RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)										DATE June 2001
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 3								R-1 ITEM NOMENCLATURE Joint DoD/DOE Munitions **PE 0603225D8Z**		
COST *(In Millions)*	FY2000	FY2001	FY2002						Cost to Complete	Total Cost
Total Program Element (PE) Cost	14.237	16.516	19.178						Continuing	Continuing
DoD/DOE Munitiond/P225	14.237	16.516	19.178						Continuing	Continuing

(U) A. Mission Description and Budget Item Justification

(U) BRIEF DESCRIPTION OF ELEMENT

(U) This R&D program is a cooperative, jointly funded effort between DoD and DOE to pursue new and innovative warhead, explosive, and fuze technologies in order to bring about major improvements in non-nuclear munitions. This program supports the development and exploration of new munitions concepts and technology preceding system engineering development. Through our funding arrangement with DOE, DoD resources are matched. More importantly, this relatively small DoD contribution effectively taps the annual billion-dollar DOE RDT&E investment by accessing the specialized skills, scientific equipment, facilities and computational tools not available in DoD.

(U) The effort exploits the extensive and highly developed technology base resident in the National Laboratories relevant to achieving the goal of developing capable, cost-effective conventional munitions, and leverages DoD investments with matching DOE investments. The current program supports 37 projects in warhead technology, energetic materials, advanced initiation and fuze development, munitions lifecycle technology, and computer simulation. A specific Service laboratory sponsors each of these projects. The program is administered and reviewed by a Joint Technical Advisory Committee composed of members from the Army, Navy, Air Force, OSD, and DOE. Projects are peer-reviewed semi-annually by DoD Service Laboratory/Technical Center personnel in order to monitor technical excellence and ensure that the technologies under development address priority DoD needs. The program is integrated with Service efforts through the Project Reliance Weapons Panel and participation in the Defense Technology Area Plan for Conventional Weapons. The program is reviewed under the Technology Area Review and Assessment process.

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DoD/DOE Munitiond/P225	14.237	16.516	19.178						Continuing	Continuing

(U) Project Number and Title: P225 DoD/DOE Munitions

(U) PROGRAM ACCOMPLISHMENTS AND PLANS

(U) FY 2000 Accomplishments:

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(U) Advanced initiation is an enabling technology for the next generation of warheads. It supports the development of advanced aimable warheads, target-adaptable warheads, and survivable high-velocity hard target penetrators. This program continues to provide improved component options and new architectures for use in advanced electronic safing, arming and firing systems. The objective is to provide a set of characterized, qualified, generic components (and suppliers) and to demonstrate their use in prototype designs. In FY1997 an effort was initiated to reduce the size and cost of electronic safing and arming devices (ESAD) by a factor of 10 over currently fielded technology. Utilizing newly developed and qualified all-commercial components, a low-energy prototype ESAD was demonstrated this year that represents a factor of 10 reduction in size and a factor of 4 reduction in cost. While this technology enables significant improvement in weapon design and capability, cost remains a barrier to utilization in low-cost, mass-produced munitions. An analysis of the cost drivers shows that we are close to the limits with the current component designs and architectures. Therefore, the focus of the component effort was shifted this year to exploit recent advances in microelectronics, micro-electromechanical systems, micro-lasers and optical initiation. These new technologies offer opportunities for increased operational capability from micro firing systems along with a further order-of-magnitude decrease in size and reduced cost. Efforts continued on component shock hardening and packaging in support of Service initiatives in high-velocity penetrators. Chip slapper detonators, ceramic capacitors, and the new MCT semiconductor switches were tested in a single axis at representative shock levels with no performance loss. A divided Hopkinson bar apparatus is under development to simultaneously test ESAD components in multi-axis shock environments as defined from instrumented high-velocity penetration tests. To preserve and transition the advanced electronic initiation technology base developed under this program, a computerized knowledge base is under development on design, manufacture, test and surveillance. Sections on slapper detonator technology were completed this year. This classified tool will ensure experience retention in archives and support government laboratories and contractors.($ 2.810 million)

