Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Navy										Date: March 2014	

Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*						R-1 Program Element (Number/Name) PE 0205620N *I Surface ASW Cmbt Sys Integr*					

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
Total Program Element	135.262	24.465	31.863	26.366	-	26.366	25.356	26.161	27.249	27.875	Continuing	Continuing
1916: *Surface ASW System Improvement*	135.262	24.465	31.863	26.366	-	26.366	25.356	26.161	27.249	27.875	Continuing	Continuing

The FY 2015 OCO Request will be submitted at a later date.

A. Mission Description and Budget Item Justification

The Navy's Strategy is to remain the preeminent maritime power, providing the U.S. a global expeditionary force committed to security and prosperity, while defending the Nation's interests. Within this vision, Anti-Submarine Warfare (ASW) remains a Navy core competency in a dynamic and uncertain maritime environment. U.S. adversaries continue to develop asymmetric capabilities and capacities to deter, disrupt, or delay the entry of U.S. and allied naval forces, and pose a constant challenge as we implement the Maritime Strategy. Evolving submarine technologies offer enhanced stealth, speed, endurance, weapons, and operational proficiency, trends foretelling that the adversary submarine of the future will have a significantly larger sphere of influence, while presenting less vulnerability to ASW forces. The effective offensive engagement range of the adversary submarine of the future will continue to match or outrange individual U.S. and multinational platform sensors and weapons in many tactical environments. Submarines are an increasing threat to all Naval and Allied ships, particularly modern diesel subs and faster torpedoes. Not only can the presence of potential hostile submarines delay naval combatant action until they are located and neutralized, submarines can also disrupt all seaborne logistics supply for any ground campaign as well as maritime commerce. ASW forces must be effective in all operating environments, ranging from the deep open ocean to the littorals, and are key to countering adversarial anti-access and area denial strategies.

The objective of this Program Element (PE) is to significantly improve existing Surface Ship Undersea Warfare (USW) sonar system capabilities through quick and affordable development/integration of emergent, transformational technologies in support of Littoral ASW, Theater ASW, Mine Reconnaissance, and overall Sea Shield efforts required to pace the threat. Detection and classification play uniquely vital roles in the success of any ASW campaign. To be effective against increasingly stealthy threats in an often ambiguous undersea environment, future sensors must be environmentally adaptive, have very low false alarm rates, and exploit the full range of current and future submarine detection vulnerabilities.

Project 1916's primary mission is to improve AN/SQQ-89(V) Measures Of Performance (MOP) by enhancing detection, tracking, classification, passive, active, torpedo Detection, Classification, and Localization (DCL) and sonobuoy data processing and display capabilities, and increasing acoustic sensor frequency bandwidth (Operational Requirements Document #667-76-05 titled 'AN/SQQ-89 Improvement Program', Test and Evaluation Master Plan 802-2 (TEMP 802-2)). Improvements to system simulation, stimulation, Information Assurance (IA), software and network architectures, and safety are included. This project takes advantage of the AN/SQQ-89(V) Open System Architecture (OSA) and Acoustic Rapid Commercial-Off-The-Shelf (COTS) Insertion (ARCI) initiatives to integrate a torpedo DCL and ASW sonar combat system capability improvements. This COTS-based Surface Ship ASW combat system, the AN/SQQ-89A(V)15, is currently planned as a backfit program for both CG47 (select CG59-73 Baseline 3 and 4 ships) and DDG51 (All DDG and follow FLT I/II/IIA) class ships. The Open Architecture (OA) (level 3 compliant) of the AN/SQQ-89A(V)15 system drives the Advanced Capability Build (ACB) spiral development process and provides budget flexibility to make COTS/OA technology solutions and ARCI-type initiatives affordable. This will be accomplished via the incorporation of select Pre-Planned Product Improvements (P3I) and

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Navy		Date: March 2014
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0205620N I *Surface ASW Cmbt Sys Integr*	

emergent, transformational ASW technologies delivered to the AN/SQQ-89(V) prime integrator every two years. ASW technology implementation will take advantage of improvements developed under the submarine Advanced Processing Build (APB) program and will in turn share unique improvements developed under this program with the submarine and surveillance ASW communities. This project will also contribute to the development of Littoral Combat Ship (LCS) ASW Mission Packages.

