

**JUSTIFICATION REVIEW DOCUMENT  
FOR OTHER THAN FULL AND OPEN COMPETITION**

**Program/Equipment:** Comprehensive dynamic and quasi-static testing of high-performance fibers.

**Authority:** 10 United States Code (U.S.C.) 2304(c)(1)                      **Amount:** \$1,500,000.00

**Prepared by:**

Typed Name: Suzanne Bosselman                      DSN: 654-0029  
Title: Systems Engineer, PM SPIE, TMD                      Date: 22 April 2010

**Contracting Officer:**

Typed Name: Susan Greider                      DSN: 298-0872  
Title: Procuring Contracting Officer                      Date Reviewed: \_\_\_\_\_

**Technical Representatives:**

Typed Name: Dr. James Zheng                      DSN: 654-4865  
Title: Chief Scientist, PM SPIE                      Date Reviewed: 4/23/2010

**Requirements Representative:**

Typed Name: LTC Jon Rickey                      DSN: 654-9321  
Title: Product Manager, PM SPE                      Date Reviewed: 4/23/2010

**Reviews:** I have reviewed this justification and find it adequate to support other than full and open competition.

**Program Manager**

Typed Name: LTC Jon Rickey                      DSN: 654-9321  
PM Soldier Protective Equipment (PM SPE)

Signature: Jon R. Rickey                      Date: 4/23/2010

**Legal Counsel**

Typed Name: David H. Scott                      DSN: 298-1553

Signature: [Signature]                      Date: 5-4-10

**Justification and Approval  
For Other Than Full and Open Competition**

1. **Contracting Agency:** US Army RDECOM Contracting Center, Aberdeen Contracting Division, ATTN: CCRD-AP-BA, Aberdeen Proving Ground, MD 21005-3013
2. **Description of Action:** Request approval to award a firm-fixed priced, three (3) year, indefinite delivery, indefinite quantity-type contract to Purdue University, 401 S. Grant Street, West Lafayette IN 47907-2024 under the statutory authority permitting Other than Full and Open Competition 10 U.S.C. 2304(c) (1), as implemented by Federal Acquisition Regulations (FAR) 6.302-1, Only One Responsible Source and No Other Supplies or Services Will Satisfy Agency Requirements, for the acquisition of testing and analysis. The minimum for the effort is \$150,000 and the maximum is \$1,500,000. 2010 Research, Development and Engineering (RDT&E) funding will be provided.
3. **Description of Supplies/Services:** Testing of high-performance fibers will be accomplished including dynamic axial tension tests and transverse compression tests. Dynamic axial testing is conducted to measure fiber response to high rate loading conditions at rates comparable to a ballistic event. Transverse compression tests are used to measure fiber properties which are relevant to ballistic performance. Services will include data reduction and reporting. For this requirement, the schedule for delivery of final report for each set of fiber tests is twelve (12) weeks after receipt of order. These techniques will be used to characterize the mechanical behavior of ballistic materials of interest to Product Manager Soldier Protective Equipment (PM SPE).
4. **Authority Cited:** The statutory authority permitting Other than Full and Open Competition is 10 U.S.C. 2304(c)(1), as implemented by FAR 6.302-1, Only One Responsible Source and No Other Supplies or Services Will Satisfy Agency Requirements.
5. **Reason for Authority Cited:** Purdue is the only source capable of meeting the Government's requirement. No other supplies or services will satisfy agency requirements. Dr. Wayne Chen, of Purdue University, is a renowned expert in fiber characterization and high rate measurement techniques. His expertise is in the development of novel experimental methods, and characterization and modeling of the dynamic mechanical behavior of advanced materials. Dr. Chen has spent the past ten years of his career developing the expertise and knowledge to perform these analyses of interest to PM SPE. Both the test methodology and measurement devices developed by Dr. Chen are one of a kind, proprietary technology. Custom experimental equipment, including a dynamic axial testing facility and micro-scale transverse compression load testing device were designed and built by Purdue University. The trained personnel possess a unique skill set and have characterized many high-performance fibers including Kevlar® KM2, 129, 600, Twaron, Zylon 555, and A265 under various loading conditions.

