Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Office of the Secretary Of Defense	Date: February 2016
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
Total Program Element	9.638	14.282	22.532	16.195	-	16.195	11.029	5.619	5.697	5.808	Continuing	Continuing
819: *Industrial Base Analysis and Sustainment*	9.638	14.282	22.532	16.195	-	16.195	11.029	5.619	5.697	5.808	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Defense-wide Industrial Base Analysis and Sustainment (IBAS) program element, directed by Title 10 USC Section 2508, provides the Department with a comprehensive ability to monitor and assess the industrial base, to address critical issues relating to urgent operational needs and industrial base vulnerabilities and to support industrial base expansion. This program maintains or improves the health of critical and fragile industry capabilities that are at risk of being lost but are needed either at present, or have verified future requirements, to support the National Defense Strategy. The goal of the program is to avoid loss of critical capabilities and resultant reconstitution costs wherever affordable and innovative mechanisms are available to the producers in the interim.

IBAS will 1) provide lifelines and safe harbors for unique critical capabilities with fragile business cases, 2) preserve design teams with the critical skills necessary for technological superiority, and 3) support expansion and competition of reliable sources.

Criteria for project selection will include factors such as 1) identifiable path of preservation, transformation or innovation between an existing capability and a capability with a very high probability of being needed in the short to medium term 2) loss of the capability is likely in the absence of the proposed project; 3) analysis showing that the project results in a lower overall cost to the department than if capability is developed from scratch when needed; and 4) preference is given to projects supporting multiple programs or services with multiple beneficiaries.

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	14.756	22.576	16.705	-	16.705
Current President's Budget	14.282	22.532	16.195	-	16.195
Total Adjustments	-0.474	-0.044	-0.510	-	-0.510
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.006	-			
• SBIR/STTR Transfer	-0.468	-			
• Reduction for rebalancing of Department priorites	-	-	-0.510	-	-0.510
• Reduction for FY16 Prior Year Execution	-	-0.044	-	-	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Office of the Secretary Of Defense	Date: February 2016
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0607210D8Z *I Industrial Base Analysis and Sustainment Support*

Change Summary Explanation

The $6 million decrease from FY2016 to FY2017 reflects a special emphasis one-time increase in FY 2016 for Space Sector Sustainment. The funding was targeted to maintain active Mercury-Cadmium-Telluride (MCT) detector production (and the capability to surge) and qualify domestic carbon fiber for structures to meet the needs of National Security Systems in the Missile and Space Sectors.

FY 2017 baseline program decreased by a net amount of $.056 mil for rebalancing of Department priorities.

Exhibit R-2A, RDT&E Project Justification: PB 2017 Office of the Secretary Of Defense			Date: February 2016
Appropriation/Budget Activity 0400 / 7	R-1 Program Element (Number/Name) PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*	Project (Number/Name) 819 / *Industrial Base Analysis and Sustainment*	

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
819: *Industrial Base Analysis and Sustainment*	9.638	14.282	22.532	16.195	-	16.195	11.029	5.619	5.697	5.808	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The IBAS program has a two-pronged approach to identify projects: 1) periodic assessments of the national technology and industrial base by the OSD Acquisition, Technology and Logistics (AT&L) office of Manufacturing and Industrial Base Policy (MIBP) as directed by 10 U.S. Code 2505, and 2) a call for projects to industry. MIBP collaborates with the services and agencies in performing assessments under the 2505 program to identify elements of the industrial base where current spending on production and research is insufficient to keep critical capabilities viable. While industrial base risks are mitigated primarily through the direct engagement of prime contractors, program managers and military departments, exceptional cases require a more direct defense-wide intervention strategy. This Defense-wide Industrial Base Analysis and Sustainment (IBAS) program element, directed by Title 10 USC Section 2508, provides the Department with that means.

