Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy	Date: February 2020
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603216N *I Aviation Survivability*

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	193.796	7.618	11.919	13.428	-	13.428	13.018	13.278	12.737	12.865	Continuing	Continuing
0584: *Acft Protective Clothing*	104.190	4.543	4.117	6.207	-	6.207	5.922	5.730	5.612	5.597	Continuing	Continuing
0591: *Acft Survivability, Vulnerability & Safety*	47.944	1.456	1.458	1.462	-	1.462	1.501	1.534	1.568	1.599	Continuing	Continuing
0592: *Acft & Ordnance Safety*	37.444	1.043	5.746	5.158	-	5.158	4.980	5.387	4.917	5.016	Continuing	Continuing
1819: *CV Acft Fire Suppress System*	4.218	0.576	0.598	0.601	-	0.601	0.615	0.627	0.640	0.653	Continuing	Continuing

A. Mission Description and Budget Item Justification

Aviation Survivability addresses the issues of aircrew and platform survivability, focusing on enhancing overall opportunity for aircrew and platform protection and enhanced performance. The capabilities addressed under this program element counter emerging threats of next generation operational weapons systems and enhance combat effectiveness in future operational mission scenarios.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under ADVANCED COMPONENT DEVELOPMENT AND PROTOTYPES because it includes all efforts necessary to evaluate integrated technologies, representative models or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	7.050	11.919	11.502	-	11.502
Current President's Budget	7.618	11.919	13.428	-	13.428
Total Adjustments	0.568	0.000	1.926	-	1.926
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.700	0.000			
• SBIR/STTR Transfer	-0.132	0.000			
• Program Adjustments	0.000	0.000	1.903	-	1.903
• Rate/Misc Adjustments	0.000	0.000	0.023	-	0.023

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy	Date: February 2020
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603216N *I Aviation Survivability*

Change Summary Explanation

FY 2021: Project Unit 0584: Funds increased due to technology maturation to transition smart/rapid solutions essential to understanding, isolating, and quantifying sources to Aircrew neck and back fatigue

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603216N / *Aviation Survivability*	Project (Number/Name) 0584 / *Acft Protective Clothing*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
0584: *Acft Protective Clothing*	104.190	4.543	4.117	6.207	-	6.207	5.922	5.730	5.612	5.597	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project 0584 develops, demonstrates, and validates technologies designed to enhance warfighter performance, protection, injury prevention, mission effectiveness, and survivability. The project addresses aircrew readiness; life support equipment; physiological episodes; hearing protection and communication intelligibility; advanced helmet vision systems; laser eye protection and supporting technologies; escape and crashworthy systems; active/passive restraint systems; survival and evasion; aircrew/injury modeling; crew centered cockpit design control stations and aircraft maintainer protection. Fully protected and mission ready Aircrew are a critical component of Ready Basic Aircraft. The goal is to ensure they are able to perform their mission effectively on time, safely, every time. Project 0584 responds to a number of operational requirements documents, including OR# 210-05-88 for Chemical and Biological protection, OR# 099-05-087 for Laser Eye Protection, Aircrew Laser Eye Protection (ALEP) joint operation requirements document JORD #513-88-99, and Capabilities Program Document (CPD) Night Vision Cueing and Display (NVCD).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Advanced Technology Crew Station	4.543	4.117	6.207	0.000	6.207
Articles:	-	-	-	-	-
FY 2020 Plans: Continue the development and testing of the military utility of Magnetorheological (MR) based vibration damping systems. Testing will investigate the capability of MR based damping systems to withstand harsh environments found onboard air and ground military vehicles where excessive impacts and vibration is causing debilitating injuries. Prototype seating systems will be subjected to longer periods of exposure to extremely harsh conditions that are more representative of the expected field conditions. Development of High Resolution Digital Night Vision Goggle will continue as a joint effort with the Army. Begin integration of digital night sensors into both goggle and helmet mounted displays formats. Begin human laboratory and field testing. Assess feasibility of increasing the field of view. Advanced component development of a Physiological Monitor Warning System will continue. The objective is to mature the development of the system so it will automatically resolve physiological issues. Testing will be conducted to prove component and subsystem maturity.					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0584 / *Acft Protective Clothing*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Continue to development of a biofidelic model of the entire spinal column based on actual human data and responses to stressors ranging from fatigue to blunt force trauma to better predict and prevent incidents that increase the level of back pain and long term disabilities. Redesign head borne prototype systems to increase functionality while reducing/optimizing loading on the head and spine to reduce strain and possible injury. Continue anthropometric assessments of the head, neck, spine, and whole body to mature a digital human modeling capability for aircrew and cockpit integration. Research is ongoing to develop a simple monitor (a small dot) which is placed on the front surface of eyewear to indicate when the device has reached its maximum amount of solar radiation before eyewear protective coating degradation begins and eyes are exposed to damaging solar rays. The effort will now address whether there's an associated degradation in the impact protection of the polycarbonate protective eye wear as the solar exposure increases. Conduct environmental testing and stability over time of the dielectric protective coating.					
FY 2021 Base Plans: Continue to advance the development of the baseline Physiological Monitor Warning System. The objective is to mature the system by refining the algorithms, improving the technology gaps in the subsystems/sensor components and expanding the monitoring to other physiological episode contributors (e.g., hydration, cognitive state) from the baseline Physiological Monitor. Mature the system from warning to a system that can enact steps to mitigate. Conduct verification and validation testing to prove component and subsystem maturity. Integrate the biofidelic model of the spinal column based on actual human data and responses to stressors into the suite of tools used to design and develop head mounted systems (e.g., helmet mounted displays, helmets, visors, oxygen masks, etc.). Redesign head borne prototype systems to increase functionality while reducing/optimizing loading on the head, neck, and spine to reduce strain and possible injury. Begin definition, integration, and support of Incapacitation Prediction for Readiness in Expeditionary Domains - an Integrated Computational Tool (I-PREDICT). Initiate foundational discussions to shift from a mannequin to a cadaver-based paradigm to improve the design and development of advanced personal protective equipment (PPE) to address chronic and acute pain/injury. The ultimate goal is to predict and prevent incidents that increase the level of back pain and long-term disabilities. Begin new anthropometric technique to assess head, neck, spine vertebral alignment/position to mature a digital human modeling capability for the design of PPE and seating systems. Continue the development and testing of the vibration damping systems, which recently transitioned into the Gunners Seat (H-60 platform). Testing will investigate the capability of MR based damping systems to withstand					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0584 / *Acft Protective Clothing*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
harsh environments found onboard air, ground, and surface ship military platforms where excessive impact and vibration is causing debilitating neck/spine injuries. Subject prototype-seating systems to longer periods of exposure to extremely harsh conditions that are more representative of the expected field conditions. Continue the development of High Resolution Digital Night Vision Goggle. Begin integration of digital night sensors and displays into both goggle and helmet mounted display formats to include the study of a new wide field of view (FOV) goggle (initially 68 deg. FOV). Study the effect of motion blur on resolution. Address windowing and increased frame rate to reduce/eliminate the negative effects of motion blur. Investigate the possibility of extending the wavelength band/sensitivity of the silicon wafer used in the digital sensor to include Short Wave InfraRed (SWIR) with Near InfraRed. Sensitivity in the SWIR region will improve resolution at extremely low light levels and in degraded visual environments. Address the ballistic test protocol for polycarbonate visors and goggles. Current accepted method has differences in test methodologies that have shown new assets failing upon receipt. Adjudicate the test protocol and investigate redesign of substrates as needed. Continue the development of the solar dots (indicates number of hours of solar exposure) to have either a series of dots or one dot that gradually degrades with exposure time to match the degradation profile seen in polycarbonate visors/goggles. Assess dielectric deposition uniformity and thickness with a goal of increasing optical density. Test environmental stability over time of the enhanced dielectric protective coating from the new on shore supplier. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The increase will support research and technology development to addresses Chief NAVAL Air Force (CNAF) priorities under "Tactical Performance/Safety/Retention trends". Physiological Monitor: Finish the development of a person mounted physiological monitor that detects human performance degradation. Complete device testing and verify data. Ensure the device provides warning to the aircrew in time to enable descent to safe altitude or recovery before the pilot is incapacitated. Includes continued technology maturation to optimize the anticipated baseline solution in order to address and correct sensing deficiencies (e.g., blood oxygen level, heart rate) to limit / significantly reduce false indications that unnecessarily abort missions. Leverage progress made in vibration damping system in new Gunners Seat and apply to other seating systems.					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0584 / *Acft Protective Clothing*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Back/Neck Injury Mitigation: Begin the integration of I-PREDICT modeling/design tool to address Musculoskeletal Mitigation Design Criteria to reduce chronic and acute Back and Neck injury. I-PREDICT focuses on head, neck and torso modeling based on data from cadaver/porcine testing.					
Accomplishments/Planned Programs Subtotals	4.543	4.117	6.207	0.000	6.207

