DCN:_____

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER

JUSTIFICATION FOR OTHER THAN FULL AND OPEN COMPETITION

I recommend that NASA, George C. Marshall Space Flight Center negotiate with Pratt & Whitney Rocketdyne, Inc. (PWR) only, for the technology development of a high-performance, lightweight 100-lbf thruster for in-space propulsion system applications. The thrusters will operate with cold oxidizer, nitrogen tetroxide mixed with 25% of nitric oxide (MON-25), and cold fuel, monomethylhydrazine (MMH). Only PWR was found to have a thruster designed for and successfully tested using MON 25/MMH.

The total estimated value of this research and development activity is $2,450,000; $1,250,000 for the base period and an additional $1,200,000 for the option period. The estimated period of performance for the combined base and option is approximately twelve (12) months.

This procurement is for the technology development of a 100-lbf thrust engine for in-space propulsion systems, such as those used on robotic lunar landers and other deep-space exploration spacecraft. The development effort shall focus on: 1) lightweight thruster components as well as on the overall thruster system; 2) low unit cost (in comparison with conventional thrusters); 3) operating with projected mission flight profiles, total burn times, and entire mission duration; and, 4) operating with cold propellants (MON-25/MMH) and in space environments. The work content will be divided into two work periods. The base period will include all hardware design, fabrication, and integration of the two thruster units including the design and fabrication of all hardware test support components. Two assembled thruster units will be delivered along with all associated instrumentation and test setup components ready for conducting design verification tests. In the option period, the thrusters will be tested in vacuum conditions with cold-temperature propellants.

This recommendation is made pursuant to FAR 6.302-1, which implements the authority for 10 U.S.C. 2304(c)(1) for the acquisition of supplies or services from only one responsible source and no other supplies or services will satisfy agency requirements. Competition is impractical for the following reasons:

1. The PWR thruster design is based on a unique miniaturized thruster concept with a highly compact valve and injector and utilizes advanced lightweight high-temperature materials for the thrust chamber and nozzle component. This simplistic innovative design approach will significantly reduce propulsion system mass and volume. The small engine envelope will not only provide the benefits of efficient system packaging for the design, but also particularly have more landing clearance for a Mars or Lunar lander. Because of a considerable savings in mass associated with this new thruster, a spacecraft equipped with multiple thrusters will be capable of carrying more payloads which would translate to millions of dollars in potential savings to the Government.

2. PWR leverages the Missile Defense Agency (MDA) heritage hardware that was designed specifically for cold propellants, MON-25 and MMH, and extensively tested with this bi-propellant combination. The thruster of interest utilizes MON-25/MMH propellants which have a freezing point of -50F, which is significantly lower than the freezing point of propellants used on conventional thrusters. As a result, the need for an active thermal management system is greatly reduced or eliminated entirely and yields less heater power requirements and lower spacecraft mass.

3. PWR's unique thruster designs require fewer parts for assembly and less machining of raw materials, which results in lower manufacturing costs and shortens development time. In addition, PWR utilizes the same highly efficient and low cost processes and fabrication techniques that are currently used to produce hundreds of flight proven thrusters per year for MDA. This approach has less risk, is more efficient and reliable, and offers significant potential cost savings to the Government.

4. This effort will allow PWR to enhance their current thruster design. The results of the preliminary thruster design review indicated that the planned enhancements to the thruster meet NASA's needs regarding lower complexity, less mass, lower cost, and use of cold propellants. PWR now is carrying the design to critical design review level using internal research and development (IR&D) funding.

5. This procurement is for the continuation of thruster demonstration and technology development which has been performed by PWR over a five-year period. This research has been funded by NASA/MSFC at a level of approximately $2,600,000, most of which would have to be duplicated by another source in order to mature the technology required to continue the current research. PWR has also used Independent Research and Development (IR&D) funding to promote the thruster research, providing three operational thruster units for the hot-fire test for technology demonstration and assessment.

Pursuant to NFS 1804.570, this proposed contract action will be published on the NASA Acquisition Internet Service (NAIS) and pursuant to FAR 5.201; this proposed contract action will be synopsized on the Federal Business Opportunities (FedBizOps) site. The disposition of any responses received in writing as a result of this publication will be added to this document by addendum.

Market research has revealed that only PWR has the matured thruster technology that offers significant advances over conventional thrusters. Further, this research revealed that only PWR has a thruster designed for and successfully tested using MON 25/MMH.

There are no known actions which the agency may take to remove or overcome barriers to competition before any subsequent acquisition for the services required.

I hereby certify the facts in this justification and any supporting data used for this justification are accurate and complete to the best of my knowledge.

Joseph C. Cianciola
Manager
Human Exploration Development Office

11/19/2012
Date

I hereby certify that the above justification is complete and accurate to the best of my knowledge and belief. In addition, I hereby determine that the anticipated cost to the Government will be fair and reasonable.

David A. Iosco
Contracting Officer

11/27/12
Date

Kim E. Whitson
Procurement Officer

11/30/2012
Date

Approved:

L. Dale Thomas
Center Competition Advocate

Dec. 3 '12
Date

ADDENDUM TO JUSTIFICATION FOR OTHER THAN FULL AND OPEN COMPETITION

The pre-solicitation synopsis required by NFS 1804.570 and FAR 5.201 was published on the NASA Acquisition Internet Service (NAIS) and the Federal Business Opportunities (BIZOPPS) on October 31, 2012. No vendors submitted a request for consideration in this procurement as a result of that synopsis.

David A. Iosco
Contracting Officer

11/27/12
Date