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(U) DoD and DOE have very similar requirements for energetic materials. Both agencies desire high explosives with increased or tailored performance and decreased sensitivity, and recent accomplishments have benefited both agencies. Like advanced initiation, improved energetic materials are enabling technology for the next generation of weapon systems that will be safer, smaller and more lethal. Under this program a combination of evolutionary and novel technologies are under development. Conventional chemistry has been used to develop more powerful, less sensitive explosives. Nano-structured and engineered materials are being explored to increase energy density and energy on target by factors of three or more. Higher risk efforts are also underway to explore the possibility of metastable High Energy Density Materials (HEDM). Using conventional chemistry a number of new candidate molecules have been synthesized, characterized and formulated. The development of new materials is based on theoretical molecular design. The structure, performance and sensitivity of new molecules are predicted computationally, then synthesis is attempted. The focus is in two areas: molecules with significantly increased energy over current materials and very insensitive materials with reasonable energies. A new molecule, LLM-121, with a predicted energy density greater than CL-20 has been made. Characterization work is pending the crystallization of the material in pure form. As reported last year, another new explosive under development is LLM-105. It is dense, thermally stable and very insensitive. With 30% more energy than TNT it has possible detonator and booster applications and is an alternative to TATB in special purpose weapons such as hard target penetrators that have to survive high shock loadings. The characterization of this material is essentially complete and formulation work is underway for possible weapons applications. Metastable Intermolecular Composites (MIC) developed under this program were the first successful examples of nano-structured energetic materials with significantly enhanced performance. They demonstrated that tailored, ultra-fine reactant particles could dramatically increase the energy release rate of thermite-like materials and provide twice the total energy of high explosives. The first application of this technology is for lead-free percussion primers for small arms ammunition, and this program is now in engineering development under SERDP funding. A new bulk process for manufacturing nano-structured energetic materials using sol-gel chemistry has now been developed with the promise of precise control of material homogeneity, properties, and geometry. Additional applications of the material are under evaluation including reactive warheads that better couple energy to the target and applications that require very high thermal loadings. Extended solid HEDMs are also under development. This work uses intense pressure and temperature to force elements into highly energetic bonding states that can be recovered to ambient conditions. Current synthesis techniques have produced CO-derived solids and a family of novel nitrogen materials, but in very small quantities. These materials are expected to be highly energetic, but characterizing them, and particularly verifying the energy content, has been difficult due to the microscopic quantities of material available. The two principal activities this year have been in improving

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the diagnostics used to characterize the new HEDMs and the design of a new bulk quantity synthesis capability. The creation of the thermochemical code Cheetah represents a major accomplishment of this program. The code predicts the performance of energetic materials including high explosives, propellants and pyrotechnics and reduces the number of tests necessary to develop a new material. Cheetah 3.0 will be released this year to more than 300 DoD, DOE and DoD contractor users. This version includes new equations of state resulting in greatly enhanced stability and accuracy of the code. A major effort is also underway to develop a suite of codes for use in predicting the response of energetic materials in weapon systems subjected to thermal and mechanical insult. The objective is to reduce the number and cost of the current go/no-go insensitive munitions test protocols required to qualify a new system for military use and to improve our understanding of the physical mechanisms and safety margins. First-generation tools for use in analyzing cookoff accidents have been developed. During this year a collaborative effort with the Navy was initiated to experimentally assess and validate these codes for use in predicting the response of weapon systems including the violence of reaction in cookoff accidents. Quantitative data on cookoff violence have been generated by both the Navy in small-scale experiments and by DOE in the scaled thermal explosion experiments. Data on both HMX based explosives and PBX-109 have been obtained for use in establishing the accuracy and range of validity of the predictive models. ($ 3.960 million)