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• OPN 4268: *Aviation Support Equipment*	37.874	55.915	64.364	-	64.364	71.971	91.325	92.941	89.728	Continuing	Continuing

Remarks

D. Acquisition Strategy

Primary Hardware Development for the Navy Advanced Technology Crew Station efforts will be performed under a Cost Plus Fixed Fee Indefinite Delivery Indefinite Quantity contract.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603216N / *Aviation Survivability*	Project (Number/Name) 0584 / *Acft Protective Clothing*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NAWCAD : Pax River MD	35.467	0.797	Dec 2018	0.663	Dec 2019	0.662	Oct 2020	-		0.662	Continuing	Continuing	Continuing
Primary Hardware Development	C/CPFF	Intevac : San Jose CA	5.607	1.575	Jun 2019	1.006	Jun 2020	1.250	Dec 2020	-		1.250	0.000	9.438	9.668
Primary Hardware Development	MIPR	US Army CERDEC : Ft. Belvoir VA	3.515	0.025	Jul 2019	0.050	Jun 2020	0.050	Dec 2020	-		0.050	0.000	3.640	3.640
Primary Hardware Development	C/CPFF	Innovital : Calverton MD	0.633	0.000	Dec 2018	0.150	Dec 2019	0.150	Dec 2020	-		0.150	0.000	0.933	0.933
Physiological Monitoring	C/CPFF	TBD : TBD	0.000	0.000		1.000	Mar 2020	1.230	Mar 2021	-		1.230	0.000	2.230	1.800
I-PREDICT	C/CPFF	TBD : TBD	0.000	0.000		0.000		1.000	Jun 2021	-		1.000	0.000	1.000	1.000
Laser Eye Protection	C/CPFF	TBD : TBD	0.000	0.000		0.000		0.350	Jun 2021	-		0.350	0.000	0.350	0.350
Prior Year Prod Dev no Longer Funded in Budget Year or Outyears	Various	Various : Various	23.380	0.000		0.000		0.000		-		0.000	0.000	23.380	23.380
Enhanced Visual	C/CPFF	SA Photonics, LLC : TBD	0.000	0.700	Sep 2019	0.000		0.000		-		0.000	0.000	0.700	0.700
		Subtotal	68.602	3.097		2.869		4.692		-		4.692	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Configuration Management	WR	NAWCAD : Pax River MD	3.337	0.504	Dec 2018	0.400	Dec 2019	0.420	Oct 2020	-		0.420	Continuing	Continuing	Continuing
Prior Year Support no Longer Funded in Budget Year or Outyears	Various	Various : Various	3.232	0.000		0.000		0.000		-		0.000	0.000	3.232	3.232
		Subtotal	6.569	0.504		0.400		0.420		-		0.420	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603216N / *Aviation Survivability*	Project (Number/Name) 0584 / *Acft Protective Clothing*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NAWCAD : Pax River MD	5.836	0.703	Dec 2018	0.558	Dec 2019	0.705	Oct 2020	-		0.705	Continuing	Continuing	Continuing
Prior Year T&E no Longer Funded in Budget Year or Outyears	Various	Various : Various	18.240	0.000		0.000		0.000		-		0.000	0.000	18.240	18.240
		Subtotal	24.076	0.703		0.558		0.705		-		0.705	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Pax River MD	4.437	0.224	Dec 2018	0.275	Dec 2019	0.375	Oct 2020	-		0.375	Continuing	Continuing	Continuing
Travel	PO	NAVAIR : Pax River MD	0.496	0.015	Oct 2018	0.015	Oct 2019	0.015	Oct 2020	-		0.015	Continuing	Continuing	Continuing
Prior Year Mgmt Svcs no Longer Funded in Budget Year or Outyears	Various	Various : Various	0.010	0.000		0.000		0.000		-		0.000	0.000	0.010	0.010
		Subtotal	4.943	0.239		0.290		0.390		-		0.390	Continuing	Continuing	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	104.190	4.543		4.117		6.207		-		6.207	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0584 / *Acft Protective Clothing*

