Missile Defense Agency (MDA) Exhibit R-2 RDT&E Budget Item Justification	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603886C Ballistic Missile Defense System Interceptors**

COST ($ in Thousands)	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Total PE Cost	341,358	340,107	386,817	500,966	708,803	815,433	553,136
R213 Ballistic Missile Defense Interceptor Block 2014	318,240	0	0	0	0	0	0
WX13 Ballistic Missile Defense Interceptor Capability Development	0	326,636	375,667	483,490	688,524	791,734	536,637
0602 Program-Wide Support	23,118	0	0	0	0	0	0
ZX40 Program-Wide Support	0	13,471	11,150	17,476	20,279	23,699	16,499

Note: The content previously planned in Project R213 has been moved to Project WX13 beginning in FY08.

A. Mission Description and Budget Item Justification

A.1 System Element Description

The Kinetic Energy Interceptor (KEI) mission is to develop a mobile, multi-use (boost, ascent, midcourse) kinetic intercept capability to enhance the layered defense performance of the Ballistic Missile Defense System (BMDS). MDA plans to use an evolutionary, spiral approach to achieve increasingly greater and more robust capabilities over time. Our initial objective is to develop a single element configuration capable of intercepting exoatmospheric ballistic missiles in the boost, ascent, and midcourse phases of flight.

MDA modified the KEI program beginning in FY 2008 to focus on the FY 2009 knowledge point. At the planned knowledge point the agency will determine whether to accelerate, slow down, modify, or terminate the KEI development program. If the program continues, the agency will define the mission area and resulting intercept flight phase (boost, ascent, or midcourse) test sequence based on BMDS capability gaps and priorities. MDA will also determine the basing mode for KEI after its knowledge point. MDA's options for demonstration and deployment of a multi-use intercept capability include a deployable/land-mobile platform, land-fixed platform, and/or sea-mobile platform. While MDA will likely develop a land-mobile capability initially, it may transition to a sea-mobile platform to enhance basing flexibility and battle space access. The multi-use booster developed for the initial configuration will be compatible with multiple kill vehicle and boost kill vehicle payloads to improve BMDS counter-countermeasure performance.

The interceptor design is compatible with land-mobile, land-fixed, and sea-mobile operations and features a high performance booster designed to carry multiple payload types. The program will also leverage and build upon BMDS sensor and Command Control, Battle Management, and Communication capabilities. The KEI design adheres to Agency quality, safety, environmental and mission assurance standards and contains several unique design features including: direct downlink of overhead infrared sensor data to a mobile weapon system, advanced boost and early ascent phase target tracking and prediction algorithms, the ability to fuse data from multiple Overhead Non-Imaging Infra-Red and radar sensors, a fast

burning rocket motor for short engagement timelines, a high velocity at burnout with heavy payloads, and a large divert capability that enables early weapon commits even during threat maneuvers.

The KEI near term program emphasis is on component risk reduction and element engineering to ensure and enhance the ability of the KEI Weapon System to execute its objectives. The Agency's goal is to mitigate critical risk areas prior to making full budget commitments. The performance, manufacturing, and cost knowledge gained through knowledge points will drive investment decisions. The major knowledge points are: 1) real-time battle management and fire control tests with fully integrated BMDS sensors and Command Control, Battle Management, and Communication capabilities to verify our quick response timeline and engagement sequences; and 2) an integrated booster flight test to demonstrate booster capabilities. Risk reduction tests for the integrated booster flight test include a series of wind tunnel tests and booster first and second stage static firings. In addition to KEI program execution performance, other BMDS investment priorities and threat evolution will dictate budget adjustments. At knowledge-based decision points, the MDA Director will decide whether to continue the project as planned, terminate the effort, slow down the project, accelerate or reprioritize missions for the planned capabilities in pursuit of operational capability objectives.

A.2 System Element Budget Justification and Contribution to the Ballistic Missile Defense System (BMDS)

The intelligence community's ability to predict exactly what the ballistic missile threat will be in ten years is limited. The mobile KEI offer the warfighter and our Allies a responsive weapon capability to counter the rapid emergence of new adversaries, countermeasures, and tactics. When based in the United States or Allied country, a KEI battery can provide wide-area asymmetric defense coverage against any threat that flies outside the atmosphere. In a forward-based role, the warfighter can employ the KEI to cut off vulnerable attack corridors designed to exploit fixed site defenses. The strategic basing flexibility of the KEI is enhanced by its ability to engage targets with only space-based sensor support.

The KEI program provides a high confidence path to a boost phase defense layer and a flexible, forward-based midcourse capability for the BMDS. Prior to fielding a mobile, multi-use interceptor capability, critical capabilities developed by the KEI program will be provided to enhance the capabilities of the BMDS. Near term, KEI early threat typing, and rapid state vector generation and threat trajectory prediction capabilities will be integrated into BMDS Command Control, Battle Management, and Communication Test Beds to improve the effectiveness of existing BMDS weapon and sensor elements. The capability to quickly type and track threats with only overhead sensors will enhance the BMDS' ability to counter the short timelines and unpredictable launch areas of asymmetric threats, as well as extend defendable battlespace for the BMDS. A high performance, high mission assurance, and cost effective booster will enhance fixed-site BMDS capability following the KEI FY 2009 booster flight knowledge point.

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The KEI common booster is capable of carrying the Multiple Kill Vehicle and other advanced payloads needed to counter complex threats. The KEI's mobility, fast acceleration, and heavy lift capacity provide the ability to deliver these payloads early in the midcourse timeline. The early KEI engagements (boost or early midcourse), in combination with later Ground Based Interceptor or Aegis Ballistic Missile Defense engagements, provide additional layers of protection and increase effectiveness against countermeasures for the BMDS.

The KEI is a vital element of the layered BMDS. KEI's unique mobility and performance combination brings to the BMDS the capability to engage threats in the early, forward portion of the BMDS battlespace. The KEI ability to execute its suite of missions is enabled by a flexible fire control design that allows the interceptor to receive data from a diverse suite of ballistic missile defense sensors (land, sea, and space), fuse this information in real-time, and execute an effective intercept. By adding a kinetic boost phase intercept layer and flexible ascent/midcourse capabilities to future BMDS capabilities, Kinetic Energy Interceptors enable the MDA to pace the threat, fill performance gaps, and increase BMDS effectiveness.

A.3 Major System Element Goals

- Successfully complete development and test events in support of FY 2009 knowledge-based decision point
  - Verify battle management and fire control capabilities (timelines and engagement sequences) through multiple real-time battle management and fire control tests with fully integrated BMDS sensor and C2BMC capabilities
  - Conduct a series of wind tunnel and booster (first and second stage) static firing test events
  - Conduct an integrated booster flight test by 3rd quarter FY 2009 with a booster design that is traceable to the tactical design
- Design multi-use booster capability in close collaboration with the Agency Systems Engineering team
- Demonstrate land-fixed midcourse intercept capabilities in flight test
- Demonstrate mobile multi-use (boost, ascent, midcourse) intercept capabilities in flight test following the Agency's decision to complete development of the mobile interceptor capability

A.4 Major Events Schedule and Description

Major Event	Project	Timeframe	Description
Flight Test			
Interceptor			
Conduct Partial Full Scale (PFS) Test (FTK-02)	WX13	2Q FY 2011	• Ejection launch from KEI all up round canister • Interceptor flight with ballast to full vehicle weight • Verify prototype avionics performance • Accelerated with FY08 funding (previously 1QFY12)
Other			