(U) Lagrangian and Eulerian hydrocodes, coupled code systems, arbitrary Lagrangian-Eulerian (ALE) codes, and supporting materials models and constitutive relations developed at the nuclear weapons laboratories have been improved and adapted to DoD problems and transitioned to the DoD user community for use in warhead design and evaluation. This program provides prompt and direct access to the substantial investments in computational mechanics and materials modeling by the DOE and acts as the conduit for transition. Specific activities supporting the technology transition include distribution of computational tools to the DoD community, support of DOE codes on centralized DoD computing systems, training of the user community, and consulting as needed.
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(U) A major thrust of this program is hard target defeat. A new concept for hard target weapons, the Monolithic Ballasted Penetrator, has been developed for high-velocity delivery that significantly increases penetration into concrete and payload volume. A 2/3-scale prototype was designed, built and tested at 3350 fps. The penetrator successfully penetrated 15 feet of concrete. Although erosion and nose recession occurred, the penetrator nose remained sharp and symmetrical, and the penetrator maintained a stable trajectory. Differences have always been observed in predictions from different hard target design codes. Global parameters such as penetration depth are tending to converge, but differences in important details such as the maximum deceleration and trajectory remain. The results can be contradictory predictions about penetrator survival or weapon effectiveness at conditions near the design envelope. To address this issue an experimental test-bed program was initiated to collect high-quality data on well-characterized targets for use in code comparisons and validation. The first series of tests has been completed that is expected to resolve questions about the effect of target strength, nose shape, penetrator scale, and penetrator velocity. Advanced materials were evaluated for high-velocity applications. Collaborative studies are underway on an Air Force identified low-alloy steel that holds promise as a low-cost replacement for current ultra-high-strength steels being postulated for future high-velocity penetrators. Metallography, mechanical property, and chemical and processing tests indicate that the material has good potential and further study is warranted. Payload survivability during high-velocity impacts was studied in a joint program with the Navy. A mid-scale penetrator loaded with LX-17, an extremely insensitive explosive, was tested at the end of FY1999. Both the penetrator and explosive survived the impact intact. The penetrator has been remotely disassembled and visual inspections and small-scale safety testing completed. No change in the properties of the explosive and no cracking or other impact related deformities were observed. These results demonstrate that a viable baseline payload exists for high-velocity penetrators. In an alternative approach to hard target defeat, work is underway on developing the concept of using a multiple shaped charge array as a precursor warhead to increase the penetration into concrete of a follow-through penetrator. In tests conducted at China Lake, multiple shaped charges fired simultaneously were shown to increase the mass of concrete removed from a target by a factor of four over that from the multiple shaped charges fired individually. This verifies the hypothesis that jet interactions can augment structural damage. Relating warhead performance to material properties requires a detailed knowledge of material properties under dynamic conditions and is considered a fundamental issue in computationally based design of future weapon systems. Additional progress has been made in demonstrating how impurity levels and grain size combine to affect the material behavior in shaped charge liners. New processing techniques were developed that produce an exceptionally fine grain structure in shaped charge liners and result in increased jet ductility. This work is important for developing long-standoff warheads for application to counter active protection systems. Our understanding of the effects of surface finish, microstructure and

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metallurgy on Ta explosively formed penetrators (EFP) is improving, resulting in designs with more consistent performance. An experimental test-bed program was initiated to examine important material properties and processing variables in Ta liners and to validate advanced materials models. For the first time, a highly time-resolved measurement was made of infrared emission from a shocked metal surface. This information provides a valuable test of the accuracy of material models used in design codes for advanced munitions.($ 3.370 million)

(U) DoD and DOE efforts toward munitions lifecycle technologies including stockpile aging, surveillance, demilitarization and disposal are coordinated under the auspices of this program. As the focus for demilitarization and disposal in DoD turns from open-burn and open-detonation to resource recycle and recovery, alternative technologies are required to turn waste materials into useful products. The potential for cutting explosives both bare and encased in steel has been demonstrated using a femtosecond laser. Unlike conventional cutting lasers that melt and vaporize material, the femtosecond laser ablates material with no evidence of heating. It offers unique capabilities for use in munitions demilitarization and manufacture. A dedicated femtosecond laser has been built in conjunction with a small blast chamber for use in scoping experiments. Work was also initiated to prepare a 10-kg explosive tank for use with laser cutting to allow exploration of demilitarization operations on full-scale munitions. The laser was used to demonstrate the defuzing of the Multiple Launch Rocket System grenade to allow its re-use. To provide automated remote capability for munition demilitarization activities a robotic workcell for disassembling 155-mm projectiles was designed and assembled. High-level software was written for remote disassembly of artillery shells to expose the submunition layers for handling and safing. When completed next year, it will provide the capability to completely disassemble the M483A1 rounds containing 88 bomblets. Age-related degradation of materials within high value weapon systems is studied in order to understand and predict changes in munition safety, performance and reliability during long term storage. Predictive models for materials and system aging are under development with a focus on solder interconnect reliability, corrosion of electronics with an emphasis on plastic encapsulated microcircuits, the aging of propellants, and the aging and fracture of adhesive joints. In the solder reliability task physical models were completed that calculate the evolution of microstructure deformation due to thermomechanical fatigue in Sn-Pb solder interconnections and validated using laboratory test samples and fielded test hardware. The goal of the task is to develop a computational tool that predicts the overall reliability of Sn-Pb solder interconnections of any geometry from physically-based calculations of deformation and crack damage
($ 1.790 million)