Aircrew Protective Clothing & Devices
Project 0584
Schedule

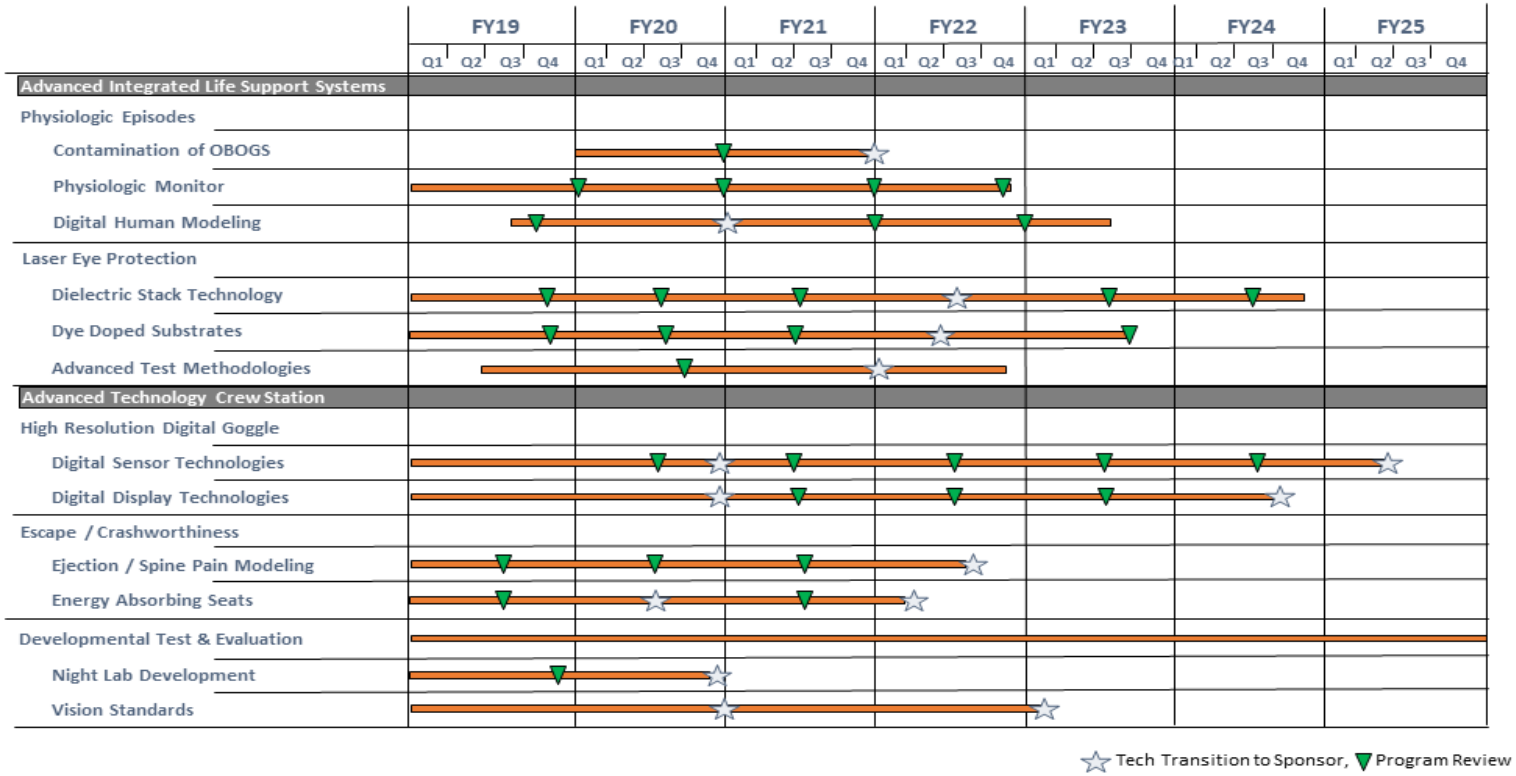

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0584 / *Acft Protective Clothing*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Acft Protective Clothing				
Advanced Integrated Life Support Systems: Contamination of OBOGS	1	2020	4	2021
Advanced Integrated Life Support Systems: Physiologic Monitoring	1	2019	4	2022
Advanced Integrated Life Support Systems: Digital Human Modeling	3	2019	3	2023
Advanced Integrated Life Support Systems: Dielectric Stack Technology	1	2019	4	2024
Advanced Integrated Life Support Systems: Dye Doped Substrates	1	2019	3	2023
Advanced Integrated Life Support Systems: Advanced Test Methodologies	2	2019	4	2022
Advanced Technology Crew Station: Digital Sensor Technologies	1	2019	2	2025
Advanced Technology Crew Station: Digital Display Technologies	1	2019	3	2024
Advanced Technology Crew Station: Ejection / Spine Pain Modeling	1	2019	3	2022
Advanced Technology Crew Station: Energy Absorbing Seats	1	2019	2	2022
Advanced Technology Crew Station: Night Lab Development	1	2019	4	2020
Advanced Technology Crew Station: Vision Standards	1	2019	1	2023