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Major Event	Project	Timeframe	Description
Element Engineering			
Conduct KEI Payload System Requirements Review	WX13	4Q FY 2008	• Establish initial requirements for integration of multiple kill vehicle capability with kinetic energy interceptor
Kinetic Energy Interceptors Knowledge Point Events			
Booster Flight One Test (FTK-01)	WX13	3Q FY 2009	• Verify booster performance • Stage 2 Technical Issues have caused 8 month delay (previously 4QFY08)
Element Engineering			
Conduct Control Test Vehicle Flight Test (FTK-03)	WX13	3Q FY 2012	• Interceptor fight with mass mock up Kill Vehicle • Accelerated with FY08 funding (previously 1QFY13)
Other			
Interceptor			
Complete booster wind tunnel tests	R213	2Q FY 2007	• Validate performance under varied environments and loads • Completed
Stage 1 Rocket Motor Static Fire One	R213	3Q FY 2007	• Validate performance under varied environments and loads • Completed
Stage 1 Rocket Motor Static Fire Two	R213	4Q FY 2007	• Validate performance under varied environments and loads • Completed
Stage 2 Rocket Motor Static Fire One	WX13	1Q FY 2008	• Validate performance under varied environments and loads • Completed
Stage 2 Rocket Motor Static Fire Two	WX13	4Q FY 2008	• Validate performance under varied environments and loads • Delayed for case winding and nozzle corrective actions (previously 1QFY08)
Stage 1 Rocket Motor Static Fire Four	WX13	1Q FY 2009	• Validate performance under varied environments and loads • Delayed for case winding corrective actions (previously 3QFY08)
Stage 1 Rocket Motor Static Fire Three	WX13	1Q FY 2009	• Validate performance under varied environments and loads • Delayed for case winding corrective actions (previously 2QFY08)
Stage 2 Rocket Motor Static Fire Four	WX13	2Q FY 2009	• Validate performance under varied environments and loads • Delayed for case winding and nozzle corrective actions (previously 4QFY08)
Stage 2 Rocket Motor Static Fire Three	WX13	2Q FY 2009	• Validate performance under varied environments and loads • Delayed for case winding and nozzle corrective actions (previously 3QFY08)
Stage 1 Rocket Motor Static Fire Five	WX13	3Q FY 2011	• Validate performance under varied environments and loads • Objective system design work delayed to align with MKV (previously 4QFY09)
Stage 2 Rocket Motor Static Fire Five	WX13	3Q FY 2011	• Validate performance under varied environments and loads • Objective system design work delayed to align with MKV (previously 4QFY09)
Stage 1 Rocket Motor Static Fire Six	WX13	4Q FY 2011	• Validate performance under varied environments and loads • Objective system design work delayed to align with MKV (previously 1QFY10)

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Major Event	Project	Timeframe	Description
Stage 2 Rocket Motor Static Fire Six	WX13	4Q FY 2011	• Validate performance under varied environments and loads • Objective system design work delayed to align with MKV (previously 1QFY10)
Element Engineering			
Support BMD System Concept Review	R213	3Q FY 2007	• Establish element contributions to future BMDS capabilities • Completed
Weapon System Element Level System Design Review	WX13	3Q FY 2009	• Establish payload, multi-use booster, and mobile element requirements • Previously only a requirements review scheduled for 1QFY09, now a design review
Weapon System Component System Design Review	WX13	4Q FY 2009	• Establish component level designs
Government System Engineering & Program Management			
Sea Mobile Alternatives Assessment	R213	2Q FY 2007 - 4Q FY 2007	• Determine, jointly with the Navy, the most appropriate sea-mobile platform

B. Program Change Summary	FY 2007	FY 2008	FY 2009
Previous President's Budget (FY 2008 PB)	356,004	227,499	393,317
Current President's Budget (FY 2009 PB)	341,358	340,107	386,817
Total Adjustments	-14,646	112,608	-6,500
Congressional Specific Program Adjustments	0	114,954	0
Congressional Undistributed Adjustments	0	-2,346	0
Reprogrammings	-9,353	0	0
SBIR/STTR Transfer	-5,293	0	0
Adjustments to Budget Years	0	0	-6,500

FY 2007 decrease of $14.646 million includes SBIR/STTR transfer and MDA reprogrammings.

FY08 increase of $112.608 million includes a Congressionally specific program increase of $114.954 million and a portion of the MDA Congressional undistributed reduction.

FY09 decrease of $6.5 million reflects MDA programmatic changes to support program requirements.

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COST ($ in Thousands)	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
R213 Ballistic Missile Defense Interceptor Block 2014	318,240	0	0	0	0	0	0
RDT&E Articles Qty	1	0	0	0	0	0	0

Note: The Ballistic Missile Defense Interceptors program is continued under project WX13 in FY08-13.

RDT&E Articles: FY07 - Booster Flight One - First and Second stage motors with ballast third stage (1).

A. Mission Description and Budget Item Justification

The Kinetic Energy Interceptors program is developing and testing fixed and mobile interceptor and fire control capabilities for the Agency's next generation kinetic interceptors capable of intercepting ballistic missiles in boost, early ascent, and midcourse. A single interceptor design is compatible with land-mobile, sea-mobile, and land-fixed basing, and the interceptor is designed to accommodate multiple payload types. Kinetic Energy Interceptors rely on distributed external sensors and flexible communication capabilities to deliver responsive layered defensive capabilities to the BMDS. The program execution focus through FY 2009 is weapon system architecture and requirements and the completion of booster and fire control knowledge point events that conclusively demonstrate the programs' readiness to proceed to intercept flight testing and Ballistic Missile Defense System integration. The knowledge point decision is supported by a campaign of real-time battle management and fire control tests conducted in FY 2006 and an integrated booster flight test in FY 2009. Risk reduction events leading to the booster flight include ten static rocket motor firings (five Stage 1 and five Stage 2) and wind tunnel testing of the interceptor air frame. The knowledge point development and testing, along with parallel objective element design, is enabled by a disciplined systems engineering effort across all the integrated product teams.

The Kinetic Energy Interceptors development and test effort is comprised of interceptor, fire control and communications, launcher, integration and test, element engineering, government systems integration and test work packages, and government systems engineering and program management.

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B. Accomplishments/Planned Program

	FY 2007	FY 2008	FY 2009
Interceptor	177,343	0	0
RDT&E Articles (Quantity)	1	0	0

The FY 2007 interceptor component development and test activities build on the successful FY 2006 Stage 1 and 2 Proof of Concept static motor firings and focus on the essential efforts required to fly a tactically representative booster in FY 2009. These activities include extensive ground testing and integration of key components (rocket motors, thrust vector control units, avionics and software, etc.) necessary to demonstrate the booster capability with a high probability of mission success. The knowledge gained from the FY 2009 booster flight will be used to engineer a multi-use interceptor that is producible, reliable, and affordable. This capability will be demonstrated through an increasingly complex set of ground and flight tests ranging from static motor firings to fully integrated intercept tests.

FY 2007 Accomplishments:
RDT&E Articles: Booster Flight One - First and Second stage motors with ballast third stage (1)

- Initiated procurement of long-lead hardware for the FY 2009 Booster Flight One (BMDS event designation, FTK-01) test article
- Completed booster hypersonic wind tunnel test series
- Conducted subsystem pre-Critical Design Review gate reviews to define the detailed configuration of the Booster Flight One test article
- Conducted two Stage 1 rocket motor static firings, one at nominal temperature and the other at 90 degrees F
- Initiated integrated ground testing of the Booster Flight One (FTK-01) avionics and associated software and Electrical Ground Support Equipment
- Executed ground testing of the Stage 1 to Stage 2 stage separation hardware to validate separation performance analysis
- Completed integration of Stage 2 rocket motor in preparation for conducting Stage 2 rocket motor static fire 1
- Conducted bench testing of thrust vector control actuators to validate performance predictions
- Began fabrication and test of Booster Flight One (FTK-01) hardware
- Provided Interceptor component input to the BMD System Concept Review
- Initiated qualification testing of avionics components

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	FY 2007	FY 2008	FY 2009
Fire Control and Communications	20,064	0	0
RDT&E Articles (Quantity)	0	0	0

The fire control and communications component development and test activities include execution of near-term activities to reduce risk associated with BMDS interface definition, fire control algorithm performance and robustness, internal and external communication latencies, and false alarm rate. Risk reduction work includes building a prototype Kinetic Energy Interceptor Fire Control shelter and testing data fusion and decision software with live overhead infrared and radar sensor data.