This capability has taken several years to develop and required significant investment in time, material, and intellectual capital. Furthermore, the need for this type of specialized service is extremely limited and is not expected to develop into a competitive industry. This facility was built through an R&D collaborative agreement with ARL and cost \$395,000 and took eighteen months to complete. This cost does not account for any previous grants or the years of research conducted by Purdue in this field prior to this contract. The cost of the intellectual capital investment is difficult to estimate but is substantially greater than the value of this prior contract. To bring another source up to speed and develop a similar capability would result in duplicated costs of \$395,000 at minimum and delay in delivery of at least eighteen months. Furthermore, it would also be contingent finding a suitable scientist to perform this research.

Understanding which fiber properties have the greatest influence on ballistic performance is essential to making improvements to fibers and fiber-based armor. Standardized test methods are commonly used to evaluate basic fiber mechanical properties and are for quality assurance testing. These methods are essential for large scale production testing; however, they have limited utility as a research and development tool. Measurement of dynamic and transverse fiber properties is an effective means to investigate subtle differences in fiber characteristics, and may prove to be the key to revealing the properties which dictate ballistic performance. PM SPE requires these measurement techniques to understand and develop a correlation between constitutive

fiber properties and performance. Standardized test methods are lacking because they cannot accomplish this objective and will not fulfill the Government's requirement.

Project Manager Soldier Protection and Individual Equipment, Technical Management Division's (PM SPIE, TMD) mission is to support PM SPE and the armor industry to advance the state of the art of armor and armor component materials. This effort serves two essential purposes: 1) enhances the understanding of fiber property-performance phenomenology and 2) provides a unique tool to measure and evaluate relevant mechanical properties of existing and new fiber grades. Through increased scientific knowledge and advanced characterization techniques, improvements to armor and armor component material can be realized.

6. **Efforts to Obtain Competition:** Market research was conducted, details of which are in market research section 8. This requirement was synopsisized in accordance with FAR 5.201 and posted to the Federal Business Opportunities website on 11 March 2010. To date, no responses have been received. If the Government determines that more than one source can meet the Government's requirements, a competitive acquisition will be initiated. For the Government to purchase the intellectual property and compete the requirement would result in a duplication of cost and effort (see paragraph 5) that would not be recoverable.
7. **Actions to Increase Competition:** The Government will continue to monitor industry capabilities through formal methods such as solicitations and through informal means such as technical meetings with industry and academia. For future buys, if any additional capable vendors emerge in the industry then a competitive acquisition will be initiated.
8. **Market Research:** Dr. James Zheng, Chief Scientist, PM SPIE, TMD is the recognized Army body armor and protective equipment technical expert. Experts from the armor industry, armor component industry, and testing community request meetings with Dr. Zheng on a regular basis to share their latest designs, new technologies, new materials, and new testing methodologies. In calendar years 2009 and 2010, Dr. Zheng has hosted or attended over 232 meetings (minimum 2 hours each) pertaining to armor emerging technologies, materials, and testing. He also regularly meets and collaborates with representatives from academia, ARL, ARO, OSD, and NSRDEC conducting research on armor, armor component materials, and testing. Dr. Zheng has visited the facilities of all of the leading ballistic fiber manufacturers including Honeywell, DuPont, DSM Dyneema, and Teijin. Dr. Zheng has also visited the facilities all of the universities who are leading the research in fiber including North Carolina State University, University of Delaware, and Purdue University. These manufacturers and universities have developed state of the art facilities and are the leaders in fiber production and testing. Through these interactions, PM SPIE actively seeks information and pursues alternative sources that will satisfy agency's needs, yet Purdue is the only source that has the required technology that can meet the Government's needs.
9. **Interested Sources:** This action was synopsisized in accordance with FAR 5.201 on 11 March 2010. To date, no responses to the synopsis have been received.
10. **Other Facts:**
  - a. **Procurement History:** Contract # W911NF-07-2-0015 – 5 Year Cooperative Agreement with Army Research Laboratory awarded competitively on 01 January 2007 for \$600,000.00 to Purdue University. This effort was awarded under R&D, Broad Agency Announcement W911NF-07-2-0015 for coordinated research and development efforts concerning the Dynamic Deformation and Failure Behavior of biological Soft Materials such as soft tissue, porcine muscle, and bones to develop a facility and test methodology to determine the tensile and compression behavior as a function of strain-rate.

