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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense **DATE:** February 2010

APPROPRIATION/BUDGET ACTIVITY 0400: <i>Research, Development, Test & Evaluation, Defense-Wide</i> BA 2: <i>Applied Research</i>	R-1 ITEM NOMENCLATURE PE 0602000D8Z: <i>Joint Munitions Technology</i>
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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	14.820	18.808	22.448	0.000	22.448	22.179	20.767	21.989	22.977	Continuing	Continuing
P000: <i>Insensitive Munitions</i>	14.820	14.990	14.615	0.000	14.615	14.786	14.971	15.241	15.529	Continuing	Continuing
P204: <i>Enabling Fuze Technology</i>	0.000	3.818	7.833	0.000	7.833	7.393	5.796	6.748	7.448	Continuing	Continuing

A. Mission Description and Budget Item Justification

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 ensuring the development of technology with the broadest applicability, while avoiding duplication of efforts.

Under the Joint Insensitive Munitions (IM) Technology Program (JIMTP), investments are focused on specific munition areas that have been identified by the S&T community and validated by the technology needs identified in the IM Strategic Plans submitted by the Program Executive Officers (PEOs). These five munitions areas are: 1) high performance rocket propulsion, 2) minimum signature rocket propulsion, 3) large caliber gun propulsion, 4) anti-armor warheads, and 5) blast and fragmentation warheads.

Under the Joint Fuze Technology Program (JFTP), investments are focused on specific capability areas that have been identified by Department strategic guidance and current shortfalls in weapon systems and will be validated by the PEOs and Heads of the Service S&T communities. These four capability areas are: 1) Hard Target Survivable Fuzing, 2) Tailorable Effects Weapon Fuzing, 3) High Reliability Fuzing, 4) and Enabling Fuze Technologies and Common Architecture2.

Munition Area Technology Groups (MATGs) and Fuze Area Technology Groups (FATGs) have been established for each munition and capability area and are tasked with 1) coordinating, establishing, and maintaining five-year technology development plans and roadmaps, 2) coordinating biannual meetings to review technical and programmatic details of each funded and proposed effort, 3) developing and submitting Technology Transition Agreements in coordination with appropriate PEOs for insertion in their IM Strategic Plans / Fuze Technology Development Plan, and 4) interfacing with other MATGs / FATGs and IM / fuze science and technology projects as appropriate. The JIMTP and JFTP will utilize a Technical Advisory Committee (TAC) (consisting of senior DoD and DOE laboratory representatives and senior Munitions PEO representatives) to provide program oversight, policy, direction and priorities during its annual meeting.

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B. Program Change Summary (\$ in Millions)

	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011 Base</u>	<u>FY 2011 OCO</u>	<u>FY 2011 Total</u>
Previous President's Budget	15.254	22.669	0.000	0.000	0.000
Current President's Budget	14.820	18.808	22.448	0.000	22.448
Total Adjustments	-0.434	-3.861	22.448	0.000	22.448
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.256	0.000			
• SBIR/STTR Transfer	-0.064	0.000			
• New project initiated	0.000	-3.708	22.448	0.000	22.448
• Other	-0.114	-0.153	0.000	0.000	0.000

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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
P000: <i>Insensitive Munitions</i>	14.820	14.990	14.615	0.000	14.615	14.786	14.971	15.241	15.529	Continuing	Continuing

A. Mission Description and Budget Item Justification

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 (United States Code, Title 10, Chapter 141, Section 2389) and regulation (DoDI 5000.1 and CJCSI 3170.01F). 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.

Under the Joint Insensitive Munitions Technology Program (JIMTP), investments are focused on five Munition Areas: High Performance Rocket Propulsion, Minimum Signature Rocket Propulsion, Blast and Fragmentation Warheads, Anti-Armor Warheads, and Large Caliber Gun Propulsion. Munition Area Technology Groups (MATGs), under tri-service leadership, have developed technology roadmaps for each Munition Area which is used to guide investments based on goals consistent with the DoD IM Strategic Plan. The program is structured around these five areas with clear cross-cutting tasks.

B. Accomplishments/Planned Program (\$ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Insensitive Munitions (IM) 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 (United States Code, Title 10, Chapter 141, Section 2389) and regulation (DoDI 5000.1 and CJCSI 3170.01F). 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,	14.820	14.990	14.615	0.000	14.615

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B. Accomplishments/Planned Program (\$ in Millions)								
				FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
<p>response to IM stimuli (i.e., they will not improve with the technology available today). New weapon developments will face similar challenges.</p> <p>Under the Joint Insensitive Munitions Program (JIMTP), investments are focused on five Munition Areas: High Performance Rocket Propulsion, Minimum Signature Rocket Propulsion, Blast and Fragmentation Warheads, Anti-Armor Warheads, and Large Caliber Gun Propulsion. Munition Area Technology Groups (MATGs), under tri-service leadership, have developed technology roadmaps for each Munition Area which is used to guide investments based on goals consistent with the DoD IM Strategic Plan. The program is structured around these five areas with clear cross-cutting tasks.</p> <p><i>FY 2009 Accomplishments:</i></p> <p>(1) High Performance Rocket Propulsion: - Scaled-up and evaluated less extinguishable propellant formulations in lab-scale tests. Trade space for propellant formation has been determined. Completed synthesis of perbromate salts and transitioned to batch scale-up feasibility study under 6.3 program. - New NWC-467 has been scaled to the hundred-pound batch size and mechanical properties master curve has been generated. Propellant meets MATG I propellant metrics and Tomahawk requirements. - Methods for desensitizing oxidizers have been scaled to 100g and characterization of its properties is underway. Propellants have been manufactured and are being characterized as well. - Case venting concepts have been tested to determine component dimensions and functionality of proposed concepts. External mitigation methods are being evaluated for application to large diameter rocket motors. (2) Minimum Signature Rocket Propulsion: Scaled-up and assessed less sensitive propellants utilizing novel co-oxidizers/ additives in laboratory tests (aging, performance, sensitivity). Prepared pint mixes of propellant formulations using ANAzF to assess hydrogen bonding affects on sensitivity. Characterization testing of formulations is ongoing. - Utilizing novel binder chemistries, formulations have been developed to reduce thermal sensitivity through energy partitioning . Began study of binding agents to improve properties and reduce sensitivity in minimum signature propellants. (3) Blast and Fragmentation Warheads: - Feasibility of multiple novel initiation methods have been demonstrated with several EIDS materials. - Three booster formulations have been developed using novel energetic materials. Characterization testing is underway. Scaled-up high energy formulation</p>								