FY 2007 Accomplishments:

- Provided Fire Control and Communications component input to the BMD System Concept Review
- Participated in comprehensive Overhead Non-Imaging Infrared (ONIR) algorithm assessment with MDA/SN and DE to evaluate the utility of overhead assets for BMDS applications in the near term
- Completed a formal study to address how to capitalize on algorithm development work and developed a transition plan for cueing BMDS radars. Planned brief to MDA Director
- Fire Control and Communications component development deferred pending Knowledge Point decision

	FY 2007	FY 2008	FY 2009
Launcher	6,342	0	0
RDT&E Articles (Quantity)	0	0	0

The near term land-mobile launcher development and test activities include launcher requirements definition, top-level design, and interface definition to establish Kinetic Energy Interceptor System requirements.

FY 2007 Accomplishments:

- Completed launcher concept design update trades and functional requirements analyses
- Provided Launcher component input to the BMD System Concept Review.
- Launcher component development deferred pending Knowledge Point decision

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	FY 2007	FY 2008	FY 2009
Integration and Test	12,938	0	0
RDT&E Articles (Quantity)	0	0	0

The Kinetic Energy Interceptor integration and test responsibilities include developmental master test planning, coordination of test range interfaces, integration facility planning and design, integration facility construction, environmental analyses and documentation, and manufacturability planning.

FY 2007 Accomplishments:

- Performed detailed range resource and safety planning and coordination for Booster Flight One (FTK-01)
- Drafted Facility Requirements Documents for Kinetic Energy Interceptors
- Generated test range requirements for inclusion in the Program Requirements Document (PRD)
- Initiated long-lead range resource, safety, and environmental planning and coordination for flight tests that follow the FY 2009 knowledge point: Partial Full Scale (FTK-02), and Control Test Vehicle (FTK-03)
- Initiated monthly Integration and Test Working Group to identify and work range issues

	FY 2007	FY 2008	FY 2009
Element Engineering	82,279	0	0
RDT&E Articles (Quantity)	0	0	0

The Kinetic Energy Interceptors element engineering activities include all prime contractor program management operations, capability and interface specification development and flow-down, operations concept definition, element-level design trades, engagement sequence definition, element analyses and performance assessments, target of opportunity analysis to reduce key program risks such as tracking and discrimination, configuration control and change management, manufacturing, quality, affordability and risk-reduction, simulation development, and collaborative engineering planning and management with the Kinetic Energy Interceptor integrated product teams and key Agency organizations (Systems Engineering, Sensors, and Command, Control, Battle Management and Communications).

FY 2007 Accomplishments:

- Provided analysis across performance trade spaces for the BMD System Concept Review to establish specific BMDS performance gaps to be filled by Kinetic Energy Interceptors
- Continued development of Kinetic Energy Interceptors Test Bed Description Document, System Specification, and Element Capability and Interface Specifications

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- Continued update of draft element top level (A-level) design specification and flow down to component integrated product teams
- Continued to update simulations to support the 2008 Nimble Titan Wargame
- Delivered Kinetic Energy Interceptors Simulation to support analysis of Boost/Ascent Phase mission
- Supported MDA Joint Engineering efforts with MDA/DE/MK/GM to work common solutions to payloads and interceptor avionics

	FY 2007	FY 2008	FY 2009
Government Systems Integration & Test	1,111	0	0
RDT&E Articles (Quantity)	0	0	0

The Government Systems Integration and Test effort includes test range planning and environmental compliance.

FY 2007 Accomplishments:
The following Environmental Documentation was completed:

- Record of Environmental Consideration for Stage 2 motor static fires at Elkton, MD
- Environmental Baseline Survey for buildings 6527 and 1611 at Vandenberg Air Force Base (VAFB), CA
- Final Description of Proposed Actions and Alternatives
- Noise impact study for launch event (FTK-01) at VAFB, CA

The following Flight Test Planning activity was completed:

- Secured facility from VAFB Space Use Panel to use for FTK-01 flight test vehicle integration test and checkout
- Initiated the formal Facility Permitting process with Air Force Space Command for use of VAFB integration facility
- Identified and initiated the required facility upgrades to support the FTK-01 flight vehicle activities at VAFB, CA
- Submitted the KEI Program Requirements Document to VAFB, CA, requesting range services and assets to support the FTK-01 test event
- Identified and submitted formal beddown request for flight vehicle integration and checkout facility at VAFB, CA, to support FTK-02 and FTK-03 flight test vehicles under MDA 5-Year Site Survey visit

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	FY 2007	FY 2008	FY 2009
Government Systems Engineering and Program Management	18,163	0	0
RDT&E Articles (Quantity)	0	0	0

The Government Systems Engineering and Program Management effort includes the program office, service laboratory and intelligence agency generation of threat data packages for the Kinetic Energy Interceptors development and test contract, BMDS interface definition and implementation support outside the Kinetic Energy Interceptor program office, participation in ballistic missile defense wargames, off-contract technology risk reduction efforts, and off-contract special studies such as congressional reports and the sea-based alternatives assessment.

FY 2007 Accomplishments:

- Participated in the BMD System Concept Review to establish specific BMDS performance gaps to be filled by Kinetic Energy Interceptors
- Continued, jointly with the Navy, a Kinetic Energy Interceptor Sea-Mobile Platform Alternatives Assessment to determine the most appropriate Kinetic Energy Interceptor sea-mobile platform
- Updated Kinetic Energy Interceptors sections of BMDS Test Bed Description Document and System Specification in collaboration with MDA Systems Engineering team and based on the results of the BMD System Concept Review
- Updated boost, ascent, and midcourse threat data package deliverables to Kinetic Energy Interceptors prime contractor to support the BMD System Concept Review and Weapon Element System Requirements Review

C. Other Program Funding Summary

	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	Total Cost
PE 0207998C BRAC	0	103,219	159,938	61,931	8,724	0	0	333,812
PE 0603175C Ballistic Missile Defense Technology	183,849	108,423	118,718	115,234	120,152	127,012	130,358	903,746
PE 0603881C Ballistic Missile Defense Terminal Defense Segment	1,082,454	1,045,276	1,019,073	795,659	719,847	548,283	439,752	5,650,344
PE 0603882C Ballistic Missile Defense Midcourse Defense Segment	2,985,140	2,243,213	2,209,262	2,276,848	1,385,258	946,437	1,103,532	13,149,690
PE 0603883C Ballistic Missile Defense Boost Defense Segment	622,218	510,241	421,229	423,927	652,642	799,792	991,839	4,421,888
PE 0603884C Ballistic Missile Defense Sensors	514,989	586,121	1,221,143	1,184,280	1,099,649	1,077,632	823,583	6,507,397
PE 0603888C Ballistic Missile Defense Test and Targets	584,615	621,861	673,691	672,976	690,938	708,991	719,209	4,672,281
PE 0603890C Ballistic Missile Defense System Core	425,889	413,934	432,262	482,947	605,219	561,947	571,498	3,493,696

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	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	Total Cost
PE 0603891C Special Programs - MDA	347,377	196,892	288,315	304,234	538,050	818,136	786,349	3,279,353
PE 0603892C Ballistic Missile Defense Aegis	1,125,426	1,126,337	1,157,783	1,234,220	1,078,539	1,066,712	1,102,542	7,891,559
PE 0603893C Space Tracking & Surveillance System	311,402	231,528	242,441	266,509	560,130	735,727	938,191	3,285,928
PE 0603894C Multiple Kill Vehicle	133,615	229,943	354,455	488,294	649,632	708,582	879,385	3,443,906
PE 0603895C BMD System Space Program	0	16,552	29,771	41,638	56,199	133,915	157,548	435,623
PE 0603896C BMD C2BMC	249,179	447,616	289,277	287,194	270,762	256,767	259,159	2,059,954
PE 0603897C BMD Hercules	46,268	52,462	55,955	55,289	56,400	51,902	52,784	371,060
PE 0603898C BMD Joint Warfighter Support	49,833	49,394	69,982	73,997	77,205	80,168	81,948	482,527
PE 0603904C Missile Defense Integration & Operations Center	104,389	78,557	96,404	100,437	100,366	101,512	102,840	684,505
PE 0603905C BMD Concurrent Test and Operations	21,870	0	0	0	0	0	0	21,870
PE 0603906C Regarding Trench	0	1,986	2,978	4,964	4,963	8,933	8,933	32,757
PE 0603907C Sea Based X-Band Radar (SBX)	0	165,243	0	0	0	0	0	165,243
PE 0605502C Small Business Innovative Research - MDA	142,510	0	0	0	0	0	0	142,510
PE 0901585C Pentagon Reservation	15,527	6,019	19,734	5,040	5,284	5,370	5,456	62,430
PE 0901598C Management Headquarters - MDA	93,350	80,392	86,453	70,355	69,855	69,855	69,855	540,115

