NNM13AA43C

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 Universities Space Research Association (USRA) only for support to the Earth Science and Astrophysics areas described in this JOFOC.

The total estimated cost of this effort is $7,646,380 and the estimated period of performance is July 1, 2013 – March 31, 2016.

This procurement is for support for the areas of Earth Science and Astrophysics supported by MSFC's Science and Technology Organization. Specifically: Short-term Prediction and Research Transition (SPoRT), Lightning Imaging Sensor (LIS), Visualization and Monitoring System (SERVIR), Geostationary Operational Environmental Satellite –R Series (GOES-R), Gamma Ray Burst Monitor (GBM), Advances Microwave Radiometer (AMPR), and High Energy Astrophysics, and Advanced Exploration Systems (AES).

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

1.) Short-term Prediction and Research Transition (SPoRT)

The forecasting effectiveness of the National Weather Service (NWS) depends on the ability to collect atmospheric observations, assimilate those observations into numerical models, convert model analyses into national environmental information and provide local warning and forecast service to affected communities. SPoRT's work directly supports these needs by the convergence of large amounts of satellite science telemetry, and then assimilating the data to provide modeling products to benefit the local and regional NWS forecasting and decision making processes. Specifically, some key forecast issues addressed by SPoRT's models – and supported by USRA personnel – include:

- correct diagnosis of cloud cover, fog and visibility, night-time minimum temperature forecasts
- coverage, amount and timing of precipitation
- improved accuracy and advanced warning for severe weather
- data voids that contribute to forecast errors
- accurate marine weather forecasts

In addition to the NWS, the SPoRT team also works collaboratively with other federal agencies, universities and private sector parties. Transitioning experimental data and products into operations through the SPoRT infrastructure will help NASA foster and accelerate Earth science strategy over the coming years and move future operational sensors into mainstream operations.

USRA has provided data analysis and scientific expertise to the SPoRT team for over 8 years. USRA experts support collaborations with international academic organizations, government and nonprofit agencies, as well as private firms to integrate NASA observations into models and to help disseminate real-time weather data to a variety of end users. The capabilities of USRA are significant with technical staff holding advanced degrees and 10 plus years of world-class expertise in each of these support areas as demonstrated through publications in peer-reviewed technical journals and peer recognition in the community. This collaboration with USRA has been a key component to the success of the SPoRT program and is critical to achieving SPoRT program objectives.

USRA scientists developed ingest and analysis capabilities for a variety of NASA data sets to support end user applications for improved weather forecasts and disaster support. These investments in resources and expertise, which have contributed significantly to the SPoRT program, cannot be replicated in a timely or cost effective manner, and have enhanced NASA's partnership with the National Weather Service and other organizations producing a more direct and effective transition of products to the operational weather community. Award to any other entity would result in duplication of costs that would not be recovered through competition and would fail to leverage the synergy and cost savings from building on the ongoing SPoRT program efforts.

USRA has already established a successful collaboration and paradigm with NASA and the NWS to transition advanced weather modeling and satellite products to their end users and can leverage this experience as the SPoRT program continues to achieve its objective. Since SPoRT has great familiarity with USRA, the continued execution of the collaboration and paradigm will insure a timely delivery of products to end users.

2.) Lightning Imaging Sensor (LIS)

The LIS team uses space-based lightning observations which provide comprehensive study into thunder storms, lightning, and fair-weather atmospheric electricity using a wide array of ground, in-situ airborne and space based observation systems as well as a sophisticated array of modeling and remote sensing algorithms. LIS hardware has flown as part of both the Optical Transient Detector (OTD) mission in 1995 and with the Tropical Rainfall Measuring Mission (TRMM) mission in 1997. The LIS team, which has included USRA scientists, has been monitoring global lightning activity with high detection efficiencies from low earth orbit now for over 17 years. The main LIS focus is determining how data from the on-orbit sensors can be used to improve severe weather forecasting and global chemistry/climate modeling. The OTD/LIS mission is the science pathfinder for the upcoming GOES-R Geostationary Lightning Mapper (GLM), planned for launch in 2015. Data from LIS is being used to prepare the GOES-R team to create and test algorithms for generating higher-level lightning products. Other collaborative activities are with the SPoRT group to optimize the use and understanding of the lightning data

in NWS forecasting models. Another important element of the LIS is supporting safety for NASA launch operations, including protection of personnel and property.
USRA is heavily involved with all of these collaborative opportunities and in every case award made outside of USRA would represent significant cost and schedule impacts to the LIS activities. Specifically, competition is impractical for the following reasons:

1. Over the past 17 years, USRA has provided to the LIS team's specific and unique data analyses and scientific expertise. This addresses the program's overarching objective (NASA Strategic Subgoal 3A) to Study planet Earth from space to advance scientific understanding and meet societal needs. It has been developed as part of LIS's heritage and USRA's long term involvement in LIS and is not available from other sources.