All projects are evaluated for industrial base risk using fragility and criticality risk criteria, similar to the more familiar probability and consequence risk criteria. Fragility examines characteristics that make a specific capability likely to be disrupted. Criticality examines characteristics that make a specific capability difficult to replace if disrupted. In addition to the gating criteria of fragility and criticality, additional factors for project selection include:

- An identifiable path of preservation or innovation for an existing capability with a very high probability of being needed in the short to medium term
- The loss of the capability is likely in the absence of the proposed support
- An analysis showing that the project results in a lower overall cost to the department than if capability is developed from scratch when needed

IBAS investments are focused on three broad industry groupings: 1) Missiles and Munitions, 2) Space, and 3) Other industrial base niches. Priority is given to investments that cut across multiple platforms and services.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Title: Missile and Munitions Industrial Base Sustainment	6.500	11.296	11.790
Description: With a multi-decade decline in missile program development and procurement, design and production capabilities for critical components within the missile sector industrial base are at risk. This has a significant impact on current and future missile programs, limiting the readiness and availability of superior technology to U.S. Warfighters. The missile sector sustainment will exercise the design and production skills of this critical industrial base by improving existing production processes, exploring advanced materials for higher performance, and upgrading outdated technology for missile components. A missile sector Fragility and Criticality assessment has highlighted the need for specific action to preserve industrial base capabilities for fuzes and thermal batteries.			

Exhibit R-2A, RDT&E Project Justification: PB 2017 Office of the Secretary Of Defense		Date: February 2016
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*	**Project (Number/Name)** 819 / *Industrial Base Analysis and Sustainment*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017

FY 2015 Accomplishments:

Advanced Solid Rocket Propulsion: Completed work on a project that supports future missile interceptor missions with advanced kill vehicle thrusters for high precision and long duration missions. This is a defense-unique industrial base niche. The project developed a new Solid Divert and Attitude Control Systems (SDACS) diverter valve with advanced structural insulators and high-temperature seals. The primary purpose was preservation of design team capabilities for Solid Divert and Attitude Control Systems (SDACS). Funding research to sustain DACS competition is a specifically stated Congressional concern.

Butanetriol (BT): Completed work to develop a qualified domestic source for BT, a solid rocket propellant precursor chemical, precluding the necessity of procurement from a prohibited foreign source. Since 2008, DoD's projected requirements have shrunk to levels that made it uneconomical for domestic suppliers to develop BT production capability. IBAS funded a cost-sharing project with the new supplier to retrofit an existing Dihydrofuran reactor, modify pumping, plumbing, heat management and process controls to an existing reactor, relocate existing atmospheric storage tank for waste collection and modify the discharge filtering system of an existing reactor.

Electronic Safe and Arm Device (ESAD): Because of the decline in missile production, fuzes are experiencing a decline in production, making the industrial base very fragile. Without intervention, loss of industry design and production expertise is expected for ESAD-based fuzes. ESADs are most commonly used in missile fuzing, but have applicability to some of the Department's most critical gun fired and air delivered munitions as well. To improve the industrial base capability, IBAS is funding EASD design projects for cost reduction and commonality across multiple missile and munition end-products. Phase I was initiated by contracting with three different suppliers to exercise their engineering capability, including the use of sub-tier suppliers and component technology, to develop lower cost, common architecture ESAD designs. These three suppliers form the critical core of the US Industrial Base for fuzes overall. Phase II is planned for award in FY 2017. In this phase the work from Phase I will then be applied against a post milestone C munition which can benefit the most from an upgraded fuze capability.

Low Energy Exploding Foil Initiators (LEEFI): This fuze project was initiated to develop a backup manufacturing capability for LEEFIs. LEEFIs are a critical subcomponent used in all Electronic Safe and Arm Devices ESADs. The current production facility is the sole source for LEEFI fuzes used in a wide variety of DoD missile programs. The ability to manufacture these specialized initiators at an alternate location eliminates the risk of a single point of failure that has the potential to hobble production on all missile programs simultaneously.

