

OSD RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

Date: February 2007

| APPROPRIATION/ BUDGET ACTIVITY RDT&E/ Defense Wide BA# 2 | | PE NUMBER AND TITLE 0602000D8Z - Joint Munitions Technology | | | | | | |
|---|-------------------|---|---------|---------|---------|---------|---------|---------|
| Cost (\$ in Millions) | FY 2006 Actual | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 |
| Total Program Element (PE) Cost | 4.905 | 11.133 | 15.542 | 15.283 | 15.517 | 15.401 | 15.603 | 15.823 |
| P000 Inensitive Munitions | 4.905 | 11.133 | 15.542 | 15.283 | 15.517 | 15.401 | 15.603 | 15.823 |

A. Mission Description and Budget Item Justification: (U) This program addresses applied research associated with improving the lethality, reliability, safety and survivability of munitions and weapon systems. The goal is to develop joint enabling technologies that can be used by the Services as they develop their specific weapon programs. The program invests in technologies from a Joint Service perspective thus insuring the development of technology with the broadest applicability.

| B. Program Change Summary | FY 2006 | FY 2007 | FY 2008 | FY 2009 |
|---|---------|---------|---------|---------|
| Previous President's Budget (FY 2007) | 6.078 | 10.447 | 10.864 | 10.571 |
| Current BES/President's Budget (FY 2008/2009) | 4.905 | 11.133 | 15.542 | 15.283 |
| Total Adjustments | -1.173 | 0.686 | 4.678 | 4.712 |
| Congressional Program Reductions | | -0.064 | | |
| Congressional Rescissions | | | | |
| Congressional Increases | | 0.750 | | |
| Reprogrammings | -1.000 | | | |
| SBIR/STTR Transfer | -0.173 | | | |
| Other | | | 4.678 | 4.712 |

C. Other Program Funding Summary: Not Applicable.

D. Acquisition Strategy: Not Applicable.

E. Performance Metrics: Not Applicable.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2007

APPROPRIATION/ BUDGET ACTIVITY
RDT&E/ Defense Wide BA# 2

PE NUMBER AND TITLE
0602000D8Z - Insensitive Munitions

PROJECT
P000

| Cost (\$ in Millions) | FY 2006 Actual | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 |
|----------------------------|----------------|---------|---------|---------|---------|---------|---------|---------|
| P000 Insensitive Munitions | 4.905 | 11.133 | 15.542 | 15.283 | 15.517 | 15.401 | 15.603 | 15.823 |

A. Mission Description and Project Justification: (U) This RDT&E effort is aimed at developing the enabling technologies needed to build weapons in compliance with Insensitive Munitions (IM) requirements established in statute (Title 10, United States Code) and regulation (DoDI 5000.1 and CJCSI 3170.01C). Using technology available today, the Department has incrementally improved the IM response of our current munitions. New munitions which have fully implemented current IM technology and design practices have been able to achieve IM compliance. However, these have been the most easily solved problems. Without new technology, future variants of current weapon systems will have the same, or worse, response to IM stimuli (i.e., they will not improve with the technology available today). New weapon developments will face similar challenges.

B. Accomplishments/Planned Program:

| Accomplishment/Planned Program Title | FY 2006 | FY 2007 | FY 2008 | FY 2009 |
|--------------------------------------|---------|---------|---------|---------|
| Insensitive Munitions (IM) | 4.905 | 11.133 | 15.542 | 15.283 |

FY 2006 Accomplishments: (U) During FY06, the focus of this program has been on five munition areas: High Performance Rocket Propulsion, Minimum Smoke Rocket Propulsion, Blast and Fragmentation Warheads, Anti-Armor Warheads, and High Performance Gun Propulsion. Specific projects addressing these areas are: (1) Insensitive Munitions (IM) Compliant High Performance Rocket Propulsion for Joint Service Applications - This multi-task project was examining novel ingredients and formulations to reduce the response of a high performance rocket propellant to unplanned stimuli. Tasks were exploring different technologies such as low ignition point binders, self-extinguishing propellants, and activated boron; (2) Developed and evaluated of insensitive Ammonium Perchlorate (AP) as a propellant/explosive ingredient - This project is developing and evaluating methods of improving the thermal response of AP through the use of additives to eliminate or suppress the partial decomposition of AP; (3) IM Minimum Smoke Propellants for Joint Service IM Applications - This project explored novel high energy oxidizers, high nitrogen ingredients, and binders for use in propellant formulations. Candidate formulations exhibiting promising mechanical, combustion, thermal and IM performance will be scaled-up and tested in generic rocket motor hardware; (4) Improved Ionic Liquids for IM Development - This project is currently still evaluating certain ionic liquids as a potential TNT replacement. Promising ionic liquids will be tailored and scaled up with the goal of improving their sensitivity and performance properties; (5) Advanced IM Compliant Plastic Bonded Explosives - This project has evaluated reduced sensitivity energetic ingredients in castable Plastic Bond Explosive (PBX) formulations using modern binder systems which promote IM properties with the goal of minimizing the shock and impact sensitivity of these new formulations while maintaining their reduced sensitivity to thermal stimuli.