D. Acquisition Strategy

The Kinetic Energy Interceptors development and test acquisition strategy focuses on developing gap-filling, multi-use kinetic energy capabilities for strategically deployable land-mobile, sea-mobile, and land-fixed platforms. The Kinetic Energy Interceptor element is being developed under a single prime contractor selected competitively at the start of development. The revised acquisition strategy for Kinetic Energy Interceptors is for payloads to be budgeted and developed under other BMDS elements that deliver each payload for integration into the Kinetic Energy Interceptors element. Initial testing of the Kinetic Energy Interceptor booster will be from a land-fixed site. The FY 2005 through FY 2009 development verification test results mitigate critical program risks, and provide the agency very detailed design, performance, cost, and programmatic knowledge to support the FY 2009 knowledge point decision. This strategy also implements early proofing of critical manufacturing processes as an integral part of the design process. The payoff for these up front program investments in systems engineering, full scale risk reduction testing, and manufacturing process development is reduced redesign and retest, fewer test failures as well as lowered manufacturing cost. The strategy will utilize Engineering and Manufacturing Readiness Levels and Software Readiness Levels as maturity and risk indicators for proceeding forward with detailed design, building flight hardware and having a production off-ramp.

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: February 2008
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I. Product Development Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Interceptor								
Interceptor	C/CPAF	Raytheon, Tucson, AZ	283,509	0	N/A	0	N/A	283,509
Fire Control and Communications								
Fire Control and Communications	C/CPAF	Northrop Grumman, Huntsville, AL/Boulder, CO	55,753	0	N/A	0	N/A	55,753
Launcher								
Launcher	C/CPAF	Northrop Grumman, Sunnyvale, CA	25,367	0	N/A	0	N/A	25,367
Integration and Test								
Integration & Test	C/CPAF	Northrop Grumman, El Segundo, CA	17,536	0	N/A	0	N/A	17,536
Element Engineering								
Contractor Element Engineering	C/CPAF	Northrop Grumman, Fairfax, VA	101,610	0	N/A	0	N/A	101,610
Government Systems Engineering and Program Management								
Subtotal Product Development			483,775	0		0		483775

Remarks

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603886C Ballistic Missile Defense System Interceptors

II. Support Costs Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Government Systems Engineering and Program Management								
Civilian Salaries		Missile Defense Agency, Huntsville, AL	2,440	0	N/A	0	N/A	2,440
Government Travel		Missile Defense Agency, Huntsville, AL	1,629	0	N/A	0	N/A	1,629
SETA	C/FFP	MEI, Huntsville, AL	15,990	0	N/A	0	N/A	15,990
KEI BMDS Interfaces	C/CPAF	Northrop Grumman, Fairfax, VA	23,645	0	N/A	0	N/A	23,645
Sea Based	MIPR	NSWC, Dahlgren, VA / NSWC, Carderock, MD/ NAVSEA, Washington, DC	8,698	0	N/A	0	N/A	8,698
FFRDC	MIPR	MITRE, Corp, McLean, VA	86	0	N/A	0	N/A	86
Information Assurance	FFRDC	MITRE, Corp	585	0	N/A	0	N/A	585
Subtotal Support Costs			53,073	0		0		53073

Remarks

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603886C Ballistic Missile Defense System Interceptors

III. Test and Evaluation Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Government Systems Integration & Test								
NEPA	MIPR	SMDC, Huntsville, AL	390	0	N/A	0	N/A	390
HTSA	MIPR	VAFB, CA	80	0	N/A	0	N/A	80
Test Infrastructure	MIPR	VAFB, CA	407	0	N/A	0	N/A	407
Stage 1 & 2 Separation Analysis	MIPR	AMCOM	1,275	0	N/A	0	N/A	1,275
Lethality	FFRDC	Sandia National Lab	150	0	N/A	0	N/A	150
Project Hercules Red Team	MIPR	MDA/DV	500	0	N/A	0	N/A	500
Subtotal Test and Evaluation			2,802	0		0		2802

Remarks

IV. Management Services Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Subtotal Management Services								

Remarks

Project Total Cost			539,650	0		0		539,650

Remarks

Missile Defense Agency (MDA) Exhibit R-4 Schedule Profile

Date: **February 2008**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**

R-1 NOMENCLATURE: **0603886C Ballistic Missile Defense System Interceptors**

Fiscal Year	2007				2008				2009				2010				2011				2012				2013			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Interceptor																												
Complete booster wind tunnel tests		▲																										
Stage 1 Rocket Motor Static Fire One			▲																									
Booster Flight One Subsystem Pre-CDR Gate Reviews				▲																								
Stage 1 Rocket Motor Static Fire Two				▲																								
Integration and Test																												
Initiate Program Environmental Assessment		▲																										
Initiate Facility Upgrades for FTK-01 Facility				▲																								
Secure Facility Permit for FTK-01				▲																								
Select Existing Integration Facility for FTK-02&03				▲																								
Government System Engineering & Program Management																												
Sea Mobile Alternatives Assessment		▲	—	▲																								
Element Engineering																												

Legend

▲	Significant Event (complete)	△	Significant Event (planned)
★	Milestone Decision (complete)	☆	Milestone Decision (planned)
◆	Element Test (complete)	◇	Element Test (planned)
▼	System Level Test (complete)	▽	System Level Test (planned)
▲—	Complete Activity	△—	Planned Activity

Missile Defense Agency (MDA) Exhibit R-4 Schedule Profile

Date
February 2008

APPROPRIATION/BUDGET ACTIVITY
RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)

R-1 NOMENCLATURE
0603886C Ballistic Missile Defense System Interceptors

Fiscal Year	2007				2008				2009				2010				2011				2012				2013			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Element Engineering																												
Support BMD System Concept Review			▲																									

Legend

▲	Significant Event (complete)	△	Significant Event (planned)
★	Milestone Decision (complete)	☆	Milestone Decision (planned)
◆	Element Test (complete)	◇	Element Test (planned)
▼	System Level Test (complete)	▽	System Level Test (planned)
▲▲	Complete Activity	△△	Planned Activity

Missile Defense Agency (MDA) Exhibit R-4A Schedule Detail	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603886C Ballistic Missile Defense System Interceptors

Schedule Profile	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Interceptor							
Complete booster wind tunnel tests	2Q						
Stage 1 Rocket Motor Static Fire One	3Q						
Booster Flight One Subsystem Pre-CDR Gate Reviews	4Q						
Stage 1 Rocket Motor Static Fire Two	4Q						
Integration and Test							
Initiate Program Environmental Assessment	2Q						
Initiate Facility Upgrades for FTK-01 Facility	4Q						
Secure Facility Permit for FTK-01	4Q						
Select Existing Integration Facility for FTK-02&03	4Q						
Government System Engineering & Program Management							
Deliver Boost/Ascent/Midcourse threat data package	2Q						
Generate KEI sections of TBDD & TBSS with MDA/SE	3Q						
Support BMD SCR	3Q						
Update test bed description document	3Q						
Sea Mobile Alternatives Assessment	2Q-4Q						
Element Engineering							
Support BMD System Concept Review	3Q						

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603886C Ballistic Missile Defense System Interceptors**

COST ($ in Thousands)	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
WX13 Ballistic Missile Defense Interceptor Capability Development	0	326,636	375,667	483,490	688,524	791,734	536,637
RDT&E Articles Qty	0	0	1	1	1	1	1

Note: This project continues the Ballistic Missile Defense System Interceptors program executed under project R213 in FY06 and FY07 and planned in PB08 project 0520 for FY08-13.