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B. Accomplishments/Planned Program (\$ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
and conduct variable confinement testing. Conclude proof of concept and manufacturing studies, begin weaponization study, and demonstration of IM characteristics of unique missile warhead explosive. Design and fabricate unique sensitization method application fixture. (4) Anti-Armor Warheads: Optimize processing procedure and complete characterization studies for cast cured explosives. Validate new small scale test process to determine binder effectiveness. Complete formulation down-selection for less-sensitive combined effects explosives and IM/performance tests for two candidates. Continue IM tests for novel coating technique evaluation for explosive materials. (5) Large Caliber Gun Propulsion: Complete full-scale primer design and demonstration testing. Manufacture large-scale quantities and complete characterization and propellant formulation mixes of novel propellant binder. Conduct instrumented ballistic simulator tests and complete modification of required modeling and simulation tools for slow cook-off studies.					
Accomplishments/Planned Programs Subtotals	14.820	14.990	14.615	0.000	14.615

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011 Base</u>	<u>FY 2011 OCO</u>	<u>FY 2011 Total</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• 0603000D8Z P002: BA 3 <i>Insensitive Munitions Advanced Technology</i>	9.176	13.534	16.979	0.000	16.979	21.621	23.440	23.818	24.248	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

- 1) Transitions of technologies developed by the Program are tracked and documented using DoD/NASA Technical Readiness Level (TRL) scale.
- 2) MATG Technology Roadmaps are prepared, evaluated, and analyzed by JIMTP management and technical staff.
- 3) Chairman's Annual Assessments for each MATG are critically reviewed by the TAC to determine progress, transition plans, and relevance of each project.
- 4) Project progress toward goals and milestones is assessed at each MATG meeting.

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5) Annual technical reports and papers are tracked and documented for the Program. 6) External Peer Review of Projects conducted as part of Joint Army/Navy/NASA/Air Force meetings.		

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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
<i>P204: Enabling Fuze Technology</i>	0.000	3.818	7.833	0.000	7.833	7.393	5.796	6.748	7.448	Continuing	Continuing

A. Mission Description and Budget Item Justification

This RDT&E effort is aimed at developing the enabling technologies needed to provide the survivable and reliable fuzing capabilities based on needs identified in the Guidance for the Development of the Force and the Secretary of Defense Memorandum, DoD Policy on Cluster Munitions and Unintended Harm to Civilians, June 19, 2008. Fuze capability through technology advancements has generally lagged the advancements made in U.S. weapons. Particularly, shortfalls have developed in the areas of: integration with advanced weapons, miniaturization, harsh environment survivability and functionality, and smart electronics and processing. Without new technology future weapon systems, as well as current weapon systems, will fail to meet the survivability and reliability needs of the warfighter.

Under the Joint Fuze Technology Program (JFTP), investments are focused in four capability areas: Hard Target Survivable Fuzing, Tailorable Effects Weapon Fuzing, High Reliability Fuzing, and Enabling Fuze Technologies and Common Architecture. Fuze Area Technology Groups (FATGs) under tri-Service leadership are developing technology roadmaps for each capability area which will be used to guide investments based on goals consistent with the strategic guidance of the Department and shortfalls in existing weapon systems.

B. Accomplishments/Planned Program (\$ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Enabling Fuze Technology This RDT&E effort is aimed at developing the enabling technologies needed to provide the survivable and reliable fuzing capabilities based on needs identified in the Guidance for the Development of the Force and the Secretary of Defense Memorandum, DoD Policy on Cluster Munitions and Unintended Harm to Civilians, June 19, 2008. Fuze capability through technology advancements has generally lagged the advancements made in U.S. weapons. Particularly, shortfalls have developed in the areas of: integration with advanced weapons, miniaturization, harsh environment survivability and functionality, and smart electronics and processing. Without new technology future weapon systems, as well as current weapon systems, will fail to meet the survivability and reliability needs of the warfighter.	0.000	3.818	7.833	0.000	7.833

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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u> <u>Base</u>	<u>FY 2011</u> <u>OCO</u>	<u>FY 2011</u> <u>Total</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• 0603000D8Z P301: <i>BA 3</i> <i>Enabling Fuze Advanced</i> <i>Technology</i>	0.000	0.000	3.597		3.597	5.424	6.692	7.613	8.771	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

- 1) Transitions of technologies developed by the Program are tracked and documented using DoD/NASA Technical Readiness Level(TRL) scale.
- 2) FATG Technology Roadmaps are prepared, evaluated, and analyzed by JFTP management and technical staff.
- 3) Chairman's Annual Assessments for each FATG are critically reviewed by the TAC to determine progress, transition plans, and relevance of each project.
- 4) Project progress toward goals and milestones is assessed at each FATG meeting.
- 5) Annual technical reports and papers are tracked and documented for the Program.

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