FY 2007 Plan: (U) In FY07, the program will remain focused on five munition areas: High Performance Rocket Propulsion, Minimum Smoke Rocket Propulsion, Blast and Fragmentation Warheads, Anti-Armor Warheads, and High Performance Gun Propulsion. New projects in FY07 will focus on (1) extending and validating modeling and simulation tools used for the design of managed energy systems, (2) experimentally assessing promising materials, and (3) evaluating new and novel methodologies for venting rocket motor and warhead cases with the goal of preventing catastrophic energy release. In addition to new projects, on-going projects and their major tasks for this year are: (1) IM Compliant High Performance Rocket Propulsion for Joint Service Applications - Complete initial scale-up and characterization of a high-performance solid rocket propellant; (2) Development and Evaluation of Insensitive Ammonium Perchlorate (AP) as a Propellant/ Explosive Ingredient - Evaluate effects of different binders on coated AP. Assess coated AP's combustion properties and down select suppressant candidates for scale-up into a propellant formulation; (3) IM Minimum Smoke Propellants for Joint Service IM Applications - Finalize Minimum Smoke formulations and continue characterization of their mechanical, burn rate and IM properties; (4) Improved Ionic Liquids for IM Development - Produce Ionic liquid candidate at 1

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RDT&E/ Defense Wide BA# 2PE NUMBER AND TITLE
0602000D8Z - Insensitive MunitionsPROJECT
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kg scale and evaluate thermochemical and physical properties of the selected formulation; (5) Advanced IM Compliant Plastic Bonded Explosives - Complete the evaluation of emerging insensitive energetic ingredients. Complete small-scale sensitivity tests on castable PBX formulation; (6) Metal-Accelerating Insensitive Pressed Explosives - Complete formulation optimization on a pressed composition and perform generic IM tests.; (7) Development of Melt Castable Nitrate Salt/Nitramine Explosives - Complete the characterization of the selected Nitrate Salt/Nitramine eutectic formulation.

FY 2008 Plans: (U) Efforts will continue on high performance rocket propellants, minimum smoke rocket propellants, blast and fragmentation explosives, anti-armor explosives and gun propulsion. Promising technologies at Technical Readiness Level (TRL) 5/6 will be transitioned to 6.3/6.4 programs or into weapon development programs. Experimental data from promising new insensitive ingredients, binders, liners and case technologies will be used to extend and validate modeling and simulation tools used for the design of weapon systems. Novel energetic materials and ingredients will be evaluated in formulations and small scale IM hardware.

FY 2009 Plan: On-going projects are: (1) Insensitive Munitions (IM) Compliant High Performance Rocket Propulsion for Joint Service Applications - Scale-up baseline high-performance rocket propellant formulation and screen best propellant/case combinations; (2) Development and Evaluation of Insensitive Ammonium Perchlorate (AP) as a Propellant/ Explosive Ingredient - Evaluate IM response of formulation utilizing suppressed AP; (3) IM Minimum Smoke Propellants for Joint Service IM Applications - Complete minimum smoke formulation development and characterization. Conduct static motor firing to assess the performance promising formulations; (4) Improved Ionic Liquids for IM Development - Begin work on second-generation ionic liquid candidates; (5) Advanced IM Compliant Plastic Bonded Explosives - Demonstrate the detonation and blast performance of a castable PBX explosive formulation. Begin work on PBX using emerging ingredients; (6) Metal-Accelerating Insensitive Pressed Explosives - Manufacture and test several explosively formed projectile charges to assess the performance of insensitive pressable explosives; (7) Development of Melt Castable Nitrate Salt/Nitramine Explosives - Complete formulation of a insensitive Nitrate salt/Nitramine metal accelerating explosive; (8) Development of IM Melt Castable Explosives - Scale up and manufacture an IM melt-castable explosive and evaluate its casting properties; (9) Reactive Liner Evaluation Study - Complete sub-scale testing of reactive liner and accelerated aging study and model the performance of a full-scale test utilizing reactive liner technology; (10) Coating Technologies for IM - Complete final report on intumescent coating testing and conduct packaging demonstration test. Begin work on a coating system for use on missile systems; (11) Thermal Energy Absorbing Binder Systems for Plastic Bonded Explosives - Complete fast cook-off testing and shock sensitivity testing of thermal energy absorbing binder systems; (12) Tailorable Aggregate Insensitive Nitramine Energetic Materials - Characterize performance and sensitivity of propellant and explosive formulations utilizing aggregate insensitive nitramine; (13) Insensitive Large Caliber Gun Propellants - Complete performance, mechanical property and chemical characterization and measurements on selected formulation. Optimize formulation as needed and generate new burn rate measurements.

C. Other Program Funding Summary: Not Applicable.

D. Acquisition Strategy: Not Applicable.

E. Major Performers Not Applicable.