Object Request Broker Architecture (CORBA) to Advanced Message Queuing Protocol (AMQP) to mitigate obsolescence. Continued environmental qualification testing of the TI14 pedigree hardware. ***FY 2017 Plans:*** Initiate development and C3I system level integration of the TI14/APB15 configuration slated for the first hull of the Block IV contract (SSN792). Continue the multi-year migration of the interface software from CORBA to AMQP to mitigate obsolescence. Complete environmental qualification testing of the TI14 pedigree hardware. ***FY 2018 Base Plans:*** Initiate development and C3I system level integration of the TI16/APB15 configuration slated for hulls 3-6 of the Block IV contract (SSN794-SSN797). Initiates the first NPES/SWFTS architectural design change since 1996 open systems standardization and program inception. Continue the multi-year migration of the interface software from CORBA to AMQP to mitigate obsolescence. Initiate environmental qualification testing of the TI16 pedigree hardware. Begin the development roadmap and initiate design of the tactical architecture which enables virtualization of as many combat system functional components as practical and operationally effective, spanning the TI-18 to TI-22 implementation timeframe. ***FY 2018 OCO Plans:*** N/A	18.484 -	14.282 -	20.326 -	0.000 -	20.326 -
Accomplishments/Planned Programs Subtotals	30.667	26.977	34.913	0.000	34.913

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604558N / *New Design SSN*	**Project (Number/Name)** 1950 / *New Design SSN Combat Sys Dev*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• SCN/2013: *VA CL*	5,318.210	4,955.219	5,225.911	-	5,225.911	7,181.369	7,209.343	6,534.775	5,263.896	48,161.837	150,856.478
• O&M,N/0204283N: *Sub Ops & Safety*	31.355	23.828	25.738	-	25.738	27.175	27.731	29.305	0.000	Continuing	Continuing
• OPN/0942: *VA CL Support Equipment*	35.747	66.838	46.610	-	46.610	68.388	29.751	24.422	24.103	Continuing	Continuing
• RDT&E/0604580N: *Virginia Payload Module*	162.168	97.920	72.861	-	72.861	0.000	0.000	0.000	0.000	0.000	496.454

Remarks

D. Acquisition Strategy

The VIRGINIA Class Submarine Program has implemented Integrated Product and Process Development (IPPD). The traditional distinct phasing of the design process has been replaced with the continuous concurrent engineering IPPD process. The IPPD approach has facilitated a smoother transition from design to manufacturing and has reduced the number of changes typically encountered during construction of the lead and early follow-on ships. In September 1997, Congress passed a law allowing Electric Boat (EB) and Northrop Grumman Newport News (NGNN), now Huntington Ingalls Industries (HII), to team for production of the first four VIRGINIA Class Submarines. Under the teaming agreement, EB remained the design yard for the VIRGINIA Class Submarine and HII became a part of the IPPD process. The Program Office is managing two Multi-Year Procurement (MYP) contracts. The first is for the Block III (FY09-13) ships. The second is for the Block IV (FY14-18) ships awarded April 2014. All Block I & II ships (SSNs 774-783) have been delivered. The first two Block III ships, SSN 784 and SSN 785, delivered in August 2014 and June 2015 respectively, with the remaining six ships awarded and under construction. The first six Block IV ships are awarded and under construction, with the remaining four to be authorized and appropriated in FY 2017 and FY 2018. The program is currently planning for the fourth MYP (Block V) contract that will reflect 10 SSNs (FY19-23) and is anticipated to award in Early FY 2019.