2. USRA developed, implemented, and now oversees operation and maintenance of the Lightning Forecast Algorithm (LFA) code. This code is incorporated into the Weather Research Forecast (WRF) model to advance and support of regional forecast activities using lightning observations. Only USRA has the necessary knowledge and capability to both operate and improve this important tool.

3. USRA developed a key lightning flash algorithm for grouping Lightning Mapping Array (LMA) network events into 3-D channel structure (including strokes and flashes). This important algorithm is widely used by the LIS program, as well as the national and international science communities, to enhance the role of LMA observations for satellite validations and broader lightning applications (includes national operational forecast demonstrations, proxy data production/ applications, lightning-chemistry). Only USRA has the necessary knowledge and understanding to maintain and improve this important lightning flash algorithm.

4. USRA provides key and unique contributions, not available from other sources, to the development and verification of proxy datasets using satellite- and ground-based lightning observations. The proxy data is needed and used to demonstrate and verify operational algorithms (e.g., the Lightning Jump algorithm, Level 2 processing code) for the GOES-R GLM program both pre-launch, and will be used to verify algorithms and instrument operations post-launch, as well as to continue to validate LIS observations.

5. The capabilities of USRA are significant with technical staff holding advanced degrees and 10 plus years of world-class expertise in each of these support areas as demonstrated through publications in peer-reviewed technical journals and peer recognition in the community. This collaboration has been a key component to the success of the LIS program. Continuing this collaboration is critical to achieving LIS program objectives.

6. The investment in USRA resources and expertise, which has contributed significantly to the on-going LIS program, cannot easily be replicated in a timely or cost effective manner. This has produced valuable science products that continue to enhance NASA's effectiveness for using LIS observations in support of important operational applications.

Award to any other entity would result in duplication of costs that would not be recovered through competition and would fail to leverage the synergy and cost savings from building on the ongoing LIS program efforts.

3.) Regional Visualization and Monitoring System - SERVIR

SERVIR is a joint venture between NASA and the U.S. Agency for International Development (USAID). For many areas around the world (specifically Central America, East Africa and the Himalayan region) where weather data is unavailable, the SERVIR system allows government officials and scientists to make better decisions on how and where to build. This data is also important in managing crops. All this allows underserved areas of the world to better understand historical and present potentials for disasters such as drought and flooding. In return, NASA has benefited by the development or modification of several models and technologies. This model and technology development is a key part of the continued work done by the SERVIR team, and is vital to the continued use of the SERVIR tools in the field. As more data is gathered and studied, prediction models and forecasts are fine tuned for each region of the world using SERVIR. Groundwork is laid for more SERVIR hubs in new areas. USRA has played several key roles in both the development and implementation of SERVIR around the world.

SERVIR provides access to the Tropical Rainfall Measuring Mission (TRMM) satellite data, which has Lightning Imaging Sensor (LIS) capability as one of its payloads, as well as local weather observations and forecasts into the Coupled Routing and Excess Storage (CREST) hydrology model, which tracks and forecasts water flow. SERVIR also works directly with MSFC's SPoRT Center to improve numerical weather forecasts using the Weather Research and Forecasting (WRF) model. The goal of this cooperative work with SPoRT is to make the WRF-based weather forecasts available to governments in the developing world for improved weather forecasting and early warning of extreme events. USRA plays a key role in all of these collaboration teams, as well as any other area of Applied Science important to MSFC, and their expertise and experience assures that NASA is able to get the best use of the SERVIR instruments. SERVIR is set up as an Applied Sciences project to improve environmental management, and disaster preparedness, as well as resilience to climate change by strengthening the capacity of governments in the developing world to integrate Earth observations and geospatial technologies into decision making for sustainable development. SERVIR staff develops these applications and then strengthens the capacity of SERVIR hubs located in Mesoamerica, East Africa, and the Himalayas. SERVIR applications are based on scientific algorithms for satellite remote sensing, ISS imagery, and in-situ wireless sensor networks. USRA has been part of SERVIR since its inception in 2004, and its staff has gained unique insight into the required applications. They have been key developers or Principal Investigators in science applications, training modules, in-situ wireless sensor networks, and even an International Space Station (ISS) Earth imaging systems. USRA has also led the development of a Science Operations Center at the NSSTC for this ISS system, currently being used to command the ISERV camera attached to the ISS. Through their work on SERVIR over the past nine years, USRA also has developed key scientific relationships with SERVIR Hub staff around the world. This is important to continue to understand and refine SERVIR's implementation and use.