Project 1916 also includes funding for the Surface Ship Enhanced Measurement Program (SSEMP), which will measure the performance of existing and new Surface Ship ASW combat systems and enables data-based assessment of the capabilities and shortfalls in the performance of these systems in realistic scenarios.

B. Program Change Summary ($ in Millions)	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	27.342	31.863	30.710	-	30.710
Current President's Budget	24.465	31.863	26.366	-	26.366
Total Adjustments	-2.877	-	-4.344	-	-4.344
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.583	-			
• Program Adjustments	-	-	-3.829	-	-3.829
• Rate/Misc Adjustments	-	-	-0.515	-	-0.515
• Congressional General Reductions Adjustments	-2.294	-	-	-	-

Change Summary Explanation

FY15 reductions reflect Department's decision to reduce contracted services as well as a rephasing of program resources to match expected expenditures.

Exhibit R-2A, RDT&E Project Justification: PB 2015 Navy										Date: March 2014	

Appropriation/Budget Activity 1319 I 7				R-1 Program Element (Number/Name) PE 0205620N I Surface ASW Cmbt Sys Integr					Project (Number/Name) 1916 I Surface ASW System Improvement		

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
1916: Surface ASW System Improvement	135.262	24.465	31.863	26.366	-	26.366	25.356	26.161	27.249	27.875	Continuing	Continuing
Quantity of RDT&E Articles	0.000	-	-	-	-	-	-	-	-	-		

The FY 2015 OCO Request will be submitted at a later date.

A. Mission Description and Budget Item Justification

The Surface ASW Systems Improvements Project will support essential performance enhancements to AN/SQQ-89(V) and Surface Ship Sonar Systems. This project will improve AN/SQQ-89(V) MOP by enhancing detection, tracking, classification, active, passive, torpedo DCL, and sonobuoy data processing and display capabilities, and increasing acoustic sensor frequency bandwidth (Operational Requirements Document #667-76-05 titled 'AN/SQQ-89 Improvement Program'), TEMP 802-2.

This project will take advantage of the AN/SQQ-89(V) OSA and ARCI initiatives to integrate a TDCL and ASW sonar and combat system capability improvements. This COTS-based Surface Ship ASW combat system, the AN/SQQ-89A(V)15, is currently planned as a backfit program for both CG47 (select CG59-73 Baseline 3 and 4 ships) and DDG51 (All DDG51 and follow FLT I/II/IIA) class ships. This project has delivered the AN/SQQ-89A(V)15 Pre-Production Prototype, performed installation on board CG73, and conducted subsequent Developmental Test & Evaluation (DT&E) and Initial Operational Test & Evaluation (IOT&E) where the system was found 'Operationally Effective' by Command Operational Test and Evaluation Force (COMOPTEVFOR).

The OSA and high performance COTS processing hardware on ships fielded with the AN/SQQ-89A(V)15 combat system provides an opportunity to integrate select P3I as well as emergent, transformational ASW technological improvements that were previously unachievable. The Undersea Warfare (USW) suites on these ships will require periodic upgrades to remain effective well into the 21st century and to pace the threat. Software upgrades target capability increases in high interest areas as prescribed by the Fleet and captured in campaign analysis. To achieve this, this project will package and deliver incremental upgrades every two years to the AN/SQQ-89A(V)15 production program via an ACB spiral development process (ACB-11, ACB-13, etc.) by inserting maturing USW technologies, such as enhancements to improve USW performance in the littoral, reduced manning on AN/SQQ-89(V) equipped ships, operator efficiency upgrades via the implementation of robust embedded data record and replay capability and active/passive sonar simulation/stimulation, DCL active/passive processing upgrades, passive sonar automated detection and classification processing bell-ringers from the ASW Community-of-Interest, detect and track through maneuvers, integration of MH-60R mission systems with the AN/SQQ-89A(V)15 combat system, integration of Mid-Frequency active detection improvements, false-alarm rate reduction, clutter reduction, integration of ASW Community-of-Interest improved acoustic intercept and small-object avoidance, ASW Multi-Sensor integration (acoustic similar-source fusion and implementation of integrated shipboard system data, and ASW combat display architecture), distributed engagement management (Network Centric Enterprise Services implementation, new displays and decision aids, ASW Community-of-Interest model capabilities implementation), Multi-Frequency Acoustic Communications (MF ACOMMS) between Surface Combatants and Submarines, and upgraded technologies such as algorithm improvements, increased Passive Narrow Band (PNB) frequency, Continuous Active Sonar (CAS), and beamformer improvements. A rigorous testing program is also required to ensure that these performance enhancements are operationally effective and suitable.