E. Performance Metrics

Successful completion of Final Operational Test and Evaluation (FOT&E) for Block III modifications. SDIP design completion.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604558N / *New Design SSN*	Project (Number/Name) 1950 / *New Design SSN Combat Sys Dev*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PTR Corrections	Various	Various : Various	30.088	0.000		0.000		0.000		-		0.000	0.000	30.088	-
Unique Virginia Class Improvements	Various	Various : Various	68.197	9.627	Nov 2015	9.932	Feb 2017	4.345	Feb 2018	-		4.345	Continuing	Continuing	Continuing
Advanced Display Sys (AN/UYQ-70)	SS/CPIF	Lockheed Martin : Keyport, WA	36.589	1.200	Nov 2015	0.000	Feb 2017	0.000		-		0.000	0.000	37.789	-
Tech Insertion/Advanced Processing Build (TI/APB) Integration	Various	Various : TBD	0.000	0.000		0.000		3.949	Nov 2017	-		3.949	Continuing	Continuing	Continuing
Photonics	C/CPIF	Kollmorgen : Northampton, MA	59.269	1.782	May 2016	0.650	Jan 2017	0.000		-		0.000	0.000	61.701	-
Large Vertical Array South Dakota Improvement Program	Various	Various : TBD	0.000	0.000		0.000		4.518	Nov 2017	-		4.518	Continuing	Continuing	Continuing
Platform Integration	SS/CPFF	Electric Boat : Groton, CT	50.943	1.617	Nov 2015	2.450	Nov 2016	2.621	Nov 2017	-		2.621	Continuing	Continuing	Continuing
Photonics	C/CPIF	Lockheed Martin : Manassas, VA	0.000	0.000		0.000		0.500	Nov 2017	-		0.500	Continuing	Continuing	Continuing
Electronic Support Measures	C/FFP	Lockheed Martin : Syracuse, NY	38.067	0.000		0.000		0.000		-		0.000	0.000	38.067	-
Virtualization Enabling Architecture Development	Various	Various : TBD	0.000	0.000		0.000		4.318	Nov 2017	-		4.318	Continuing	Continuing	Continuing
Technology Refreshment	Various	Various : Various	20.355	0.000		0.000		0.000		-		0.000	0.000	20.355	-
Technical Direction Agent	WR	NUWC : Newport, RI	303.651	7.489	Jan 2016	7.550	Nov 2016	6.222	Nov 2017	-		6.222	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC : Carderock, MD	12.853	0.906	Nov 2015	0.690	Nov 2016	0.220	Nov 2017	-		0.220	Continuing	Continuing	Continuing
Technology Refreshment/ Info. Assurance	C/CPFF	Progeny Systems : Manassas, VA	38.405	2.030	Nov 2015	0.810	Jan 2017	0.000		-		0.000	0.000	41.245	-
Acoustic Intercept & Sonar	C/CPFF	Progeny Applied : Manassas, VA	0.000	0.000		0.000		0.500	Nov 2017	-		0.500	Continuing	Continuing	Continuing
High Frequency & Sonar Sensors	C/CPFF	Applied Research Lab : University of Texas	0.000	0.000		0.000		0.300	Nov 2017	-		0.300	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604558N / *New Design SSN*	Project (Number/Name) 1950 / *New Design SSN Combat Sys Dev*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Next Generation Architecture - Electronic Warfare System	WR	NSMA : Various	0.000	0.000		0.000		4.145	Nov 2017	-		4.145	Continuing	Continuing	Continuing
Systems Engineering	WR	SSC : Charleston, SC	8.168	0.559	Nov 2015	0.550	Nov 2016	0.800	Nov 2017	-		0.800	Continuing	Continuing	Continuing
Systems Engineering	WR	NUWC : Keyport, WA	11.536	0.354	Nov 2015	0.895	Nov 2016	0.800	Nov 2017	-		0.800	Continuing	Continuing	Continuing
Miscellaneous	Various	Various : Various	142.159	2.183	Nov 2015	1.350	Feb 2017	0.675	Feb 2018	-		0.675	Continuing	Continuing	Continuing
		Subtotal	820.280	27.747		24.877		33.913		-		33.913	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Various	Various	Various : TBD	6.212	0.000		0.000		0.000		-		0.000	0.000	6.212	-
		Subtotal	6.212	0.000		0.000		0.000		-		0.000	0.000	6.212	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Support Services/ETS	C/CPAF	SEAPORT : Rockville, MD	32.736	2.920	Dec 2015	2.100	Dec 2016	1.000	Dec 2017	-		1.000	Continuing	Continuing	Continuing
DAWDF	Various	Various : Various	0.195	0.000		0.000		0.000		-		0.000	0.000	0.195	-
		Subtotal	32.931	2.920		2.100		1.000		-		1.000	-	-	-

	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	859.423	30.667		26.977		34.913		-		34.913	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604558N / *New Design SSN*	**Project (Number/Name)** 1950 / *New Design SSN Combat Sys Dev*