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603216N / *Aviation Survivability*	Project (Number/Name) 0591 / *Acft Survivability, Vulnerability & Safety*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
0591: *Acft Survivability, Vulnerability & Safety*	47.944	1.456	1.458	1.462	-	1.462	1.501	1.534	1.568	1.599	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Aircraft Survivability, Vulnerability and Safety. This project evaluates and develops prototype hardware and software solutions to improve the survivability of Navy and Marine Corps aircraft. This project addresses the likelihood of an aircraft being hit (susceptibility) and the probability of a kill if the aircraft is hit (vulnerability). Types of programs funded under this project include signature reduction efforts, subsystem and component hardening and development of Integrated Aviation Survivability Equipment (iASE) architectures for simulation and training systems.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Technology Requirements	0.030	0.040	0.045	0.000	0.045
Articles:	-	-	-	-	-
FY 2020 Plans: Planned trade studies include: threats assessments; vulnerability assessments of both rotary wing and fixed wing aircraft; efficacy of USN/USMC simulation training systems within the updated threat system and EW environment. ***FY 2021 Base Plans:*** Planned trade studies include: expansion of threats assessments to include new and/or evolved threats. Update modeling and simulation capabilities to better reflect the evolving threat environment. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Amount increased due to projected labor rate increase.					
Title: Technology Design & Development	1.426	1.218	1.317	0.000	1.317
Articles:	-	-	-	-	-
FY 2020 Plans: Conduct asymmetric threats modeling and analyses based on OASIS simulation study. Integrate iASE architecture within the USN/USMC simulation and training system environment. Advance model development					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0591 / *Acft Survivability, Vulnerability & Safety*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
relating to Advanced Electronic Attack, Electro-Magnetic Maneuver Warfare, and spectrum dominance in support of air combat training and Live Virtual Constructive capabilities to improve aircraft survivability and lethality. Conduct combat situational awareness analyses to integrate existing federated capabilities. ***FY 2021 Base Plans:*** Conduct asymmetric threats modeling and analyses based on expansion of the OpNav Aircraft Survivability Integration Study (OASIS) project to include additional aircraft platforms. Continue integration efforts for the iASE architecture within the USN/USMC simulation and training system environment. Model results of combat situational awareness analyses to evaluate effectiveness of proposed solutions. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Airframe integration requirements increased due to application of previous study findings to additional aircraft platforms.					
Title: Technology Test & Evaluation	0.000	0.200	0.100	0.000	0.100
Articles:	-	-	-	-	-
FY 2020 Plans: Integration, laboratory, and flight testing of prototype hardware in support of the Integrated Aircraft Survivability Equipment architecture development and in support of countermeasures simulation hardware. Integrate and chamber test Live Virtual Constructive solutions. Begin testing combat situational awareness capability in a simulated environment. ***FY 2021 Base Plans:*** Continue prototype hardware testing in support of the iASE architecture development and in support of countermeasures simulation hardware. Continue testing combat situational awareness capability in a simulated environment. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0591 / *Acft Survivability, Vulnerability & Safety*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Cost decreased as testing for proof-of-concept is finalized and results are evaluated for applicability to increased project scope.					
Accomplishments/Planned Programs Subtotals	1.456	1.458	1.462	0.000	1.462

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Primary Hardware Development will be performed under either a Cost Plus Fixed Fee or a Firm Fixed Price contract.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0591 / *Acft Survivability, Vulnerability & Safety*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NAWCAD : Pax River, MD	13.130	0.256	Oct 2018	0.276	Oct 2019	0.255	Oct 2020	-		0.255	Continuing	Continuing	Continuing
Systems Engineering	WR	NAWCWD : China Lake, CA	0.353	0.089	Oct 2018	0.150	Oct 2019	0.087	Jan 2021	-		0.087	Continuing	Continuing	Continuing
Systems Engineering	MIPR	DTIC : Ft. Belvoir, VA	0.713	1.081	Jan 2019	0.692	Jan 2020	0.875	Nov 2020	-		0.875	0.000	3.361	3.361
System Engineering	C/CPFF	TEKLA : Dumfries, VA	0.000	0.000		0.100	Dec 2019	0.100	Apr 2021	-		0.100	0.000	0.200	0.200
Prior Year Prod Dev cost no longer funded in FYDP	Various	Various : Various	21.268	0.000		0.000		0.000		-		0.000	0.000	21.268	21.268
		Subtotal	35.464	1.426		1.218		1.317		-		1.317	Continuing	Continuing	N/A

Remarks

All prior year lines have been consolidated

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Support cost no longer funded in FYDP	Various	Various : Various	4.569	0.000		0.000		0.000		-		0.000	0.000	4.569	4.569
		Subtotal	4.569	0.000		0.000		0.000		-		0.000	0.000	4.569	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NAWCAD : Patuxent River, MD	2.453	0.000		0.100	Oct 2019	0.050	Apr 2021	-		0.050	Continuing	Continuing	Continuing
Developmental Test & Evaluation	WR	NAWCWD : China Lake, CA	0.000	0.000		0.000		0.050	May 2021	-		0.050	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0591 / *Acft Survivability, Vulnerability & Safety*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	C/CPFF	GTRI : Atlanta, GA	0.000	0.000		0.100	Jan 2020	0.000		-		0.000	0.000	0.100	0.100
Prior Year T&E cost no longer funded in FYDP	Various	Various : Various	2.995	0.000		0.000		0.000		-		0.000	0.000	2.995	2.995
		Subtotal	5.448	0.000		0.200		0.100		-		0.100	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Pax River, MD	1.738	0.030	Oct 2018	0.040	Oct 2019	0.045	Oct 2020	-		0.045	Continuing	Continuing	Continuing
Prior Year Mgmt cost no longer funded in FYDP	Various	Various : Various	0.725	0.000		0.000		0.000		-		0.000	0.000	0.725	0.725
		Subtotal	2.463	0.030		0.040		0.045		-		0.045	Continuing	Continuing	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	47.944	1.456		1.458		1.462		-		1.462	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0591 / *Acft Survivability, Vulnerability & Safety*