Interruption to USRA staffing would be highly detrimental, and would result in loss of support for SERVIR hubs as well as great impact to the modeling development activities.

USRA also supports the development of wireless sensor networks for environmental monitoring. This work provides the methods for distributing the data. Integrating low cost wireless communication modules with environmental sensors can be deployed for applications such as early warning systems for landslide detection, which is a key component to the development and use of the forecast data being made available afield. The USRA expert in this activity was brought in after a national search to obtain the best talent to support this work.

Because of the unique experience of USRA through their technical collaborations, ISS Earth imaging system development, the SERVIR facilities at the NSSTC, and expertise derived from the involvement of USRA in SERVIR since inception, it is beneficial for the Government to continue collaborative work with USRA. It would be detrimental to the technical goals of SERVIR to not be allowed to work with the USRA experts on the team. There would be a cost and schedule hit if new team members were brought in to replace USRA. Further, the areas of the world currently served by SERVIR would be greatly impacted by the inability to gather and understand data needed to make weather forecasts and observations.

<u>Specifically, USRA expertise is critical to SERVIR in several areas:</u>

1. Water Resource Assessment.

   Understanding water availability is one of the critical needs in all SERVIR regions. USRA has been instrumental in tailoring the CREST modeling system for specific regional needs. USRA has turned the modeling system into a scientific tool, which the end users in the region can use. The continuing work includes tailoring the model to perform long-term historic analysis and scripting it to make it into a forecasting system. All this is dependent on USRA's past history and expertise gained through collaborations with other MSFC Applied Science areas.

2. Numerical Weather Prediction and Air Quality Modeling

   Satellite datasets play a vital role in numerical weather predictions. USRA personnel have significant expertise in scientific modeling setup, execution and analysis to generate short-term weather forecasts. USRA scientists are experts in the state-of-the-science air quality modeling coupled with weather forecasts to provide air quality assessment system for the end users particularly in the Mesoamerican region.

3. Scientific Data Dissemination

   Generating science products is one step in the journey of translating remotely sensed data into actionable information. Equally important is the transition of the scientific data to fit the needs of the end user. SERVIR has developed several tools to make that transition effective. USRA has played a vital role in development of the tools. USRA personnel have developed several means for translating the data into actionable information using internet and mobile platforms, thus allowing implementation in the

field. USRA continues to refine these tools based on the data being gathered by the SERVIR team.

4. Scientific Needs Assessment of End Users

   SERVIR links the latest science with the satellite datasets to the needs of SERVIR regions. The translation of the science capabilities results in applications within the context of the needs of the region. The SERVIR Applied Sciences Team brings a wealth of science products and USRA personnel have been critical in linking the products to the end users' scientific needs for decision making.

5. Satellite Data Validation with Ground Observations

   Modeling, remotely sensed data and in-situ observations are the three important components for accurate understanding and forecasting of any natural phenomenon. To make the remote sensing products more relevant to the end users in SERVIR regions, bolstering in-situ observations has become absolutely essential. USRA personnel have pioneered in developing validation models for scientific measurements and transmitting those in near real time. This means that information from many sources is integrated into a tool in which, for instance, flood data can be real-time reviewed in order to support decision making. For example, USRA personnel are leading a demonstration of a river flooding alert system for a highly flood-prone region in Bangladesh, which is in the Hindu Kush Himalayan region supported as a SERVIR hub. The end users are anticipating using this information to save lives and rebuild responsibly. For the first time, a meld of scientific observations and near real-time alert systems will help the community cope with an impending disaster. This activity would not be possible without USRA's support.

6. International Space Station (ISS)

   In addition to analytical models, SERVIR has been improving access to space-based Earth observation information that assists critical decision making during and after natural disasters. The International Space Station (ISS)/SERVIR Environmental Research and Visualization System (ISERV) was launched to the ISS in July 2012 and recently had a successful on orbit activation. The ISERV camera will receive commands directly from personnel working in the NSSTC to acquire image data from specific areas of the earth as the ISS passes over. The ISERV team is led by USRA experts.

4.) Geostationary Operational Environmental Satellite R Series (GOES-R)

1. The GOES-R Geostationary Lightning Mapper (GLM) is slated for a 2015 launch. Risk reduction and algorithm development are ongoing in preparation for this mission. USRA's expertise and continued support are critical to the mission preparation and support. As an example of the collaboration seen in the work done at MSFC / NSSTC with USRA, this GOES-R mission has benefitted from science and technology developed from the OTD/LIS mission discussed in section 2, "Lightning Imaging Sensor". This kind of collaborative effort is key to meeting requirement and schedules for

programs/project such as GOES-R.

2. For the last 5 years, USRA has provided to the GOES-R Geostationary Lightning Mapper (GLM) program specific and unique data analyses and scientific expertise not available from other sources, which address the program's overarching objectives.