Thermal Batteries: Similar to the issue with fuzes, the decline in missile production has made the industrial base for thermal batteries very fragile. Production is falling below minimum sustaining rates. IBAS has initiated three projects for thermal battery technical improvements in battery materials and shelf life that will lower minimum sustaining rates: improved material composition

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017

that will provide additional domestic suppliers, characterization of Thermal Battery shelf-life model to enhance production quality and sustainment (reducing costs and industrial base burden), and improved thin film production to broaden and improve the market.

FY 2016 Plans:

Electronic Safe and Arm Device (ESAD): Phase I engineering projects which will continue to develop lower cost, common architecture ESAD designs.

Low Energy Exploding Foil Initiators (LEEFI): Work will be completed on the backup manufacturing capability for LEEFI fuzes eliminating the potential single point of failure affecting all missile programs.

Thermal Batteries: Work will continue on the three projects for thermal battery technical improvements.

Solid Rocket Motors: For the purpose of sustaining at-risk critical design skills, DoD will conduct advanced propulsion system technology development, maturation and demonstration that advance the state-of-the-art in propulsion component, sub-system and system solutions that enable enhanced multi-mission capabilities. The focus will be: (1) improving and maintaining design engineering capability and knowledge base in the areas of advanced propellant formulations, case/nozzle/insulation approaches, ignition systems, energy management approaches, and safety enhancements; (2) implementation of propulsion solutions that advance state-of-the-art in mission flexibility, agility, volumetric/mass efficiency, and affordability; and (3) demonstration of a down-selected integrated flight-type propulsion solution that effectively demonstrates that the critical technological elements can function together in a relevant environment.

FY 2017 Plans:

Electronic Safe and Arm Device (ESAD): Phase II will be initiated which takes the engineering projects of phase I and performs the system integration work to retrofit the new ESADs to existing post milestone C munition which can benefit the most from an upgraded fuze capability. This will further exercise the critical fuze industrial base along with the subtier suppliers as pre-qualification prototype quantities will be manufactured after the design from phase I is further refined for the selected application. The end production will not only be to have successfully supported this critical industrial base, but to also pave the way for the warfighter to receive a higher quality upgraded capability from a munition system. Application of ESAD designs as common architecture to multiple missiles and munitions during this phase enables realization of the desired cost savings.

Thermal Batteries: The thermal battery industrial sector initiative will continue with call for proposals for FY 2017 and 2017. The primary focus for FY 2017-2018 time period will be on improvements within product characteristics and production methods, and development of new technologies which enable the sustainment of the industrial base while meeting Department of Defense requirements. The thermal battery industrial sector will continue to be assessed to ensure existing and emerging requirements are developed to support National Security Directives.

Exhibit R-2A, RDT&E Project Justification: PB 2017 Office of the Secretary Of Defense		Date: February 2016
Appropriation/Budget Activity 0400 / 7	**R-1 Program Element (Number/Name)** PE 0607210D8Z / *Industrial Base Analysis and Sustainment Support*	**Project (Number/Name)** 819 / *Industrial Base Analysis and Sustainment*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Solid Rocket Motors: Work will continue on the solid rocket motor project initiated in 2016.			
Title: Space Industrial Base Sustainment	3.638	7.000	-
Description: Investment in key sub-tier suppliers will ensure qualified suppliers exist to support future system development efforts. ***FY 2015 Accomplishments:*** Radiation Hardened Products: A number of unique radiation hardened products from a sole source supplier highly likely to be used by a number of future programs have completed development but require final space qualification. The supplier cannot fund this at their own expense. Without funding to perform space qualification work, the products will not be ready for use when needed and the supplier is highly likely to leave the business. Work was initiated to perform final space qualification work and avoid the much higher cost of developing replacement products with an alternative supplier. National Security Space Programs: Mercury Cadmium Telluride (MCT) infrared sensors permit highest performance and highest technical and manufacturing readiness levels for tactical/strategic/space applications. Volumes for MCT wafer fab production in 2014 plummeted 60% below historical annual average for the past seven years. Forecast volumes to fall another 50% next year, far below the minimum number per year to maintain this critical technology. IBAS initiated work to identify cost drivers and develop improvements in space-based sensors. This builds upon Defense Wide Manufacturing Science and Technology (ManTech) work on material for MCT infrared focal plane arrays. ***FY 2016 Plans:*** Radiation Hardened Products: Work will be completed on the project for final space qualification work and avoid the much higher cost of developing replacement products with an alternative supplier. The critical devices and technologies to be qualified: * Planar Diodes * Photodiodes * Phototransistors * Rad Hard By Design Bipolar Junction Transistors * Optocoupler devices * Surface Mount package diodes in UM packages * Insulated Gate Bipolar Transistors (IGBT) * Rad Hard MOSFET Devices			