Aircraft Survivability, Vulnerability and Safety– Project 0591 Schedule

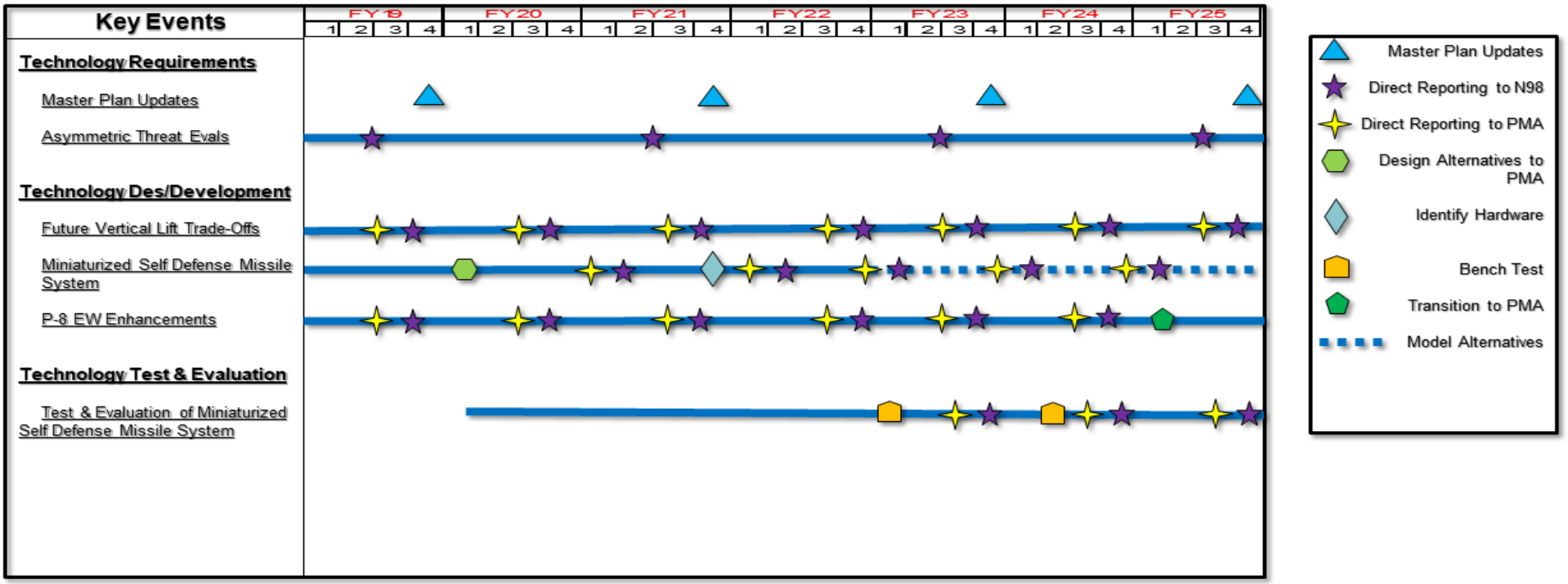

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0591 / *Acft Survivability, Vulnerability & Safety*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Acft Survivability, Vulnerability & Safety				
Technology Des/Development: Future Vertical Lift Trade-Offs	1	2019	4	2025
Technology Des/Development: Miniaturized Self Defense Missile System	1	2019	4	2025
Technology Des/Development: P-8 EW Enhancements	1	2019	4	2025
Technology Test & Evaluation: Test & Evaluation of Miniaturized Self Defense Missile System	1	2020	4	2025

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603216N / *Aviation Survivability*	Project (Number/Name) 0592 / *Acft & Ordnance Safety*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
0592: *Acft & Ordnance Safety*	37.444	1.043	5.746	5.158	-	5.158	4.980	5.387	4.917	5.016	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Aircraft and Ordnance Safety Program transitions innovative munitions safety technology to Navy and Marine Corps air weapons, to comply with the Chief of Naval Operations direction that all munitions carried aboard Navy ships be insensitive to unplanned stimuli (thermal, impact, and shock events). The Aircraft and Ordnance Safety Program also ensures the safety and protection of personnel, aircraft, ships, and operational facilities, through improved precision targeting, fail-safe ordnance, selective effects munitions and shock/blast force protection technologies.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Insensitive Munitions (IM)	1.043	5.746	5.158	0.000	5.158
Articles:	-	-	-	-	-
FY 2020 Plans: Air-to-Air Demonstration: IM improvement through the integration of solid fuel ramjet technology with traditional solid rocket motor. Continue Sidewinder rocket motor technology risk reduction evaluation in support of PMA-259 planned block III transition with highly-loaded-grain, high-performance motor, and radio frequency cook-off sensor. Improved Air-Launched Weapons: An insensitive solid propellant tailored to Highly Loaded Grain (HLG) technology. Develop propellants that possess a high burning rate at 1500-2000PSI and high mechanical strain at cold temperatures (-650 C). Continued work with HLG in a 21" diameter motor. Continue Insensitive Munitions (IM) and performance evaluation of a cast/cure minimum smoke composite propellant that will meet -650 C requirement for fixed-wing platforms. Testing will be done in a Hellfire configuration to demonstrate transition ability to a system with equivalent requirements in support of PMA 242 tier III requirements. Continue evaluation of Highly-loaded-grain high performance rocket motor and application of Slow cook- off-sensor technology in Advanced Anti-Radiation Guided Missile (AARGM) configuration for transition to PMA-242 AARGM BLK II upgrade. Advanced Containment/Case Warhead Materials: Continue working the Metal Matrix Composite case for continued improved IM responses. Distributed Fiber Optic sensing for In-Situ Propellant Health Monitoring (DFOS). DFOS to monitor the temperature and stress/strain within a solid rocket motor. Applied to full-scale HLG motor testing as a stress-strain field characterization to supplement analytical tools. Develop a 3-D model					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0592 / *Acft & Ordnance Safety*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
to compare the FMU 139 D/B with previous fuzes which it is slated to replace. The integration of technology developed in the Joint Service Insensitive Munitions Technology Program program will aid in IM improvement in the fuze family. Demonstrate IM performance of the Joint Multiple Effects Warhead System in the new revised configuration for transition to PMA 280.					
FY 2021 Base Plans: Air-to-Air Demonstration: Improved liner system for use in bombs, specifically Mark 80 Series, which will optimize the minimum 8-minute protection during Fast Cook-off. Insensitive Munitions (IM) benefits of integrating Rocket Solid Fuel RamJet Technology with traditional solid rocket motor propellant in IM testing scenario including Fast Cook-off, bullet impact, fragment impact, and shape charge jet. Improved Air-Launched Weapons: Develop a Polymer-bonded Explosive 109 use loaded variant of IM vented Bomb Live Unit 117 for the Navy. Investigate the use of Precision-controlled Additive Manufactured fragments to improve IM response as well as increase lethality over multiple target sets. Perform initial testing to improve warhead initiation system to increase warhead performance. Advanced Containment/Case Warhead Materials: Continue working the Metal Matrix Composite case for continued improved IM responses. Integrate a remote RF sensor into an Evolved Seasparrow Missile, Block III type system capable of igniting the motor prior to cook-off upon generating a signal indicating thermal runaway is imminent. Shock/Blast Barrier Protection Modeling, Demo & Testing: High Impulse Booster - improving performance by supporting a more robust firetrain under hard impacts as it can transfer the shock over large distances that could be encountered due to explosive fill compression. Improve the reaction of the Block 2 RAM rocket motors to the Fast Cook-off and Slow Cook-off tests through the application of a mature Thermally Initiation Venting System technology. Determine the feasibility of shock sensitizing a large failure diameter Polymer-bonded Explosive fill. Single-use fragment projector for reduced cost and improved flexibility. Using Large Scale Gap Test to improve analysis of shock initiation of energetics using energy per unit area technique.					
FY 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0592 / *Acft & Ordnance Safety*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Decrease due to several projects ending in FY20, e.g., Minimum Signature IM Improved Propellant for Next Generation Air-to-Air Ground Weapon Systems, Energetic Materials Additive Manufacturing, and FMU-139 D/B 3-D Modeling.					
Accomplishments/Planned Programs Subtotals	1.043	5.746	5.158	0.000	5.158