Exhibit R-2A, RDT&E Project Justification: PB 2015 Navy		Date: March 2014	
Appropriation/Budget Activity 1319 I 7	**R-1 Program Element (Number/Name)** PE 0205620N I *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 I *Surface ASW System Improvement*	

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2013	FY 2014	FY 2015
Title: SQQ-89A(V)15 Surface Ship ASW Advanced Capability Build (ACB) Development	20.465	27.913	22.366
Articles:	-	-	-

Description: Develop enhancements to the AN/SQQ-89A(V)15 Open System Architecture (OSA) via the integration of transformational technologies through an ACB spiral development process. Items include hull-mounted Acoustic Intercept (ACI) sensor, ACI performance predictions and signal injection capabilities, hull array adaptive beamformer and towed array shape compensated beamformer improvements via the Beamformer Functional Segment (BFFS), Mid-Frequency Active (MFA) Cooperative Organic Mine Defense (COMID) mine avoidance upgrades, MFA rapid replay and multi-waveform tracker, Hull Passive Processing Functional Segment (HPPFS) improvements, Sensor Performance Prediction Functional Segment (SPPFS) improvements, Undersea Warfare Control Functional Segment (UCFS) improvements, Supportability Functional Segment (SupFS) improvements, Recording Functional Segment (RecFS) improvements, Common System Services/Mission Package Services (CSS/MPS) improvements, full bandwidth towed array passive ASW and automated torpedo DCL algorithm improvements (active/passive) within the Torpedo Recognition and Alertment Functional Segment (TRAFS) necessary to extend detection ranges and reduce false alert/alarm rates, new Undersea Situational Awareness Workstation (USAW) sensor to reduce the number of displays required for system operation, Multi-Frequency Acoustic Communications (MF ACOMMS) development, integration of MH-60R mission systems with the AN/SQQ-89A(V)15 combat system, explosive source integration with AN/SQQ-89A(V)15 processes, simplification of displays and active processing, and a Sonar Logger capability to significantly reduce operator data logging requirements. These items will be integrated and delivered to the CG47 and DDG51 class AN/SQQ-89A(V)15 backfit production programs via ACB updates. Import advanced development capabilities from the submarine Advanced Processing Build (APB) and Acoustic Rapid Commercial-off-the-Shelf (COTS) Insertion (ARCI) projects. Export advanced capabilities to submarine and surveillance combat system programs.

Resolve/troubleshoot issues/deficiencies that arise from the AN/SQQ-89(V) Surface Ship ASW Test & Evaluation program. Rapidly address and correct problems/deficiencies in processing, capability or operations within the following areas within the AN/SQQ-89(V) USW combat system architecture; sensor processing, acoustics, fire control, contact management, performance prediction, operator productivity and on-board training, MFTA, Digital Fire Control Interface (DFCI), MFA processing, and adaptive beamforming.

FY 2013 Accomplishments:
Continued testing and production of enhancements to the AN/SQQ-89A(V)15 for ACB-13. Land-based testing will include capability and suitability testing in-lab of the integrated system on tactical hardware. Completed development of ACB-13 and delivered the ACB-13 software build to the AEGIS certification process. Initiated development of concepts and capabilities for ACB-15. Development will include completing the first step and starting the second step of the 4 Step ACB process; Step 1 - algorithm assessment by peer review panels of Subject Matter Experts (SMEs) to down-select technologies and assist

Exhibit R-2A, RDT&E Project Justification: PB 2015 Navy		Date: March 2014	
Appropriation/Budget Activity 1319 I 7	**R-1 Program Element (Number/Name)** PE 0205620N I *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 I *Surface ASW System Improvement*	