Project R213 sub-sections for Launcher, Fire Control & Communications, and Integration & Test have been combined into the Project WX13 sub-sections for Element Engineering due to the near-term focus on interceptor development. Launcher, Fire Control & Communications, and Integration & Test work required to support the development path to a mobile interceptor capability are contained within the Element Engineering sub-section. Also, the sub-section for Government Integration and Test has been folded into the Government Systems Engineering and Program Management sub-section. Government Integration and Test work to support development flight testing and integrated (intercept) flight testing is contained within the Government Systems Engineering and Program Management sub-section.

RDT&E Articles: FY09 - Partial Full Scale (FTK-02) - Spare First and Second stage motors from Booster Flight One with prototype avionics module and mock payload (1). FY10 - Control Test Vehicle One (FTK-03) - Prototype avionics, mock payload, and third stage (1). FY11 - Control Test Vehicle Two (FTK-04) - Full avionics module, full capability third stage, and mass simulator of MKV payload (1). FY12 - MKV Characterization Flight (MCF) Test (FTK-05) - Full avionics module, full capability third stage, and MKV payload. FY13 - MKV Flight (FTK-06) - Full interceptor flight with target (1).

A. Mission Description and Budget Item Justification

The Kinetic Energy Interceptors (KEI) mission is to develop a mobile, multi-use (boost, ascent, midcourse) kinetic intercept capability to enhance the layered defense performance of the Ballistic Missile Defense System (BMDS). MDA plans to use an evolutionary, spiral approach to achieve increasingly greater and more robust capabilities over time. Our initial objective is to develop a single element configuration capable of intercepting exoatmospheric ballistic missiles in the boost, ascent, and midcourse phases of flight. The program execution focus through FY 2009 is the completion of the booster knowledge point event that conclusively demonstrates the programs' readiness to proceed to intercept flight testing and Ballistic Missile Defense System integration. Risk reduction events leading to the booster flight include ten static rocket motor firings (five Stage 1 and five Stage 2) and wind tunnel testing of the interceptor air frame. The knowledge point development and testing, along with parallel objective element design, is enabled by a disciplined systems engineering effort across all the integrated product teams.

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603886C Ballistic Missile Defense System Interceptors**

At the planned knowledge point the agency will determine whether to accelerate, slow down, modify, or terminate the KEI development program. If the program continues the agency will define the mission area and resulting intercept flight phase (boost, ascent, or midcourse) test sequence based on BMDS capability gaps and priorities. MDA will also determine the basing mode for KEI after its knowledge point. MDA's options for demonstration and deployment of a multi-use intercept capability include a deployable/land-mobile platform, land-fixed platform, and/or sea-mobile platform. While MDA will likely develop a land-mobile capability initially, it may transition to a sea-mobile platform to enhance basing flexibility and battle space access. The multi-use booster developed for the initial configuration may also be mated in the future with discrimination payloads to improve BMDS counter-countermeasure performance.

The Kinetic Energy Interceptors development and test effort is comprised of interceptor development, element engineering, and government system engineering and program management work packages. Ongoing work to maintain the path to a mobile interceptor capability and integration and test work to support booster development flight tests are included in Element Engineering.

B. Accomplishments/Planned Program

	FY 2007	FY 2008	FY 2009
Interceptor	0	207,455	254,168
RDT&E Articles (Quantity)	0	0	1

The FY 2008 interceptor component development and test activities are heavily focused on the flight test of a tactically representative booster in the third quarter of FY 2009. These activities include extensive ground testing and integration of key components (rocket motors, thrust vector control units, avionics and software, etc.) necessary to demonstrate the booster capability with a high probability of mission success. The knowledge gained from a successful booster flight will be directly leveraged to engineer a multi-use interceptor that is both producible and reliable. This capability will be demonstrated through an increasingly complex set of ground and flight tests ranging from static motor firings to fully integrated intercept tests.

FY 2008 Planned Program:

- Conduct two Stage 2 Static Rocket Motor Firing to validate rocket motor performance in increasingly demanding environments
- Complete Draft Booster Prime Item Development Specification

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603886C Ballistic Missile Defense System Interceptors**

FY 2009 Planned Program:
RDT&E Articles: FY 2009 - Partial Full Scale (FTK-02) - Spare First and Second stage motors from Booster Flight One with prototype avionics module and mock payload (1).

- Conduct two Stage 1 Static Rocket Motor firing to validate performance in increasingly demanding environments
- Conduct two Stage 2 Static Rocket Motor firing to validate performance in increasingly demanding environments

	FY 2007	FY 2008	FY 2009
Element Engineering	0	93,780	86,811
RDT&E Articles (Quantity)	0	0	0

The Kinetic Energy Interceptors element engineering activities include all prime contractor program management operations, capability and interface specification development and flow-down, operations concept definition, element-level design trades, engagement sequence definition, element analyses and performance assessments, target of opportunity analysis to reduce key program risks such as tracking and discrimination, configuration control and change management, manufacturing, quality, affordability and risk-reduction, simulation development, and collaborative engineering planning and management with the Kinetic Energy Interceptor integrated product teams and key Agency organizations (Systems Engineering, Sensors, and Command, Control, Battle Management and Communications). The near term focus of element engineering is a cost effective, high mission assurance land-fixed interceptor capability. Element engineering for a mobile interceptor capability will occur in parallel to the degree necessary to ensure the land-fixed interceptor is compatible with planned mobile launcher and fire control and communications components. Integration and Test work in support of development and integrated flight tests is also part of element engineering. System engineering will focus on developing common booster configurations and common payload interfaces to support boost, ascent, and midcourse missions.

FY 2008 Planned Program:

- Conduct KEI Payload System Requirements Review to establish common payload requirements that incorporate MDA core standards and logistics design considerations and preserve land-fixed element, and mobile element capability.
- Coordinate and define BMDS and KEI architectures with MDA/DE and MDA/BC
- Joint engineering/analysis and component development and test efforts for payload System Requirements Reviews
- Update element capability and interface specifications
- Initiate risk reduction efforts for the CG(X) Modular Launch System; studies, assessments, and interface definitions will be conducted against existing MK57 and Standard Missile class launch eject systems
- Initiate risk reduction work for common payload development
- Establish a robust model and simulation capability for weapon system performance trades

- Update Developmental Master Test Plan
- Develop Partial Full Scale (FTK-02) Program Plan
- Perform detailed range resource and safety planning and coordination for Booster Flight One (FTK-01)
- Initiate and complete design activity for Partial Full Scale (FTK-02) and Control Test Vehicle (FTK-03) integration and checkout facility modification and repair
- Execute FTK-01 Pathfinder integration, checkout and test operations
- Define and identify Government Furnished Equipment required to support FTK-02 and FTK-03 integration at Vandenberg Air Force Base
- Initiate planning for the Booster System Integration Laboratory

FY 2009 Planned Program:

- Conduct Weapon System Element Level System Design Review
- Conduct Weapon System Component System Design Reviews
- Conduct mobility risk reduction work to include C-Band Spectrum compatibility testing; midcourse fire control algorithm upgrades; and midcourse software architecture planning and initial software prototype development that includes a framework to add a future boost capability that also leverages and incorporates late midcourse GMD fire control functionality
- Complete Kinetic Energy Interceptors system specification, and element capability and interface specifications
- Validate and verify model and simulation capability to support weapon system performance
- Deliver Kinetic Energy Interceptors Simulation to support Weapon Element System Design Review
- Update Developmental Master Test Plan
- Initiate long-lead range resource and safety and environmental planning and coordination for Partial Full Scale (FTK-02) and Control Test Vehicle (FTK-03) flight tests
- Conduct Booster Flight One (FTK-01) test to validate and demonstrate the performance of the Kinetic Energy Interceptor booster
- Provide required FTK-01 post-test reports
- Initiate and complete modification and repair activity for FTK-02 and FTK-03 integration and checkout facility
- Initiate design activity at Hill Air Force Base for FTK-04 and FTK-05 integration and checkout facility modification and repair
- Define and identify Government Furnished Equipment required to support FTK-04 and FTK-05 integration at Hill Air Force Base

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603886C Ballistic Missile Defense System Interceptors**

	FY 2007	FY 2008	FY 2009
Government Systems Engineering and Program Management	0	25,401	34,688
RDT&E Articles (Quantity)	0	0	0

The Government Systems Engineering and Program Management effort includes the program office, service laboratory and intelligence agency generation of threat data packages for the Kinetic Energy Interceptors development and test contract, BMDS interface definition and implementation support outside the Kinetic Energy Interceptor program office, participation in ballistic missile defense wargames, off-contract technology risk reduction efforts, and off-contract special studies.