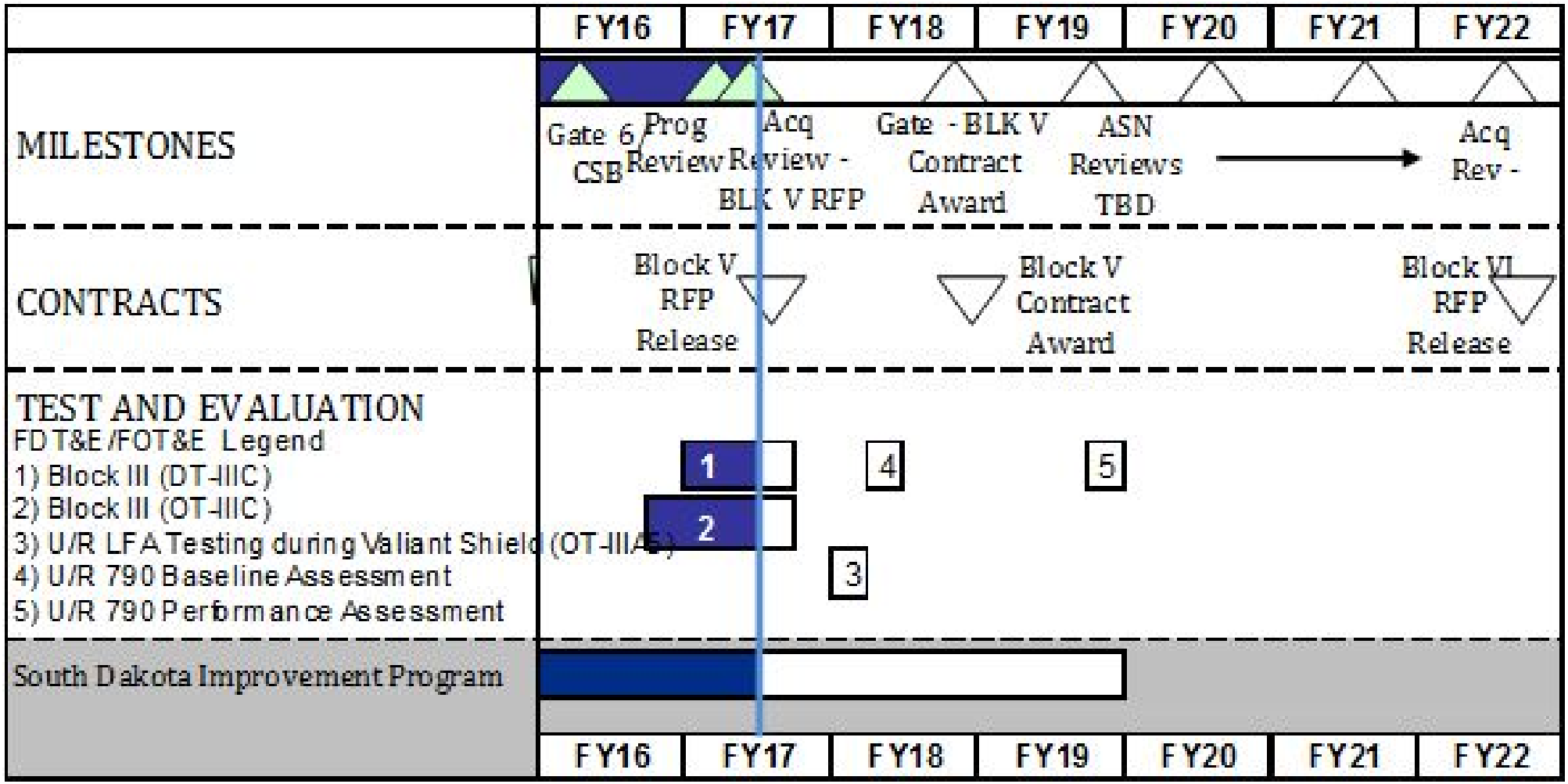

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604558N / *New Design SSN*	**Project (Number/Name)** 1950 / *New Design SSN Combat Sys Dev*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1950				
MILESTONE: Gate 6 CSB	2	2016	2	2016
MILESTONE: Prog Review	1	2017	1	2017
MILESTONE: Acquisition Review - BLK V RFP	2	2017	2	2017
MILESTONE: Gate - BLK V Contract Award	4	2018	4	2018
MILESTONE: ASN Reviews (annual) (TBD)	4	2019	4	2022
CONTRACTS: Block V RFP Release	3	2017	3	2017
CONTRACTS: Block V Contract Award	4	2018	4	2018
CONTRACTS: Block VI RFP Release	4	2022	4	2022
TEST & EVALUATION: Block III (DT-IIIC)	4	2016	3	2017
TEST & EVALUATION: Block III (OT-IIIC)	2	2016	3	2017
TEST & EVALUATION: U/R LFA Testing during Valiant Shield	1	2018	2	2018
TEST & EVALUATION: U/R 790 Baseline Assessment	2	2018	3	2018
TEST & EVALUATION: U/R 790 Performance Assessment	3	2019	4	2019
SOUTH DAKOTA Improvement Program	1	2016	4	2019

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604558N / *New Design SSN*	Project (Number/Name) 3062 / *Submarine Multi-Mission Team Trainer*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3062: *Submarine Multi-Mission Team Trainer*	32.289	7.528	2.450	2.668	-	2.668	2.715	2.773	2.834	2.891	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