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2013	FY 2014	FY 2015
developers with technical guidance; Step 2 - algorithm/technology testing with open and closed data sets to further down-select and refine capabilities prior to integration and test. ACB-15 will focus on transitioning passive improvements from submarine APB development, improved torpedo detection and classification performance, and integrating MH-60R capability into the SQQ-89. MH-60R integration with ACB-15 is being conducted in alignment with Aegis integration of MH-60R. *FY 2014 Plans:* Continue development and integration of enhancements to the AN/SQQ-89A(V)15 for ACB-15. Priority candidates currently planned for ACB-15 include: Active Clutter Reduction, Torpedo Defense, Integration of Submarine Passive improvements, and phased integration of MH-60R. Finish the conduct of independent Step 2 testing of ACB-15 individual technologies to finalize transitions for integration onto the tactical hardware. Following independent testing, begin integration of ACB-15 capabilities into the tactical string. Integrated ACB-15 will be used for land-based testing of the full system. Prepare data collection and test plans for Step 3 land-based testing as part of 4 Step ACB process. Step 3 includes a peer review by SMEs of fully integrated tactical capability. *FY 2015 Plans:* Continue development and integration of enhancements to the AN/SQQ 89A(V)15 for ACB-15. Priority candidates will continue to be assessed during the ACB Step process. Individual capabilities which meet Step 2 requirements will be integrated onto tactical hardware. Step 3 land-based testing of full tactical system will test individual capability and system performance of ACB-15. Step 4 at-sea testing of ACB-15 will test system capability with shipboard interfaces prior to production transition. Initiate development of concepts and capabilities for ACB-17.			
Title: AN/SQQ-89(V) Surface Ship ASW Test & Evaluation Program	0.800	0.700	0.800
Articles:	-	-	-
FY 2013 Accomplishments: Conducted ACB-11/Technology Insertion (TI)-11 Development Test (DT) and Operational Assessment (OA) to support fielding of ACB-11. In support of Aegis Modernization (AMOD), provided ACB-11/TI-12 engineering releases for integration and certification. In support of the AN/SQQ-89A(V)15 upgrade onboard DDG 54, completed ACB-11/TI-12 System Qualitication Test (SQT) in 3Q13 and supported AIE in 4Q13. Initiated ACB-13 Step 3. *FY 2014 Plans:* Finalize test ship and resources in support ACB-11 Operational Test (OT). Complete ACB-13 Step 3, conduct SQT dry run 1Q14, conduct DT at the Land-Based Test Site (LBTS) prior to formal SQT. *FY 2015 Plans:* Plan ACB-13 At-Sea DT events with lead ships. Update TEMP 802-2 to cover ACB-13 DT/OT requirement.			
Title: Surface Ship Enhanced Measurement Program (SSEMP)	3.200	3.250	3.200

Exhibit R-2A, **RDT&E Project Justification:** PB 2015 Navy		**Date:** March 2014
Appropriation/Budget Activity 1319 *I* 7	**R-1 Program Element (Number/Name)** PE 0205620N *I Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 *I Surface ASW System Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	**FY 2013**	**FY 2014**	**FY 2015**
Articles:	-	-	-
Description: Analyze the sonar employment in the operational setting and report results for improvement of training/employment guidance. Perform Fleet exercise data reconstruction and post-test analysis each year. Conduct selected at-sea data collection activities by providing planning support, ship riders, and analyst support. Evaluate prototype sonar employment tactics, sonar processing and automation algorithms, and communication protocols for the detection, classification, tracking, and intra-Fleet hand-off to Fleet ASW assets, and provide summary reports to document results.			
FY 2013 Accomplishments: Continued ACB-11 performance assessment and operator at-sea testing and analysis of SSEMP cases. Updated lab hardware to TI-12 and installed ACB-11 tactical software.			
FY 2014 Plans: Support analysis of ACB-11/ACB-13 Return On Investment (ROI) test. Support ACB-11 IT/OT data collection and analysis of operational performance. Plan ACB-11 and ACB-13 lab-based system and operator performance comparison test and continue analysis of SSEMP cases.			
FY 2015 Plans: Commence ACB-13 performance assessment and operator at-sea testing and analysis of SSEMP cases. Update lab hardware to support ACB-13 install on ACB-11/TI-12 hardware. Continue analysis of SSEMP cases.			
Accomplishments/Planned Programs Subtotals	24.465	31.863	26.366