The Kinetic Energy Interceptor is designed as a multi-use land/sea all-up round. The interceptor dimensions and safety features such as a gas eject launch make it compatible with surface combatants, submarines, and large non-combatant ships. In FY 2005 we completed a joint study with the Navy on the concept of operations and feasibility of the sea-mobile multi-use mission. In FY 2006, FY 2007, and FY 2008 we will complete a joint KEI Sea-Mobile Platform Alternatives Assessment to decide on a KEI sea-mobile platform strategy which will allow us to begin platform-specific planning, system engineering, and risk reduction to facilitate a smooth start on future sea-mobile development and test.

The Government Integration and Test work for test range planning and event support and environmental compliance are included under Government Systems Engineering and Program Management.

FY 2008 Planned Program:

- Update Kinetic Energy Interceptors sections of BMDS System Specification Description Document and System Specification in collaboration with MDA Systems Engineering team
- Participate in Nimble Titan and Joint Project Optic Windmill Wargames
- Analyze relevant Targets of Opportunity test data and incorporate results into Kinetic Energy Interceptors simulations and engineering notebooks
- Complete Sea-Mobile Alternatives Assessment study
- Complete and deliver the Pre-Launch Operation Requirements Document for Booster Flight One (FTK-01) to Vandenberg Air Force Base
- Complete and deliver the Program Introduction for FTK-02 through FTK-04 to Vandenberg Air Force Base
- Establish Memorandum of Agreement with the US Army Corps of Engineers to provide design surveillance activity for the FTK-02 and FTK-03 facility
- Complete and publish the Kinetic Energy Interceptors Phase 1 Environmental Assessment
- Conduct required MDA test reviews for FTK-01
- Provide required Environmental Documentation for Stage 2 motor static fires at Arnold Engineering Development Center

FY 2009 Planned Program:

- Update Kinetic Energy Interceptors sections of BMDS System Specification
- Participate in Nimble Titan Wargame
- Analyze relevant Targets of Opportunity test data and incorporate results into Kinetic Energy Interceptors simulations and engineering notebooks
- Complete and deliver the Launch Operation Requirements Document for FTK-01 to Vandenberg Air Force Base
- Conduct final MDA test reviews for FTK-01
- Establish Memorandum of Agreement with the US Army Corps of Engineers to provide construction surveillance activity for FTK-02 and FTK-03 integration facility
- Establish Memorandum of Agreement with the US Army Corps of Engineers to provide design surveillance activity for FTK-04 and FTK-05 integration facility
- Return FTK-01 integration facility to acceptable condition for turnover to Vandenberg Air Force Base

C. Other Program Funding Summary

	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	Total Cost
PE 0207998C BRAC	0	103,219	159,938	61,931	8,724	0	0	333,812
PE 0603175C Ballistic Missile Defense Technology	183,849	108,423	118,718	115,234	120,152	127,012	130,358	903,746
PE 0603881C Ballistic Missile Defense Terminal Defense Segment	1,082,454	1,045,276	1,019,073	795,659	719,847	548,283	439,752	5,650,344
PE 0603882C Ballistic Missile Defense Midcourse Defense Segment	2,985,140	2,243,213	2,209,262	2,276,848	1,385,258	946,437	1,103,532	13,149,690
PE 0603883C Ballistic Missile Defense Boost Defense Segment	622,218	510,241	421,229	423,927	652,642	799,792	991,839	4,421,888
PE 0603884C Ballistic Missile Defense Sensors	514,989	586,121	1,221,143	1,184,280	1,099,649	1,077,632	823,583	6,507,397
PE 0603888C Ballistic Missile Defense Test and Targets	584,615	621,861	673,691	672,976	690,938	708,991	719,209	4,672,281
PE 0603890C Ballistic Missile Defense System Core	425,889	413,934	432,262	482,947	605,219	561,947	571,498	3,493,696
PE 0603891C Special Programs - MDA	347,377	196,892	288,315	304,234	538,050	818,136	786,349	3,279,353
PE 0603892C Ballistic Missile Defense Aegis	1,125,426	1,126,337	1,157,783	1,234,220	1,078,539	1,066,712	1,102,542	7,891,559
PE 0603893C Space Tracking & Surveillance System	311,402	231,528	242,441	266,509	560,130	735,727	938,191	3,285,928
PE 0603894C Multiple Kill Vehicle	133,615	229,943	354,455	488,294	649,632	708,582	879,385	3,443,906

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603886C Ballistic Missile Defense System Interceptors**

	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	Total Cost
PE 0603895C BMD System Space Program	0	16,552	29,771	41,638	56,199	133,915	157,548	435,623
PE 0603896C BMD C2BMC	249,179	447,616	289,277	287,194	270,762	256,767	259,159	2,059,954
PE 0603897C BMD Hercules	46,268	52,462	55,955	55,289	56,400	51,902	52,784	371,060
PE 0603898C BMD Joint Warfighter Support	49,833	49,394	69,982	73,997	77,205	80,168	81,948	482,527
PE 0603904C Missile Defense Integration & Operations Center	104,389	78,557	96,404	100,437	100,366	101,512	102,840	684,505
PE 0603905C BMD Concurrent Test and Operations	21,870	0	0	0	0	0	0	21,870
PE 0603906C Regarding Trench	0	1,986	2,978	4,964	4,963	8,933	8,933	32,757
PE 0603907C Sea Based X-Band Radar (SBX)	0	165,243	0	0	0	0	0	165,243
PE 0605502C Small Business Innovative Research - MDA	142,510	0	0	0	0	0	0	142,510
PE 0901585C Pentagon Reservation	15,527	6,019	19,734	5,040	5,284	5,370	5,456	62,430
PE 0901598C Management Headquarters - MDA	93,350	80,392	86,453	70,355	69,855	69,855	69,855	540,115

D. Acquisition Strategy

The Kinetic Energy Interceptors development and test acquisition strategy focuses on developing gap-filling, multi-use kinetic energy capabilities for strategically deployable land-mobile, sea-mobile, and land-fixed platforms. The Kinetic Energy Interceptor element is being developed under a single prime contractor selected competitively at the start of development. The revised acquisition strategy for Kinetic Energy Interceptors is for payloads to be budgeted and developed under other BMDS elements that deliver each payload for integration into the Kinetic Energy Interceptors element. Initial testing of the Kinetic Energy Interceptor booster will be from a land-fixed site. The FY 2005 through FY 2009 development verification test results mitigate critical program risks, and provide the agency very detailed design, performance, cost, and programmatic knowledge to support the FY 2009 knowledge point decision. This strategy also implements early proofing of critical manufacturing processes as an integral part of the design process. The payoff for these up front program investments in systems engineering, full scale risk reduction testing, and manufacturing process development is reduced redesign and retest, fewer test failures as well as lowered manufacturing cost. The strategy will utilize Engineering and Manufacturing Readiness Levels and Software Readiness Levels as maturity and risk indicators for proceeding forward with detailed design, building flight hardware and having a production off-ramp.

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603886C Ballistic Missile Defense System Interceptors

I. Product Development Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Interceptor								
Interceptor	C/CPAF	Raytheon, Tucson, AZ	0	207,455	1/2Q	254,168	1/2Q	461,623
Element Engineering								
Contractor Element Engineering	C/CPAF	Northrop Grumman, Fairfax, VA	0	44,780	1/2Q	86,811	1/2Q	131,591
Contractor KEI BMDS KV Engineering and Development	SS/CPAF	Raytheon, Tucson, AZ	0	49,000	2Q	0	N/A	49,000
Government Systems Engineering and Program Management								
Subtotal Product Development			0	301,235		340,979		642214

Remarks

In FY09-13, MDA will fund KEI payload engineering and development from the Multiple Kill Vehicle Program Element.