To achieve desired submarine force readiness levels, it is necessary to construct highly sophisticated shore based Combat System Team Trainers capable of training personnel in all aspects of submarine approach, attack and surveillance operations in a controlled, simulated environment. The Combat Control System (CCS) MK1, CCS MK2, and AN/BYG-1, along with sonar systems AN/BSY-1, AN/BQQ-5, and AN/BQQ-10 are installed on SSN and SSGN class submarines. These tactical systems are planned for future upgrades with the next hardware and software revisions which will provide enhanced War Fighter capabilities. The Tactical Acoustic Rapid COTS (commercial-off-the-shelf) Insertion (ARCI) phased upgrades are also being installed with future revisions. The Advanced Processing Builds (APB) and Technical Insertion (TI) sensors, which feed technology insertion into the CCS/Acoustic development, directly impact the trainers.

The Submarine Multi-Mission Team Trainer (SMMTT) supports operator, employment, strike, and Battle Group training for enlisted and officer pipelines. The SMMTT provides operators and combat teams the opportunity to train ashore, prior to, and between deployments. The shore based training provides a means of maintaining team proficiency in stand alone or in combined team mode prior to ship deployment.

FY-16 RDTE,N Line 3062 was increased in support of SSBN Modernization. This funding executed the development, test and evaluation of new sensors and stimulation/simulation hardware and software required to integrate with tactical systems to build new SSBN Attack Centers.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Submarine Multi-Mission Team Trainer	7.528	2.450	2.668	0.000	2.668
Articles:	-	-	-	-	-
Description: To achieve desired submarine force readiness levels, it is necessary to construct highly sophisticated shore based Combat System Team Trainers capable of training personnel in all aspects of submarine approach, attack and surveillance operations in a controlled, simulated environment.					
FY 2016 Accomplishments: Develop implementation of latest Advanced Processor Build (APB), Technical Insertion (TI) and associated training displays. These efforts include new sensor developments and simulations to match advancements in tactical systems supported by SMMTT. These efforts will also integrate the APB into the SMMTT baseline along with completing and integrating the Low Cost Conformal Array (LCCA) sensor. In addition, the 3062 RDTEN					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604558N / *New Design SSN*	**Project (Number/Name)** 3062 / *Submarine Multi-Mission Team Trainer*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
line was increased in support of SSBN Modernization. This funding will be used for the development, test and evaluation of new sensors and stimulation/simulation hardware and software required to integrate with tactical systems to build new SSBN Attack Centers. ***FY 2017 Plans:*** Develop implementation of latest Advanced Processor Build (APB), Technical Insertion (TI) and associated training displays. These efforts include new sensor developments and simulations to match advancements in tactical systems supported by SMMTT. These efforts will also integrate the APB into the SMMTT baseline along with completing and integrating the LCCA sensor. ***FY 2018 Base Plans:*** Develop implementation of latest Advanced Processor Build (APB), Technical Insertion (TI) and associated training displays. These efforts include new sensor developments and simulations to match advancements in tactical systems supported by SMMTT. These efforts will also integrate the APB into the SMMTT baseline along with completing and integrating the LCCA sensor. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	7.528	2.450	2.668	0.000	2.668

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/5661: *Submarine Training Device Mods*	0.000	48.020	74.550	-	74.550	66.708	76.169	70.674	81.220	Continuing	Continuing

Remarks

D. Acquisition Strategy

The SMMTT program software development is accounted for in this RDTEN line. All production kits are procured in OPN PE 0804731N BLI 566100.

E. Performance Metrics

Within 90 days of introduction to the Fleet, this RDTEN project shall develop required changes to the Control and Display Documentation and Interface Description Language (IDL) Interfaces for the initial development for new sensors that are required to simulate/stimulate the TI/APB for the AN/BQQ-5 and AN/BYG-1 in the SMMTT Trainer.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604558N / *New Design SSN*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
9999: *Congressional Adds*	14.505	36.207	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	50.712
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The FY16 RDT&E Congressional add for small business technology insertion will be applied to existing small business contracts to continue VA Class combat systems development in the areas of sonar, electronic warfare, weapons systems launch, information assurance and advanced submarine control systems.

The FY16 RDT&E Congressional add for New Design SSN SBIR (Cong) is for VA Class submarine hydro-dynamic enhancements.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017
Congressional Add: Small Business Technology Insertion ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A	12.069	0.000
Congressional Add: New Design SSN SBIR (Cong) ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A	24.138	0.000
Congressional Adds Subtotals	36.207	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Successful completion of Milestone III Review. Successful completion of Final Operational Test and Evaluation (FOT&E) for Technology Insertion (TI)-08 and Block III.