Exhibit R-2A, RDT&E Project Justification: PB 2017 Office of the Secretary Of Defense		Date: February 2016
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
National Security Space Programs: Work will be completed on identifying cost drivers and develop improvements in space-based sensors that builds upon ManTech work on material for MCT infrared focal plane arrays. A new project will be initiated to preserve capability by manufacturing additional wafers targeting the performance requirements for space infrared sensors. High Performance Carbon Fiber: A number of specialized (high-strength and high modulus) carbon fibers are critical to manufacturing composite structures for all types of major U.S. space military and civilian programs (e.g., satellites, space launch vehicles, spacecraft and a wide ride range of missile systems). Key carbon fibers for these applications are unique, essential (not readily substitutable) and proprietary to a single producer/single factory in one foreign country (Japan). This foreign, single point-of-failure source of supply, of materials critical to essentially all major high priority space programs, is vulnerable to many severe and long-lasting supply disruption risks (e.g., natural disaster, industrial accidents, future Asia conflicts, foreign government controls and higher foreign commercial market priorities. Regarding the latter, U.S. program carbon fiber use typically represents a small fraction of total global demand. Carbon fibers recently developed in the U.S. and commercialized for civilian applications are promising alternatives to imports. They represent a competitive second source, a more assured supply, cost less, and reportedly perform equal to or better than imports. Historically, U.S. government programs have relied on single foreign sourced legacy materials and funding is often not available in government programs to test and qualify alternative second sources. FY 2016 IBAS funds will be used to test and qualify U.S. second sources of commercially available carbon fibers. With strong cooperation from industry primes, lower tier and material suppliers -- a significant list of promising U.S. government qualification program opportunities are identified for FY 2016 execution (e.g., multiple satellites, missiles and “other” systems). Planned IBAS projects represent low technology risks, have well defined and near-term program transition points and are low-cost relative to significant industry investments in new, domestically manufactured carbon fiber supplies.			
Title: Other Unique Industry Capabilities	4.144	4.236	4.405
Description: With an overall decline in defense budgets, the industrial base sectors and niches hit hardest are those with a combination of unique requirements and low, limited or declining production. ***FY 2015 Accomplishments:*** CounterBomber: A program to sustain a suicide bomber detection capability provided by the CounterBomber system was initiated. This IBAS implementation addressed the risk of the manufacturer leaving the market because of falling sales associated with decreased U.S. troop deployment. IBAS bridged the gap between rapid prototype and formal DoD production while facilitating additional improvements including lowering the system size, weight, power consumption and cost. Electromechanical Actuators: This project was initiated to preserve unique capabilities in the manufacture of precision Electromechanical Actuators and to establish a domestic ability to machine planetary roller screws, a component critical to the actuators’ performance. These actuators are needed to meet performance requirements for weapons and stores elevator systems			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
aboard the Gerald R. Ford Class of aircraft carriers. This unique manufacturing capability was at risk due to the interval between the first and second ships' material procurements. ***FY 2016 Plans:*** CounterBomber: The program to a sustain suicide bomber detection capability provided by the CounterBomber system will continue. During the first half of FY 2016, the Size, Weight and Power (SWAP) reduction effort will completed, as well as enhancements to the core CounterBomber technology which includes limited crowd scanning capabilities providing the US Government with a smaller, lighter, more resource efficient system at a lower acquisition cost, and having significant performance improvements that greatly expand the opportunities for employing this technology both domestically and abroad; implementation of AT hardware and software guards will ensure that the system can be continue utilized as a Force Protection asset to forward deployed US Armed Forces. Electromechanical Actuators: The project to preserve Electromechanical Actuator manufacturing capability for aircraft carrier weapons and stores elevator systems will continue through FY 2016. ***FY 2017 Plans:*** Critical Energetic Materials: Critical Energetic Materials: For the purpose of maintaining an adequate North American industrial base for critical key energetic materials and their pre-cursors, DOD will develop prototype manufacturing processes for many key energetic materials and their pre-cursors. Project phasing is expected to be: Phase 1 – Analysis of current technology/capability, Phase 2 – Develop a plan for a prototype manufacturing process, Phase 3 – Build the prototype manufacturing process, and Phase 4 – Provide samples of the materials with that manufacturing process. DoD will conduct additional industrial base assessments in FY 2016 to identify weaknesses and fragile and critical capabilities for FY 2017 project development. A Joint Industrial Base Working Group (JIBWG) Panel will rank the proposals, and the Deputy Assistant Secretary of Defense (DASD) for Manufacturing and Industrial Base Policy (MIBP) will make the final selection.			
Accomplishments/Planned Programs Subtotals	14.282	22.532	16.195