II. Support Costs Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Government Systems Engineering and Program Management								
Civilian Salaries		Missile Defense Agency, Huntsville, AL	0	2,457	N/A	3,139	N/A	5,596

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: February 2008
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Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Government Travel		Missile Defense Agency, Huntsville, AL	0	401	N/A	662	N/A	1,063
SETA	C/FFP	MEI, Huntsville, AL	0	9,662	1/3Q	11,361	1/3Q	21,023
FFRDC	FFRDC	MITRE Corp, McLean, VA	0	332	1Q	404	1Q	736
GFE	Various	Northrop Grumman, Fairfax, VA	0	102	1/2Q	1,146	1/2Q	1,248
Safety Support	MIPR	AMCOM, Huntsville AL	0	248	1/2Q	261	1/2Q	509
Subject Matter Experts	MIPR	AMRDEC, Huntsville, AL	0	400	1/2Q	236	1/2Q	636
CG(X) Modular Launcher	C/CPAF	Northrop Grumman, Fairfax, VA	0	1,535	2/3Q	0	N/A	1,535
Sea Mobile Analysis of Alternatives	MIPR	NSWC, Dahlgren, VA	0	102	2/3Q	0	N/A	102
Independent Assessment Team	C/FFP	COLSA Corp, Huntsville, AL	0	1,000	1/2Q	1,050	1/2Q	2,050
BMDS Interfaces	MIPR	Various	0	5,208	3/4Q	15,302	3/4Q	20,510
Subtotal Support Costs			0	21,447		33,561		55008

Remarks

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603886C Ballistic Missile Defense System Interceptors**

III. Test and Evaluation Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Government Systems Engineering and Program Management								
NEPA	MIPR	SMDC, Huntsville, AL	0	215	1/2Q	180	1/2Q	395
Range Support Services	MIPR	VAFB, CA	0	2,601	1/3Q	187	1/2Q	2,788
Host Tenant Support Agreement	MIPR	VAFB, CA	0	100	1/2Q	107	1/2Q	207
Stage 1 & 2 Separation Analysis	C/FFP	Calspan, Buffalo, NY	0	1,000	1/3Q	0	N/A	1,000
Construction Surveillance	MIPR	Army Corps of Engineers	0	38	2/3Q	653	1/2Q	691
Subtotal Test and Evaluation			0	3,954		1,127		5081

Remarks

IV. Management Services Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Subtotal Management Services								

Remarks

Project Total Cost			0	326,636		375,667		702,303

Remarks

Missile Defense Agency (MDA) Exhibit R-4 Schedule Profile

Date: **February 2008**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**

R-1 NOMENCLATURE: **0603886C Ballistic Missile Defense System Interceptors**

Fiscal Year	2007				2008				2009				2010				2011				2012				2013			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Kinetic Energy Interceptors Knowledge Point Events																												
Booster Flight One Test (FTK-01)											△																	
Interceptor																												
Stage 2 Rocket Motor Static Fire One					▲																							
Stage 2 Rocket Motor Static Fire Two								△																				
Stage 1 Rocket Motor Static Fire Three									△																			
Stage 1 Rocket Motor Static Fire Four									△																			
Stage 2 Rocket Motor Static Fire Three										△																		
Stage 2 Rocket Motor Static Fire Four										△																		
Interceptor Component System Design Review												△																
Interceptor Component Design Review - 0																△												
Canister Eject Testing																△												
Conduct Partial Full Scale (PFS) Test (FTK-02)																		△										
Stage 1 Rocket Motor Static Fire Five																			△									

Legend

▲	Significant Event (complete)	△	Significant Event (planned)
★	Milestone Decision (complete)	☆	Milestone Decision (planned)
◆	Element Test (complete)	◇	Element Test (planned)
▼	System Level Test (complete)	▽	System Level Test (planned)
▲——▲	Complete Activity	△——△	Planned Activity

Missile Defense Agency (MDA) Exhibit R-4 Schedule Profile

Date: **February 2008**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**

R-1 NOMENCLATURE: **0603886C Ballistic Missile Defense System Interceptors**

Fiscal Year	2007				2008				2009				2010				2011				2012				2013			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Interceptor																												
Stage 2 Rocket Motor Static Fire Five																			△									
Stage 1 Rocket Motor Static Fire Six																				△								
Stage 2 Rocket Motor Static Fire Six																				△								
Stage 3 Static Firing Series Complete																				△								
Interceptor Component Design Review - 1																					△							
Deliver Integrated Flight Test Articles and Spare																							△				△	
Element Engineering																												
Complete Sea-Mobile Alternatives Study					▲																							
Complete KEI Section of BMDS System Spec							△																					
Support BMD System Concept Review							△																					
Conduct KEI Payload System Requirements Review								△																				
Support BMDS KV System Requirements Review									△																			
Complete VAFB Integration Facility Mods & Repairs											△																	

Legend

▲	Significant Event (complete)	△	Significant Event (planned)
★	Milestone Decision (complete)	☆	Milestone Decision (planned)
◆	Element Test (complete)	◇	Element Test (planned)
▼	System Level Test (complete)	▽	System Level Test (planned)
▲▲	Complete Activity	△△	Planned Activity

Missile Defense Agency (MDA) Exhibit R-4 Schedule Profile	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603886C Ballistic Missile Defense System Interceptors

Fiscal Year	2007				2008				2009				2010				2011				2012				2013			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Element Engineering																												
Weapon System Element Level System Design Review											△																	
Weapon System Component System Design Review												△																
Complete HAFB Integration Facility Design													△															
Support Payload PDR & CDR													△							△								
Complete HAFB Canister Insertion Facility Design																	△											
Complete HAFB Integration Facility Mods & Repair																	△											
Complete HAFB Canister Insert. Fac. Mods & Repairs																					△							
Conduct Control Test Vehicle Flight Test (FTK-03)																							△					
Conduct Control Test Vehicle Flight Test (FTK-04)																											△	
Government System Engineering & Program Management																												
Participate in Nimble Titan Wargame Exercise							△				△				△				△				△				△	

Legend

▲	Significant Event (complete)	△	Significant Event (planned)
★	Milestone Decision (complete)	☆	Milestone Decision (planned)
◆	Element Test (complete)	◇	Element Test (planned)
▼	System Level Test (complete)	▽	System Level Test (planned)
▲▲	Complete Activity	△△	Planned Activity

Missile Defense Agency (MDA) Exhibit R-4A Schedule Detail	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603886C Ballistic Missile Defense System Interceptors

Schedule Profile	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Kinetic Energy Interceptors Knowledge Point Events							
Booster Flight One Test (FTK-01)			3Q				
Interceptor							
Stage 2 Rocket Motor Static Fire One		1Q					
Stage 2 Rocket Motor Static Fire Two		4Q					
Stage 1 Rocket Motor Static Fire Three			1Q				
Stage 1 Rocket Motor Static Fire Four			1Q				
Stage 2 Rocket Motor Static Fire Three			2Q				
Stage 2 Rocket Motor Static Fire Four			2Q				
Interceptor Component System Design Review			4Q				
Interceptor Component Design Review - 0				4Q			
Canister Eject Testing				4Q			
Conduct Partial Full Scale (PFS) Test (FTK-02)					2Q		
Stage 1 Rocket Motor Static Fire Five					3Q		
Stage 2 Rocket Motor Static Fire Five					3Q		
Stage 1 Rocket Motor Static Fire Six					4Q		
Stage 2 Rocket Motor Static Fire Six					4Q		
Stage 3 Static Firing Series Complete					4Q		
Interceptor Component Design Review - 1						1Q	
Deliver Integrated Flight Test Articles and Spare						3Q	3Q
Element Engineering							
Complete Sea-Mobile Alternatives Study		1Q					
Complete KEI Section of BMDS System Spec		3Q					
Support BMD System Concept Review		3Q					
Conduct KEI Payload System Requirements Review		4Q					
Support BMDS KV System Requirements Review			1Q				
Complete VAFB Integration Facility Mods & Repairs			3Q				
Weapon System Element Level System Design Review			3Q				
Weapon System Component System Design Review			4Q				

Missile Defense Agency (MDA) Exhibit R-4A Schedule Detail	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603886C Ballistic Missile Defense System Interceptors**

