

OSD RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

Date: February 2007

APPROPRIATION/ BUDGET ACTIVITY
RDT&E/ Defense Wide BA# 3

PE NUMBER AND TITLE

0603225D8Z - Joint DoD/DOE Munitions Technology Support

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	23.606	22.765	23.488	23.773	23.926	24.059	24.375	24.718
P225 Joint DOD/DOE Munitions	23.606	22.765	23.488	23.773	23.926	24.059	24.375	24.718

A. Mission Description and Budget Item Justification: (U) The mission of the Joint DoD/Department of Energy (DOE) Munitions Technology Development Program (JMP) is to develop advanced technologies needed to meet warfighting needs and bring about major improvements in non-nuclear munitions. A Memorandum of Understanding (MOU) between DoD and DOE provides the basis for the long-term commitment to this effort. Under the auspices of the JMP, the fusion of DOE technologies with Joint Services needs has provided major advances in warfighting capabilities for many years and continues to play a crucial role in the exploration, development, and transition of new technologies needed by the Services. The JMP is aligned with Department strategic plans such as the 2006 QDR and is developing capabilities and modeling tools for urban combat and counter-terrorism efforts. The JMP provides a unique opportunity for the collaboration of DoD and DOE scientists and engineers so they can develop technologies of interest to both Departments, within a structured framework of technical reviews and scheduled milestones. The JMP has strong support from the Services in that they are actively engaged in leading JMP technical activities and collaborating in the transition of new capabilities. This interdepartmental cooperation makes use of the substantial historic investment in scientific resources by the DOE , and the budgeted JMP funds represented in this justification are supplemented by matching DOE funds.

<u>B. Program Change Summary</u>	FY 2006	FY 2007	FY 2008	FY 2009
Previous President's Budget (FY 2007)	24.702	16.862	19.362	24.439
Current BES/President's Budget (FY 2008/2009)	23.606	22.765	23.488	23.773
Total Adjustments	-1.096	5.903	4.126	-0.666
Congressional Program Reductions		-0.097		
Congressional Rescissions				
Congressional Increases				
Reprogrammings	-0.400			
SBIR/STTR Transfer	-0.696			
Other		6.000	4.126	-0.666

C. Other Program Funding Summary: Not Applicable.

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OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)									Date: February 2007									
APPROPRIATION/ BUDGET ACTIVITY RDT&E/ Defense Wide BA# 3			PE NUMBER AND TITLE 0603225D8Z - Joint DoD/DOE Munitions Technology Support					PROJECT P225										
Cost (\$ in Millions)	FY 2006 Actual	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013										
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<u>A. Mission Description and Project Justification:</u> (U) The Joint DoD/DOE Munitions Technology Development Program (JMP) is a collaborative, jointly-funded effort between DoD and Department of Energy (DOE) and has the mission to develop new and innovative warhead, explosive, initiation, and lifecycle technologies, as well as enabling tools, in order to bring about major improvements in non-nuclear munitions. The JMP supports the development and exploration of advanced munitions concepts and enabling technologies which precede system engineering. Through a Memorandum of Understanding (MOU) arrangement with DOE, DoD resources are evenly matched. More importantly, this relatively small DoD contribution effectively taps the annual multi-billion dollar DOE Research, Development, Test, and Evaluation (RDT&E) investments by accessing technical experts with highly specialized skills, advanced scientific equipment, unique facilities, and computational tools not available within DoD. These efforts take advantage of the extensive and highly developed technology base resident in the DOE national laboratories relevant to achieving the JMP goals of developing capable, cost-effective, conventional munitions. (U) The JMP currently supports about 50 projects which can be summarized in five technical focus areas: Initiation, Fuzing, and Sensors; Energetic Materials; Computational Mechanics and Material Modeling; Warhead and Integration Technology; and Munitions Lifecycle Technologies. The JMP is administered and monitored by Office of the Secretary of Defense (OSD), and reviewed annually by the Technical Advisory Committee (TAC) composed of senior executives from the Army, Navy, Air Force, Special Operations Command, OSD, and DOE. Projects are organized in Technology Coordinating Groups (TCGs) in order to bring together the disciplines necessary to properly evaluate technical content and progress. DoD Service laboratory technical experts lead each of the TCGs to ensure that the technologies under development address high priority DoD needs; they also coordinate the semi-annual technical peer-review process. (U) The JMP is further integrated with Service efforts through participation in the Defense Technology Area Plan (DTAP) for conventional weapons. The JMP is also reviewed under the Technology Area Review and Assessment (TARA) process. After reviewing the JMP, a recent Weapons TARA panel assessed the JMP as follows: broad range of products transitioned to DoD as a result of JMP efforts; effectively leverages DOE expertise and funding; critical computational tools provided to DoD; well integrated into Service efforts; TCGs provide an effective forum for technical collaborations.																		
<u>B. Accomplishments/Planned Program:</u> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left; padding: 5px;">Accomplishment/Planned Program Title</td> <td style="text-align: center; padding: 5px;">FY 2006</td> <td style="text-align: center; padding: 5px;">FY 2007</td> <td style="text-align: center; padding: 5px;">FY 2008</td> <td style="text-align: center; padding: 5px;">FY 2009</td> </tr> <tr> <td style="padding: 5px;">Joint DOD/DOE Munitions</td> <td style="text-align: right; padding: 5px;">23.606</td> <td style="text-align: right; padding: 5px;">22.765</td> <td style="text-align: right; padding: 5px;">23.488</td> <td style="text-align: right; padding: 5px;">23.773</td> </tr> </table>									Accomplishment/Planned Program Title	FY 2006	FY 2007	FY 2008	FY 2009	Joint DOD/DOE Munitions	23.606	22.765	23.488	23.773
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Joint DOD/DOE Munitions	23.606	22.765	23.488	23.773														
FY 2006 Accomplishments: (U) Exploding Foil Initiators (EFIs) were developed by the JMP and transitioned to the Army and Air Force. Both are implementing EFIs into new systems. In the development of new Electronic Safe and Arm Devices (ESADs), a batch assembly process for monolithic micro-CDUs was completed. A design for a MEMS-based g-switch with low cross-axis sensitivity was also completed. Both designs are in the process of being transitioned to industry. Component development and evaluation continued for compact firesets. Nanostructure multilayer (NML) technologies for high voltage capacitors and multilayer dielectric breakdown switches successfully produced 20-layer capacitors with up to 102 nF of capacitance in a footprint of 8 mm by 10 mm. These technologies can be integrated into micro-CDUs for smaller and more cost-effective components. Advanced initiation systems development continued with work on diagnostics for monitoring the current distribution in multipoint initiators. The latest miniaturization																		