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(U) FY 2001 Plans:

(U) Improvement of electronic safing, arming and firing systems will continue with a focus on miniaturization, cost reduction and shock survivability for hard target penetrators. The development of a micro firing system will continue with a design goal of a further factor of 10 reduction in size over the recently demonstrated low-energy systems (and a factor of 100 over currently fielded technology.) Activities will include component development and evaluation, improved system integration, and demonstration of manufacturing technologies. Fabrication of nano-structured capacitors and micro-electromechanical transformers and other safe and arm components will be demonstrated, and system tests will be initiated. Chip slapper detonators were recently qualified for fleet use by the Navy. To provide continued support for system applications a reliability study on performance as a function of electrical input will be defined and conducted jointly with the Navy. In addition an extensive program of detonator testing across the range of required environmental conditions, including cold, temperature cycling and humidity will be initiated to evaluate long-term reliability of the low-energy chip slapper assemblies in realistic military environments. Component testing in shock environments and the development of packaging technology will continue in support of Service initiatives in hard target munitions. A unique experimental capability for testing component response to simultaneous multi-axis shocks was developed and will be used to simulate realistic system shock environments. Multipoint detonator arrays are used in advanced aimable and target-adaptable warheads, and arrays of 4 to 112 detonators have been successfully produced and fired. However, large multipoint firings must be conducted at voltages well above the predicted threshold values for individual detonators to ensure reliable performance of all of the points. Severe current oscillations have been observed in physically large multipoint circuits and appear to be responsible for the anomalous behavior of the detonators. An experimental effort has been undertaken which should confirm the mechanism responsible for the oscillations and provide a path for developing mitigation schemes and more robust multipoint designs. ($ 3.290 million)

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(U) Work in energetic materials will be aligned with the recommendations from the DoD 2000 Weapons Technical Area Review and Assessment (TARA). They expressed concern over the decline in DoD core investments in energetic materials and recommended a national initiative in high energy density materials to maintain weapon lethality as weapon and platform size decrease. They specifically emphasized the need to exploit opportunities in nano-energetics. Efforts sponsored under this program are consistent with their comments. The development and characterization of new insensitive and new high-energy, high-power materials will continue with synthesis based on theoretical molecular design. The predicted performance and material sensitivity properties of the new high-energy molecule LLM-121 will be confirmed, and detonator and booster applications of the very insensitive LLM-105 will continue to be developed. The investigation of sol-gel chemistry as a bulk manufacturing process for nano-structured energetic materials will continue with a focus on material consistency, material characterization and process scale-up. Of particular interest is the development and evaluation of engineered pyrotechnics using this process. Samples materials will be provided to others in the DoD energetics community for weapons evaluations. The creation of new HEDMs will continue, along with the development and implementation of accurate techniques for determining the crystal structure and energy content of the newly synthesized materials. The new bulk quantity synthesis capability will be established with the installation of a special press designed to produce sample sizes of 100 mm3. At this scale the energy content can be measured using standard techniques with great reliability and accuracy. With the release of Cheetah 3.0 the emphasis in Cheetah development will turn towards implementing more sophisticated kinetic models into the code that can account for differences in explosive microstructure including explosive particle morphology and towards generating more accurate equations of state for detonation products. To support this work a new impulsive stimulated light scattering spectrometer will be used to conduct measurements in a diamond cell to monitor the onset of chemical reactivity at extreme conditions with great accuracy. Efforts to develop and validate computational tools for predicting munition system response to operational threat and accident environments will continue. The joint experimental program with Navy to measure the violence of reaction in cookoff accidents will be expanded from simple to complex geometry tests. The simulation tools will be exercised against these data to validate the models and expand their ability to predict weapon system performance and response in accident situations. The response of energetic materials to low strain-rate deformations, where the mechanical properties of the materials control the energetic response, is also under investigation. Experimental data on the dynamic stress-strain response of both the crystalline energetic material as well as the non-energetic binders used in currently fielded explosives will be generated to support the development of predictive computational tools. ($ 4.526 million)