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

All planned programs are accomplished via civilian labor and use of government testing facilities.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603216N / *Aviation Survivability*	Project (Number/Name) 0592 / *Acft & Ordnance Safety*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NAWCWD : China Lake, CA	37.436	1.043	Oct 2018	5.746	Oct 2019	5.158	Oct 2020	-		5.158	Continuing	Continuing	Continuing
		Subtotal	37.436	1.043		5.746		5.158		-		5.158	Continuing	Continuing	N/A

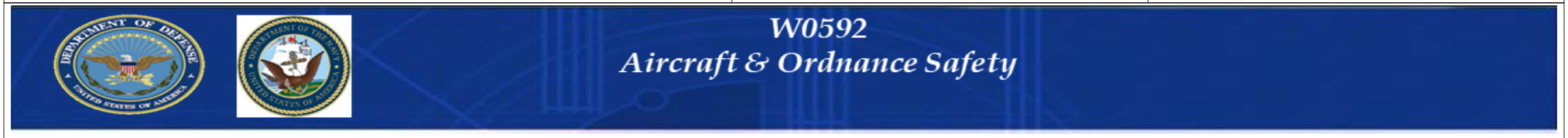
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Mgmt no longer funded in FYDP	Various	Various : Various	0.008	0.000		0.000		0.000		-		0.000	0.000	0.008	0.008
		Subtotal	0.008	0.000		0.000		0.000		-		0.000	0.000	0.008	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	37.444	1.043		5.746		5.158		-		5.158	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0592 / *Acft & Ordnance Safety*