Schedule Profile	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Complete HAFB Integration Facility Design				1Q			
Support Payload PDR & CDR				1Q	4Q		
Complete HAFB Canister Insertion Facility Design					1Q		
Complete HAFB Integration Facility Mods & Repair					1Q		
Complete HAFB Canister Insert. Fac. Mods & Repairs						1Q	
Conduct Control Test Vehicle Flight Test (FTK-03)						3Q	
Conduct Control Test Vehicle Flight Test (FTK-04)							3Q
Government System Engineering & Program Management							
Participate in Nimble Titan Wargame Exercise		3Q	3Q	3Q	3Q	3Q	3Q

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603886C Ballistic Missile Defense System Interceptors**

COST ($ in Thousands)	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
0602 Program-Wide Support	23,118	0	0	0	0	0	0
RDT&E Articles Qty	0	0	0	0	0	0	0

Note: Efforts within this project continue in FY 2008 under project ZX40

A. Mission Description and Budget Item Justification

Program-Wide Support provides funding for common non-headquarters support functions across the entire program such as strategic planning, program integration, business management, cost estimating, contracting, and financial management, to include preparation of financial statements, reimbursement of financial services provided by DFAS, internal review and audit, earned-value management, and program assessment. Includes costs for both government civilians performing these functions, as well as outside services and support contractors that augment government staff in these areas. Many of these costs reside within the Missile Defense Agency Executing Agents in the Services: Army Space and Missile Defense Command, Army PEO Space and Missile Defense, Office of Naval Research, and various Air Force laboratory and acquisition activities, although some functions and costs within this program element are performed by MDA employees assigned within the National Capital Region (NCR). Other costs included herein provide facility capabilities for MDA Executing Agent locations, such as physical and technical security, legal services, travel and training, office and equipment leases, utilities and communications, supplies and maintenance, and similar operating expenses. Also includes funding for charges on canceled appropriations in accordance with Public Law 101-510, legal settlements, and foreign currency fluctuation on a limited number of foreign contracts.

B. Accomplishments/Planned Program

	FY 2007	FY 2008	FY 2009
Civilian Salaries and Support	23,118	0	0
RDT&E Articles (Quantity)	0	0	0

See Section A: Mission Description and Budget Item Justification

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603886C Ballistic Missile Defense System Interceptors

C. Other Program Funding Summary

	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	Total Cost
PE 0207998C BRAC	0	103,219	159,938	61,931	8,724	0	0	333,812
PE 0603175C Ballistic Missile Defense Technology	183,849	108,423	118,718	115,234	120,152	127,012	130,358	903,746
PE 0603881C Ballistic Missile Defense Terminal Defense Segment	1,082,454	1,045,276	1,019,073	795,659	719,847	548,283	439,752	5,650,344
PE 0603882C Ballistic Missile Defense Midcourse Defense Segment	2,985,140	2,243,213	2,209,262	2,276,848	1,385,258	946,437	1,103,532	13,149,690
PE 0603883C Ballistic Missile Defense Boost Defense Segment	622,218	510,241	421,229	423,927	652,642	799,792	991,839	4,421,888
PE 0603884C Ballistic Missile Defense Sensors	514,989	586,121	1,221,143	1,184,280	1,099,649	1,077,632	823,583	6,507,397
PE 0603888C Ballistic Missile Defense Test and Targets	584,615	621,861	673,691	672,976	690,938	708,991	719,209	4,672,281
PE 0603890C Ballistic Missile Defense System Core	425,889	413,934	432,262	482,947	605,219	561,947	571,498	3,493,696
PE 0603891C Special Programs - MDA	347,377	196,892	288,315	304,234	538,050	818,136	786,349	3,279,353
PE 0603892C Ballistic Missile Defense Aegis	1,125,426	1,126,337	1,157,783	1,234,220	1,078,539	1,066,712	1,102,542	7,891,559
PE 0603893C Space Tracking & Surveillance System	311,402	231,528	242,441	266,509	560,130	735,727	938,191	3,285,928
PE 0603894C Multiple Kill Vehicle	133,615	229,943	354,455	488,294	649,632	708,582	879,385	3,443,906
PE 0603895C BMD System Space Program	0	16,552	29,771	41,638	56,199	133,915	157,548	435,623
PE 0603896C BMD C2BMC	249,179	447,616	289,277	287,194	270,762	256,767	259,159	2,059,954
PE 0603897C BMD Hercules	46,268	52,462	55,955	55,289	56,400	51,902	52,784	371,060
PE 0603898C BMD Joint Warfighter Support	49,833	49,394	69,982	73,997	77,205	80,168	81,948	482,527
PE 0603904C Missile Defense Integration & Operations Center	104,389	78,557	96,404	100,437	100,366	101,512	102,840	684,505
PE 0603905C BMD Concurrent Test and Operations	21,870	0	0	0	0	0	0	21,870
PE 0603906C Regarding Trench	0	1,986	2,978	4,964	4,963	8,933	8,933	32,757
PE 0603907C Sea Based X-Band Radar (SBX)	0	165,243	0	0	0	0	0	165,243
PE 0605502C Small Business Innovative Research - MDA	142,510	0	0	0	0	0	0	142,510
PE 0901585C Pentagon Reservation	15,527	6,019	19,734	5,040	5,284	5,370	5,456	62,430
PE 0901598C Management Headquarters - MDA	93,350	80,392	86,453	70,355	69,855	69,855	69,855	540,115

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603886C Ballistic Missile Defense System Interceptors**

COST ($ in Thousands)	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
ZX40 Program-Wide Support	0	13,471	11,150	17,476	20,279	23,699	16,499
RDT&E Articles Qty	0	0	0	0	0	0	0

Note: In accordance with the Missile Defense Agency revised block structure, the content previously planned in Project 0602 for FY08-FY13 is now captured in Project ZX40.

A. Mission Description and Budget Item Justification

Program-Wide Support provides funding for common non-headquarters support functions across the entire program such as strategic planning, program integration, business management, cost estimating, contracting, and financial management, to include preparation of financial statements, reimbursement of financial services provided by DFAS, internal review and audit, earned-value management, and program assessment. Includes costs for both government civilians performing these functions, as well as outside services and support contractors that augment government staff in these areas. Many of these costs reside within the Missile Defense Agency Executing Agents in the Services: Army Space and Missile Defense Command, Army PEO Space and Missile Defense, Office of Naval Research, and various Air Force laboratory and acquisition activities, although some functions and costs within this program element are performed by MDA employees assigned within the National Capital Region (NCR). Other costs included herein provide facility capabilities for MDA Executing Agent locations, such as physical and technical security, legal services, travel and training, office and equipment leases, utilities and communications, supplies and maintenance, and similar operating expenses. Also includes funding for charges on canceled appropriations in accordance with Public Law 101-510, legal settlements, and foreign currency fluctuation on a limited number of foreign contracts.

B. Accomplishments/Planned Program

	FY 2007	FY 2008	FY 2009
Civilian Salaries and Support	0	13,471	11,150
RDT&E Articles (Quantity)	0	0	0

See Section A: Mission Description and Budget Item Justification

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603886C Ballistic Missile Defense System Interceptors

C. Other Program Funding Summary

	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	Total Cost
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PE 0603904C Missile Defense Integration & Operations Center	104,389	78,557	96,404	100,437	100,366	101,512	102,840	684,505
PE 0603905C BMD Concurrent Test and Operations	21,870	0	0	0	0	0	0	21,870
PE 0603906C Regarding Trench	0	1,986	2,978	4,964	4,963	8,933	8,933	32,757
PE 0603907C Sea Based X-Band Radar (SBX)	0	165,243	0	0	0	0	0	165,243
PE 0605502C Small Business Innovative Research - MDA	142,510	0	0	0	0	0	0	142,510
PE 0901585C Pentagon Reservation	15,527	6,019	19,734	5,040	5,284	5,370	5,456	62,430
PE 0901598C Management Headquarters - MDA	93,350	80,392	86,453	70,355	69,855	69,855	69,855	540,115

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: February 2008
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603886C Ballistic Missile Defense System Interceptors

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