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(U) The development of Eulerian, Lagrangian, coupled and ALE codes relevant to the design and evaluation of munitions will continue. Efforts will continue in the development, implementation and validation of material constitutive and failure models supporting the simulation of warhead formation and warhead/target interactions. The program also provides a conduit to the improved materials models emerging from the DOE Advanced Strategic Computing Initiative providing high resolution, accurate predictions of materials behavior and failure relevant to the analyses of weapon systems. The transition and support of these tools and models along with user training will be provided as needed.($ 2.410 million)

(U) Testing of the Monolithic Ballasted Penetrator will be completed with a 2/3-scale prototype fired against an oblique concrete target to evaluate penetrator behavior and performance. Data from the small-scale experiments performed in FY2000 on oblique entry into rock targets will be evaluated and used to improve the modeling of target entry dynamics and in-target trajectories. The experimental test-bed program for code validation will continue. The data package from the first instrumented test series will be provided to the community for benchmarking and validating the various hard target penetrator design tools. The objective is to identify and resolve differences in the models and calculations. Evaluation of the Air Force experimental steel will continue with measurements of its dynamic properties and further studies of processing variables that contribute to its strength and toughness. As follow-on to the Navy payload survivability study, the program will support further testing to gather data useful to fuze designers. On-board instrumentation will be provided to the Navy for use in gathering realistic penetration environments during hard target penetration events. In the study of precursor charges for hard target weapons, the use of multiple simultaneous shaped charge jet impacts has been shown to significantly increase target damage. The concept will be further explored in tests against full-scale targets at China Lake where precursor designs, charge arrays, and liner materials will be evaluated. The study of dynamic material properties will continue with a focus on the role of processing, impurities and microstructure on the dynamic behavior of warhead liner materials. The objective of this work is to understand and exploit the effects of processing. To evaluate the accuracy of the current materials models, an experimental Ta liner test-bed program was undertaken. In this study Ta EFP liners have been fabricated to a generic design by four different process routes resulting in four well-characterized microstructures. The resulting liners will be fired and the slugs will be soft caught and compared to the shapes predicted by the advanced materials models. Infrared thermometry measurements of shocked metal plates will continue based on the success in FY2000.($ 3.830 million)

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(U) A process has been developed that utilizes waste Explosive D available from demilitarization operations to form picramide, the starting material for synthesis of the insensitive explosive TATB, a high value product for both DoD and DOE. This process, which was demonstrated in FY2000, will be scaled-up from 1 kg to 10 kg in collaboration with Mason and Hangar, Amarillo, Texas, in support of a Navy manufacturing technology program to commercialize the process planned to start in FY2001. Exploitation of femtosecond laser cutting and machining of explosives for both munitions demilitarization and manufacturing will continue. The emphasis this year will be on the determination of optimum cutting parameters, safety limits, and geometry limits for munitions related materials and high explosives, and on the preparation of the 10-kg explosive tank for use with laser cutting. A parallel modeling effort will study femtosecond time-scale kinetics of the interaction of a laser pulse with energetic material. Work on the robotic workcell will focus on completing the technologies required to transition the existing M483A1 automated disassembly workcell into a production system. The complete remote disassembly of 155-mm artillery shells to expose the submunition layers for handling and safing will be demonstrated. The ultimate program goal is to implement integrated vision capabilities with force control and compliant tooling to demonstrate completely automated disassembly of a cluster munition with safing of the individual submunitions. Development of materials and system aging models will continue in the areas of solder interconnects, plastic encapsulated microcircuits, propellants, and adhesive joints. A model for the reliability of plastic encapsulated microcircuits in dormant storage will be completed and validated using field and accelerated aging information. This is an important area for DoD because commercial specifications and test protocols used for electronic components do not accurately represent the long-term storage times and conditions relevant for DoD munitions.($ 2.460 million)