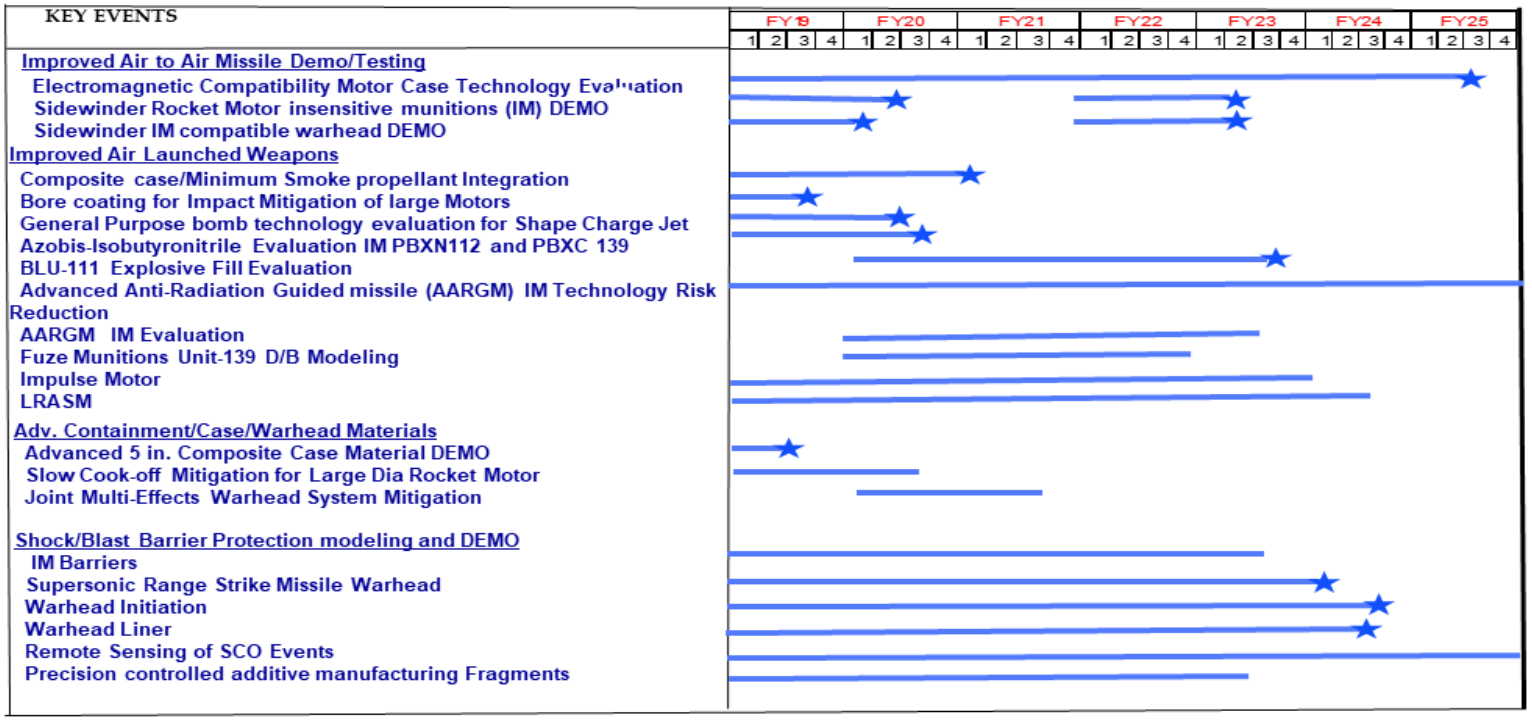


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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0592 / *Acft & Ordnance Safety*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Acft & Ordnance Safety				
Improved Air to Air Missile Demonstration Testing: Electromagnetic Compatibility (EMC) Motor Case Technology Evaluation	1	2019	3	2025
Improved Air to Air Missile Demonstration Testing: Sidewinder Rocket Motor insensitive munitions (IM) DEMO (1)	1	2019	2	2020
Improved Air to Air Missile Demonstration Testing: Sidewinder Rocket Motor IM DEMO (2)	1	2022	2	2023
Improved Air to Air Missile Demonstration Testing: Sidewinder IM Compatible Warhead DEMO (1)	1	2019	1	2020
Improved Air to Air Missile Demonstration Testing: Sidewinder IM Compatible Warhead DEMO (2)	1	2022	2	2023
Improved Air Launched Weapons: Composite case	1	2019	2	2021
Improved Air Launched Weapons: Bore Coating for Impact Mitigation of Large Motors	1	2019	3	2019
Improved Air Launched Weapons: General Purpose (GP) Bomb Technology Evaluation for Shape Charge Jet	1	2019	2	2020
Improved Air Launched Weapons: Azobis-Isobutyronitrile (AIBN) Evaluation IM PBXN112 and PBXC 139	1	2019	4	2020
Improved Air Launched Weapons: BLU-111 Explosive Fill Evaluation	2	2020	4	2023
Improved Air Launched Weapons: Advanced Anti-Radiation Guided missile (AARGM RM) IM Technology Risk Reduction	1	2019	4	2025
Improved Air Launched Weapons: AARGM RM IM Evaluation	1	2020	3	2023
Improved Air Launched Weapons: Fuze Munitions (FMU)-139 D/B Modeling	1	2020	4	2022
Improved Air Launched Weapons: Impulse Motor	1	2019	4	2023
Improved Air Launched Weapons: Long Range Anti-Ship Missile (LRASM)	1	2019	3	2024
Adv. Containment/Case/Warhead Materials: Composite Case Material DEMO	1	2019	3	2019

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 0592 / *Acft & Ordnance Safety*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Adv. Containment/Case/Warhead Materials: Slow Cook-off (SCO) Mitigation for Large DIA Rocket Motor	1	2019	4	2020
Adv. Containment/Case/Warhead Materials: Joint Multi-Effects Warhead System (JMEWS) Mitigation	1	2020	3	2021
Shock/Blast Barrier Protection Modeling and DEMO: IM Barriers	1	2019	4	2023
Shock/Blast Barrier Protection Modeling and DEMO: Supersonic Range Strike Missile Warhead	1	2019	4	2023
Shock/Blast Barrier Protection Modeling and DEMO: Warhead Initiation	1	2019	3	2023
Shock/Blast Barrier Protection Modeling and DEMO: Warhead Liner	1	2019	2	2023
Shock/Blast Barrier Protection Modeling and DEMO: Remote Sensing of SCO Events	1	2019	4	2025
Shock/Blast Barrier Protection Modeling and DEMO: Precision controlled additive manufacturing (PAM) Fragments	1	2019	2	2023

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603216N / *Aviation Survivability*	Project (Number/Name) 1819 / *CV Acft Fire Suppress System*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
1819: *CV Acft Fire Suppress System*	4.218	0.576	0.598	0.601	-	0.601	0.615	0.627	0.640	0.653	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops improved fire-fighting systems and fire protective measures for aircraft-related fires on aircraft carriers, including assessment of fire properties, definition of fire threats, improvements to fire-fighting agents and delivery systems, fire detection and suppression system performance evaluations, and fire-fighter training improvements.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Fire-Fighting	0.576	0.598	0.601	0.000	0.601
Articles:	-	-	-	-	-

FY 2020 Plans:

Continue support for Naval Air Training and Operating Procedures Standardization improvements, and modeling and simulation for fire prediction. Continue monitoring aqueous film forming foam developments and other clean agents. Continue to monitor new equipment improvements for saws, spreaders, and other improvements to reduce or discontinue the use of Motor Gasoline on ships. Continue evaluations for flash-hood, crash-fire-rescue face shield and firefighter personnel floatation device improvements. Continue to monitor and recommend Electromagnetic Aircraft Launch Systems fire doctrine, Carrier Fixed Wing Aircraft Nuclear hangar bay conflagration management system operations, and unmanned carrier launched airborne surveillance and strike firefighting operations impacts. Continue project looking at firefighter issues related to composites, weapons and fuels and develop procedures to be used aboard ship to rapidly and safely extinguished deep seated smoldering fires with composite materials. Continue to evaluate training and certification requirements and equipment to bring the ship up to aviation boatswains mate capabilities and readiness for Air Capable Ships, ships that rely on the ships damage control team and limited resources. Continue improved weapons cooling scenario testing. Continue project looking at options for firefighter equipment storage on CVN's and LHA/D ships.

FY 2021 Base Plans:

Continue support for Naval Air Training and Operating Procedures Standardization improvements for aircraft fire prediction and protection. Continue monitoring aqueous film forming foam developments and other clean agents. Continue to monitor new equipment improvements for saws, spreaders, and other improvements to reduce or discontinue the use of Motor Gasoline on ships. Continue evaluations for flash-hood, crash-fire-rescue face shield and firefighter personnel floatation device improvements. Continue to monitor and

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 1819 / *CV Acft Fire Suppress System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
recommend Electromagnetic Aircraft Launch Systems fire doctrine, Carrier Fixed Wing Aircraft Nuclear hangar bay conflagration management system operations, and unmanned carrier launched airborne surveillance and strike firefighting operations impacts. Continue project looking at firefighter issues related to composites, weapons and fuels and develop procedures to be used aboard ship to rapidly and safely extinguished deep-seated smoldering fires with composite materials. Continue to evaluate training and certification requirements and equipment to bring the ship up to aviation boatswains mate capabilities and readiness for Air Capable Ships, ships that rely on the ships damage control team and limited resources to fight aircraft related fires. Continue improved weapons cooling scenario testing. Continue project looking at options for firefighter equipment storage on CVN's and LHA/D ships. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Amount increased due to projected NAWC labor rate increase.					
Accomplishments/Planned Programs Subtotals	0.576	0.598	0.601	0.000	0.601

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

This is a non-ACAT program. Procurement strategy is determined by market survey and cooperative opportunities.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603216N / *Aviation Survivability*	Project (Number/Name) 1819 / *CV Acft Fire Suppress System*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NAWCWD : China Lake, CA	0.199	0.043	Oct 2018	0.062	Oct 2019	0.075	Oct 2020	-		0.075	Continuing	Continuing	Continuing
Prior Yr Prod Dev no longer funded in the FYDP	Various	Various : Various	0.335	0.000		0.000		0.000		-		0.000	0.000	0.335	0.335
		Subtotal	0.534	0.043		0.062		0.075		-		0.075	Continuing	Continuing	N/A