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
• OPN/2136: *AN/SQQ-89 Surface ASW Combat System*	80.060	83.231	79.802	-	79.802	106.533	116.132	152.367	168.394	Continuing	Continuing
• OPN/0900: *DDG Modernization*	407.707	285.994	338.569	-	338.569	427.258	491.224	719.671	669.440	Continuing	Continuing
• OPN/0960: *CG Modernization*	80.868	10.539	-	-	-	-	87.990	113.260	106.778	Continuing	Continuing

Remarks

D. Acquisition Strategy

- Via an ACB spiral development process, incorporate evolutionary and transformational technologies into AN/SQQ-89A(V)15 production systems (planned for select Baseline 3 and 4 CG47 Class and all FLT I/II/IIA DDG51 Class hulls) at scheduled intervals to pace the threat. This project has delivered the AN/SQQ-89A(V)15 Pre-Production Prototype, the AN/SQQ-89A(V)15 ACB-09 to 14 ships and the AN/SQQ-89A(V)15 ACB-11 to 4 ships.

Exhibit R-2A, **RDT&E Project Justification:** PB 2015 Navy		**Date:** March 2014
Appropriation/Budget Activity 1319 *I* 7	**R-1 Program Element (Number/Name)** PE 0205620N *I Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 *I Surface ASW System Improvement*

- Awarded new, competitive contract for AN/SQQ-89(V) prime system integrator and engineering services in FY13.

E. Performance Metrics

- Deliver incremental capability increases in high interest areas, as prescribed by the Fleet and captured in campaign analysis, every two years to the AN/SQQ-89A(V)15 production program via an ACB spiral development process (ACB-09, ACB-11, ACB-13, etc.) by inserting maturing USW technologies.
- Continue ACB-13 development reflecting continued improved clutter reduction, multi-ship operations, improved convergence zone (CZ) detection via improved CAS, improved passive processing via Multi-Function Towed Array (MFTA) Shape Estimation, Improved detection and Classification via Common Displays, False Alarm reduction via Radar Fusion, Improved Classification via Acoustic Fusion, Sonar situational awareness, via Undersea Situational Awareness Workstation (USAW), Contact management via continued depreciation of Undersea Warfare Control Functional Segment (UCFS) non-weapons functions, Operator Probability of Correct Classification (Pcc) Improvements via Common Display Architectures/Common GEO displays, and localization improvements via improved Target Motion Analysis (TMA) and localization algorithms.
- Continue SAST system development, integration and testing to reflect sensor simulation/stimulation improvements in MFTA Active Receive, CAS, and implemented radar tracks.
- Completed AN/SQQ-89A(V)15 Surface Ship ASW Combat System Pre-Production Prototype, performed installation, conducted DT&E, and Initial IOT&E.

Exhibit R-4, RDT&E Schedule Profile: PB 2015 Navy			Date: March 2014
Appropriation/Budget Activity 1319 *I* 7	**R-1 Program Element (Number/Name)** PE 0205620N *I Surface ASW Cmbt Sys Integr*		**Project (Number/Name)** 1916 *I Surface ASW System Improvement*

Proj 1916 — schedule chart spanning FY 2013 through FY 2019 (quarterly columns)

Acquisition/Contract Milestones
- Contract Award ▲ (FY 2013 3Q)

AN/SQQ-89A(V)15 Advanced Capability Build (ACB-13)
- ACB-13 Development – Certification
- SQT ▲ AIE ▲
- ACB-13 Delivery ▲

AN/SQQ-89A(V)15 Advanced Capability Build (ACB-15)
- ACB-15 Development – Certification
- SQT ▲ AIE ▲
- ACB 15 Delivery ▲

AN/SQQ-89A(V)15 Advanced Capability Build (ACB-17)
- ACB-17 Development – Certification
- SQT ▲ AIE ▲
- ACB-17 Delivery ▲

AN/SQQ-89A(V)15 Advanced Capability Build (ACB-19)
- ACB-19 Development – Certification

Surface Ship Enhanced Measurement Program (SSEMP)
- SSEMP

2015PB - 0205620N - 1916