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(U) <u>FY 2002 Plans:</u>

(U) Continue the development and demonstration of improved components and architectures for robust, low-cost, miniature safing, arming and firing systems. Demonstrate a prototype micro fireset based on microelectronics and micro-electromechanical components. Continue component development and evaluation and explore commercial sources for manufacturing. The program goal is a factor of 10 reduction in fireset size over the current low-energy designs. Continue the testing program on chip slapper detonators to evaluate long-term performance and reliability in realistic military environments. Complete the characterization of detonators, capacitors, switches, etc. in shock environments for application to hard target munitions toward the program goal of demonstrating a prototype ESAD in a high-velocity penetrator. Resolve the design issues causing current oscillations in multipoint detonator arrays utilizing low-energy chip slapper detonators and develop improved design principals. Prepare for the large multipoint array demonstrations and begin transition of the technology to DoD contractors. Continue to support and develop the knowledge base tool for preservation of advanced initiation technology. Expand its scope to include other fireset components beyond detonators.($ 3.370 million)

(U) Continue efforts to synthesize, characterize and scale-up new energetic materials with increased or tailored performance and decreased sensitivity. Complete the formulation work toward the development and qualification of an LLM-105 booster explosive. Continue the development of nano-structured and engineered energetic materials, including sol-gel derived materials, and evaluate their effectiveness and utility for warhead applications. Demonstrate the feasibility of bulk synthesis on CO-derived and nitrogen HEDMs and complete initial measurements of their energy content. Explore the synthesis of additional extended solid HEDMs. Continue the development and maintenance of the Cheetah thermochemical code for performance predictions of energetic materials, and provide user support to the DoD community. Exercise the first generation of simulation tools for munitions response to accident environments against test data to validate the codes and expand their ability to predict weapon system performance and response in accident situations. The joint experimental program with Navy to measure the violence of reaction in cookoff accidents will be expanded to testing and analyses of a full weapon system. Experiments to determine mechanical property for both fielded high explosives and their constituents will be executed for use in developing and validating high explosive mechanical response models. ($ 6.843 million)

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(U) Continue to develop, extend and apply the hydrocodes and associated materials models for warhead design and evaluation. Ongoing code and material model development will continue to focus on greater accuracy, improved physics, and extension to a broader class of real-world problems. Continue to support the transition of these tools, the training and consulting for the DoD user community.($ 2.605 million)

(U) Continue the study of advanced hard target penetrator concepts and adapt designs to state-of-the-art materials and manufacturing methods. Complete the experimental hard target test-bed program for code validation with a series of oblique impact tests into concrete. The focus will be on obtaining data that reveals the dynamic rotations of the penetrator during target entry and the resulting trajectory. The data will be provided to the DoD community for use in validating and benchmarking hard target design tools. Investigate weldability and melt processes to optimize properties and castability of the new Air Force low-cost penetrator steel. Continue the science-based technology projects relating warhead performance to material properties under dynamic conditions as a prelude to improved computational modeling and the transition of improved warhead designs to developmental and fielded weapon systems. Complete the simulations of the Ta liner test-bed experiments and assess the utility of the new materials models. Continue the development and evaluation of powder metallurgy production methods for EFP liners for enhanced anti-armor warhead applications. Initiate the development of advanced aimable warheads exploiting the individually controlled, distributed micro-firesets under development in the advanced initiation task.($ 3.900 million)

(U) Continue the development of femtosecond laser cutting and machining of explosives for both munitions demilitarization and manufacturing operations. Begin large-scale HE tests in preparation for demonstrations on live munitions. Adapt the robotic workcell to the disassembly of Adam mine rounds. Design and simulate the disassembly process, fabricate the hardware and demonstrate the complete remote disassembly of the mine round. Continue the development of materials and system aging models with a focus on predicting the reliability of solder interconnects, plastic encapsulated microcircuits, propellants, and adhesive joints.($ 2.460 million)

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(U) **B. Program Change Summary**	**FY2000**	**FY2001**	**FY2002**	**Total Cost**
Previous President's Budget Submit	14.315	16.670	16.785	Continuing
Appropriated Value	0.000	16.670	0.000	Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed Undistributed Reduction	0.000	-0.154	0.000	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	-0.073	0.000	0.000	
c. Other	0.000	0.000	2.393	
Current President's Budget	14.237	16.516	19.178	Continuing

Change Summary Explanation

(U) **Funding**: FY 2000 fund was identified as a source on the FY 2000 OMNIBUS reprogramming action. FY 2001 reductions reflect Section 8086 adjustments.

(U) **Schedule**: N/A

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(U) **Technical**: N/A

(U) **C.** **Other Program Funding Summary Cost** N/A

(U) **D.** **Acquisition Strategy**: N/A

(U) **E.** **Schedule Profile**: N/A