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2017 Office of the Secretary Of Defense		Date: February 2016
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E. Performance Metrics

Goal - Insert industrial base considerations consistently in program review:
To make informed investment and production decisions
To avoid reconstitution costs for capabilities that DoD will need again.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Office of the Secretary Of Defense			Date: February 2016
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Missile and Munitions Industrial Base Projects	Various	various : various	5.000	6.500		10.981		11.624		-		11.624	-	-	-
Space Sector Projects	Various	various : various	1.789	3.932		7.000		-		-		-	-	-	-
Other Defense Industrial Base Capability Projects	Various	various : various	2.500	3.526		4.222		4.237		-		4.237	-	-	-
		Subtotal	9.289	13.958		22.203		15.861		-		15.861	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Industrial Base Analysis Sustainment (IBAS) Program Management Services	MIPR	RDECOM, RDCB-DE : Rock Island, IL	0.349	0.324		0.329		0.334		-		0.334	-	-	-
		Subtotal	0.349	0.324		0.329		0.334		-		0.334	-	-	-

	Prior Years	FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	9.638	14.282		22.532		16.195		-		16.195	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Office of the Secretary Of Defense			Date: February 2016
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IBAS Project Plan

FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Solid Rocket Propulsion							
Butanetriol							
Infrared sensors							
	LEEFI						
	CounterBomber						
	Electronmechanical Actuators						
	Infrared sensors						
	Radiation Hardened Products						
	ESAD Fuzes						
	Thermal Batteries						
		Carbon Fiber					
		Mercury Cadmium Telluride					
			New Competed Project				

Exhibit R-4A, RDT&E Schedule Details: PB 2017 Office of the Secretary Of Defense		Date: February 2016
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
N/A				
Infrared Sensors	3	2014	4	2015
LEEFI	1	2015	4	2016
CounterBomber	1	2015	4	2016
Electromechanical Actuators	1	2015	4	2016
Infrared Sensors II	1	2015	4	2016
Radiation Hardened Electronic Components	1	2015	4	2016
ESAD Fuzes	1	2015	4	2019
Thermal Battery	1	2015	4	2019
High Strength High Modulus Carbon Fiber	1	2016	4	2017
Mercury Cadmium Telluride	1	2016	4	2017
Solid Rocket Motors				
Solid Rocket Motors	2	2016	4	2021
Critrical Energetic Materials				
Critiical Energetic Materials	1	2017	4	2018