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technology was transitioned to production facilities and to the Services in order to begin implementation. Rapid prototyping of systems for individual control of multiple initiation sites was demonstrated using 1-by-4 and 4-by-4 arrays of slappers on alumina and printed circuit board substrates. Further experiments were performed to investigate the theory and models of explosive behavior in very small geometries (micro-detonics). Micro-fireset development included the ink-jet deposition of energetics on MEMS-scale substrates. A miniature Synthetic Aperture Radar (mini-SAR) was designed with reduced size and cost (both by a factor of 5), and a prototype was successfully flight tested. The Laser Dynamic Range Imager was transitioned to NASA for use on space shuttle flights. Initial experiments were performed to measure the run-to-detonation distance of advanced explosives for both low pressure and slapper-driven initiation. A new project was started with a focus on millimeter scale initiation and detonation. This work is attempting to understand the behavior and response of thin layers and small quantities of explosives, as are required for all MEMS-based fuzes and micro-firesets. Work on energetic materials has been aligned with the recommendations from a recent Weapons TARA, and is coordinated with the national initiative in Advanced Energetic Materials. This focus area of the JMP is aimed at developing the next-generation EMs that have increased energy density over those in the current inventory while attempting to provide insensitivity to extreme environments. A fundamentally new approach to increasing lethality while simultaneously reducing collateral damage is being investigated. (U) Efforts to synthesize, characterize and scale-up new EMs with increased or tailored performance and decreased sensitivity have been continued. Coordination with the national Advanced Energetic Materials initiative helped focus these efforts. A new explosive, LLM-105 (developed by the JMP), continues to look promising as an insensitive main charge and as a booster material. As part of the scale-up of fabrication processes. Other new energetic materials continue to be developed by JMP activities. JMP scientists synthesized N-hydroxy derivatives of heterocycles which offer the possibility of forming nitrogenous salts. Samples of these materials were provided to NSWC-Indian Head for evaluation. Also, an updated version (#4) of Cheetah, a thermochemical detonation simulation code widely used in the U.S., was released to the DoD for making more accurate performance predictions for an extended set of energetic materials. (U) The development of Eulerian, Lagrangian, and ALE codes relevant to the design and evaluation of munitions is an on-going, long-term effort. CTH, a workhorse shock physics code developed by the JMP, is used by over 120 licensees throughout the DoD and DOE, on desktop PCs to the massively parallel, High Performance Computing (HPC) center resources. It is the number 1 "go-to" code for the weapons community and has been instrumental in the development of a number of DoD weapon systems. CTH continues to be improved and made available to both Departments. FY 2007/FY 2008/FY 2009 Plans: (U) Studies will continue on predictive materials aging of solders, including investigation of electronics corrosion, and aging of propellants and adhesives. Further development of the Bayesian approach to system reliability assessment will be conducted. The development of robotic disposal of munitions will be continued and new automation technologies for removing and safing submunitions that are automatically armed on exit from a projectile will be developed. Chemical kinetic models for combustion of TNT and RDX will be added to the extensive chemical database already existing for combustion processes. A project to develop a network of sensors for monitoring and quantifying the gaseous and particulate metallic species of environmental concern in OB/OD plumes will continue with field tests. The JMP will continue low collateral damage verification testing in comparison with current best baseline munitions. They will also continue to develop, extend, and support the application of DOE codes and associated material models to DoD warhead and explosives design and evaluation. <u>C. Other Program Funding Summary:</u> Not Applicable. <u>D. Acquisition Strategy:</u> Not Applicable. <u>E. Major Performers</u> Not Applicable.		