During market research, PM SPIE, TMD learned of the innovative research and development being conducted at Purdue University and recognized the potential benefits gained for body armor by evaluating individual ballistic fibers using the test methodology developed by Purdue for biological soft tissues. Through Purdue's increased scientific knowledge and advanced characterization techniques, improvements to armor and armor

component material can be realized. Therefore, a sole source procurement based on the foregoing justification was initiated to procure this unique testing from Purdue University.

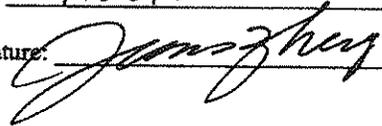
- b. **Acquisition Data Availability:** Tech data packages are not available for this effort. This purchase is not for a commodity item. This work is cutting edge research and investigative in nature; therefore, cannot be specified in a technical data package.
- c. **Urgent and Compelling Urgency:** Not applicable
- d. **Subcontracting Competition:** There are no subcontracting opportunities. Purdue will perform all of the services required under this contract; no sub-contracting will be required.
- e. **Follow-on Contracts-** Purdue University had a previous collaborative agreement with ARL (see Procurement History) for development of valid dynamic testing capabilities for single fibers. This new requirement seeks to leverage the proprietary technology that was specifically developed to fulfill an Army need. Award to any other source would result in substantial duplication of cost to the Government that is not expected to be recovered through competition and unacceptable delays in fulfilling the agency's requirements (see section 5).

11. **Technical Certification:** I certify that the supporting data under my cognizance, which are included in the justification, are accurate and complete to the best of my knowledge and belief.

Typed Name: Dr James Zheng

Date: 4/23/2010

Title: Chief Scientist, PM SPIE,TMD

Signature: 

12. **Requirements Certification:** I certify that the supporting data under my cognizance, which are included in the justification, are accurate and complete to the best of my knowledge and belief.

Typed Name: LTC Jon Rickey

Date: 4/23/2010

Title: Product Manager, PM SPE

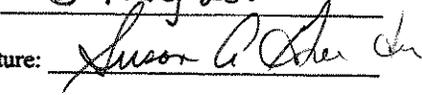
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13. **Fair and Reasonable Cost Determination:** I hereby determine that the anticipated cost to the Government for this contract action will be fair and reasonable in accordance with FAR 15.404-1(a)(3). Cost analysis will be used to evaluate the reasonableness of individual cost elements and a price analysis will be conducted to verify that the overall price offered is fair and reasonable. In accordance with 15.403-4 Certified Cost and Pricing Data is required.

Typed Name: Susan Greider

Date: 5 May 2010

Title: Procuring Contracting Officer

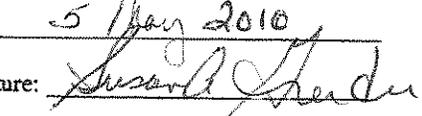
Signature: 

14. **Contracting Officer Certification:** I certify that this justification is accurate and complete to the best of my knowledge and belief.

Typed Name: Susan Greider

Date: 5 May 2010

Title: Procuring Contracting Officer

Signature: 

**APPROVAL**

Based on the foregoing justification, I hereby approve the procurement of services with Purdue University for testing and analysis to characterize the mechanical behavior of ballistic materials of interest, on an other than full and open competition basis pursuant to the authority of 10 U.S.C. 2304(c)(1), subject to availability of funds, and provided that the services and property herein described have otherwise been authorized for acquisition.

Date: 5/7/10

Signature: *Dennis P. Longo*  
Dennis P. Longo  
Special Competition Advocate