Remarks

All prior year lines have been consolidated.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Support	C/CPFF	ICI : Virginia Beach, VA	0.105	0.000	Nov 2018	0.030	Nov 2019	0.000		-		0.000	0.000	0.135	0.135
Engineering Support	WR	NAWCWD : China Lake, CA	0.457	0.150	Oct 2018	0.176	Oct 2019	0.186	Oct 2020	-		0.186	Continuing	Continuing	Continuing
Engineering Support	C/CPFF	Hughes Associates : Baltimore, MD	0.097	0.035	Nov 2018	0.030	Nov 2019	0.010	Nov 2020	-		0.010	0.000	0.172	0.172
Engineering Support	C/CPFF	AVW : Chesapeake, VA	0.149	0.000		0.000		0.000		-		0.000	0.000	0.149	0.149
Engineering Support	WR	NRL : Washington, DC	0.019	0.010	May 2019	0.010	May 2020	0.010	May 2021	-		0.010	Continuing	Continuing	Continuing
		Subtotal	0.827	0.195		0.246		0.206		-		0.206	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Technology Test & Evaluation	WR	NAWCWD : China Lake, CA	1.586	0.260	Oct 2018	0.180	Oct 2019	0.210	Oct 2020	-		0.210	Continuing	Continuing	Continuing
Technology Test & Evaluation	C/FFP	Hughes Associates : Baltimore, MD	0.578	0.030	Nov 2018	0.050	Nov 2019	0.060	Nov 2020	-		0.060	0.000	0.718	0.718

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603216N / *Aviation Survivability*	Project (Number/Name) 1819 / *CV Acft Fire Suppress System*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior yr T&E no longer funded in the FYDP	Various	Various : Various	0.329	0.000		0.000		0.000		-		0.000	0.000	0.329	0.329
		Subtotal	2.493	0.290		0.230		0.270		-		0.270	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	WR	NAWCWD : China Lake, CA	0.364	0.048	Oct 2018	0.060	Oct 2019	0.050	Oct 2020	-		0.050	Continuing	Continuing	Continuing
		Subtotal	0.364	0.048		0.060		0.050		-		0.050	Continuing	Continuing	N/A

	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	4.218	0.576		0.598		0.601		-		0.601	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 1819 / *CV Acft Fire Suppress System*

Aircraft Fire Suppression Systems– Project 1819 Schedule

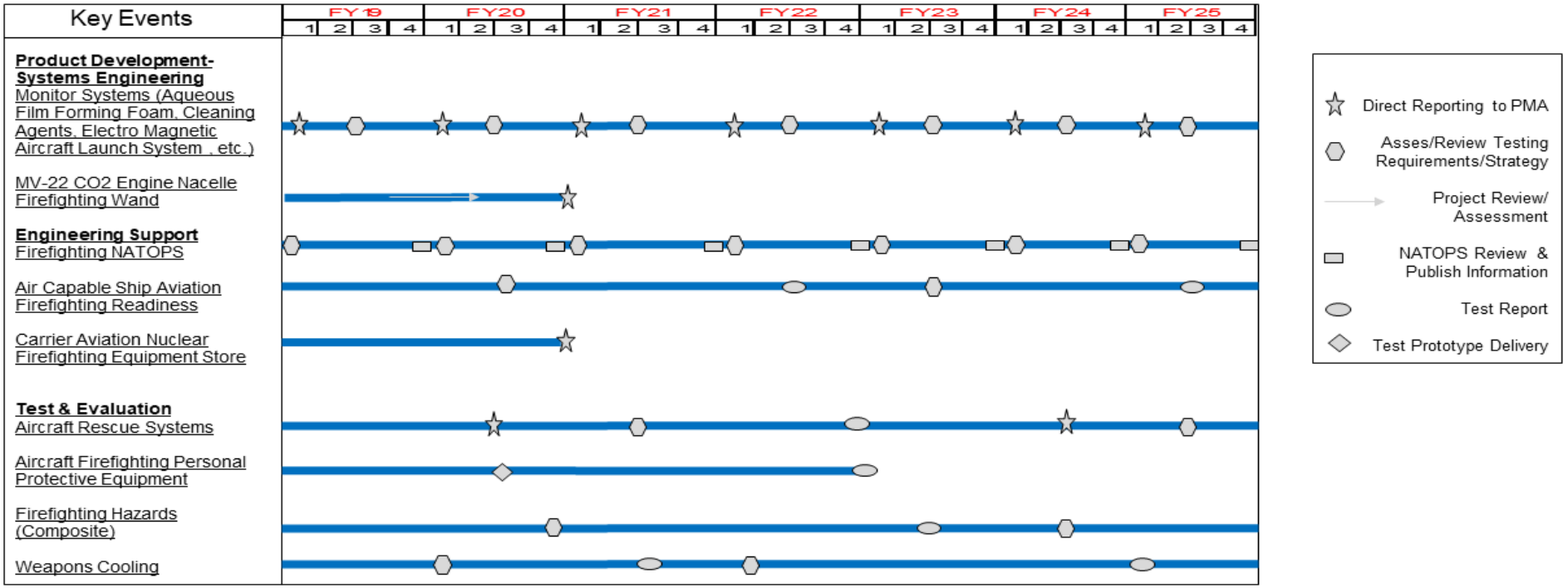

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603216N / *Aviation Survivability*	**Project (Number/Name)** 1819 / *CV Acft Fire Suppress System*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
CV Acft Fire Suppress System				
Product Development-Systems Engineering: Monitor Systems (Aqueous Film Forming Foam, Cleaning Agents, Electro Magnetic Aircraft Launch System (EMALS), etc.)	1	2019	4	2025
Product Development-Systems Engineering: MV-22 CO2 Engine Nacelle Firefighting Wand	1	2019	4	2020
Engineering Support: Firefighting NATOPS	1	2019	4	2025
Engineering Support: Air Capable Ship (ACS) Aviation Firefighting Readiness	1	2019	4	2025
Engineering Support: Carrier Aviation Nuclear (CVN) Firefighting Equipment Store	1	2019	1	2020
Test & Evaluation: Aircraft Rescue Systems	1	2019	4	2025
Test & Evaluation: Aircraft Firefighting Personal Protective Equipment (PPE)	1	2019	4	2022
Test & Evaluation: Firefighting Hazards (Composite)	1	2019	4	2025
Test & Evaluation: Weapons Cooling	1	2019	4	2025