3. USRA developed and continues to modify and expand the GLM Validate Lightning Detection (VaLiD) software validation analysis tool. In support of GOES-R Risk Reduction activities, USRA also developed and continues to optimize the operation and maintenance of the Lightning Forecast Algorithm (LFA). This provides data to the Weather Research Forecast (WRF) model to advance and support regional forecast activities using lightning observations. Only USRA has the necessary knowledge and capability to both operate and improve these important operations tools.

4. USRA developed a key algorithm for grouping Lightning Mapping Array (LMA) network events into 3-D channel structure (including strokes and flashes). This important algorithm is widely used by the GOES-R GLM program, as well as the national and international science communities, to enhance the role of LMA observations for GLM proxy data production/applications. The proxy data is used to demonstrate and verify operational algorithms (e.g., the Lightning Jump algorithm, Level 2 processing code) for the GOES-R GLM program during pre-launch, and for post-launch instrument operations verification and testing. Only USRA has the necessary knowledge and understanding to maintain and improve this important lightning flash algorithm.

5. USRA manages GOES-R GLM Algorithm Working Group (AWG) activities including monthly Earned Value Management (EVM) reporting, and hosting/organization of the annual GLM Science Meeting. USRA also supports GOES-R Calibration Working Group (CWG) activities including weekly reporting, calibration document reviews, and laboratory calibration verification. All of these activities have followed a long investment learning curve, and therefore are not easily replaceable.

6. The capabilities of USRA are significant with technical staff holding advanced degrees and 10 plus years of world-class expertise in each of these support areas as demonstrated through publications in peer-reviewed technical journals and peer recognition in the community. This collaboration has been a key component to the success of the GOES-R GLM program. It has produced valuable algorithms that will continue to enhance NASA's ability for applying and evaluating future GLM observations. Continuing this collaboration is critical to achieving program objectives. The investment in resources and expertise, which has contributed significantly to the on-going GOES-R GLM program, cannot be replicated in a timely or cost effective manner. Award to any other entity would result in duplication of costs that would not be recovered through competition and would fail to leverage the synergy and cost savings from building on the ongoing GOES-R GLM program efforts.

5.) Gamma Ray Burst Monitor (GBM)

The Fermi (formerly "GLAST") Gamma Ray Burst Monitor (GBM) was launched in July, 2008, as the secondary payload of the Fermi Gamma-ray Space Telescope mission. USRA support was part of this original team and continues today. Now in its fourth year of orbital operations, GBM's wide energy coverage and high sensitivity have provided significant advancements in gamma–ray burst information. It has successfully performed as designed on orbit and was approved for continued mission operations by a NASA Senior Review in January 2012. The original GBM proposal requires MSFC to support GBM mission operations for the duration of the flight. This requires a senior staff of qualified scientists, engineers and other support personnel. Duties for these personnel include operation/maintenance of the GBM Ground Instrument Operations Center, time critical assessment/promulgation of GBM data products, real-time maintenance/modifications as required of various ground software products and the electronics system ("pipeline") through which it flows. Among those who are pivotal players in meeting these mission requirements are 2 USRA personnel who serve as the Principle Investigator and the Ground Software Engineer. USRA possesses key knowledge of the GBM instrument/system from working with the instrument / system for a number of years which can't be obtained nay other way. Replacement of either would pose a significant detriment toward meeting mission requirements and/or to fulfilling US and international customer support expectations.

Specific USRA support includes:

* Serving as the lead author of the Gamma-Ray Burst Catalog, which is a critical/continually evolving science summary product, recently published and now in its second iteration.
* Providing maintenance of the various GBM scientific products
* Providing science leadership for the individual science team members, to include carefully nurtured relationships with our international partners in Germany and Ireland
* Significant professional insight for on-orbit command development/testing/submission in conjunction with GSFC's Integrated Test and Operations System (ITOS).
* Responsibility for refinement/maintenance of GBM ground hardware and the GBM flight software test system operation.
* Creating and maintaining the GBM ITOS and AstroRT (satellite operations software) displays.
* Serving as the primary liaison with Fermi Mission Scientist and the Fermi Users Group
* Chairing the weekly GBM trigger assessment meetings and provides expert interpretation of data
* Possesses experienced-based assessment capabilities with regards to GBM detector response issues
* Unique experience-based expertise with gamma-ray spectral de-convolution
* Oversight of the GBM ground software system since prior to Fermi launch and possesses foundational system knowledge that would be extremely costly and time consuming to replace.
* Unique system-wide knowledge of the entire (extensive) GBM data infrastructure, including the computer systems used and how the data must be processed before delivery to our internationally dispersed science teams and customers.
* Designing and implementing of GBM mission critical data pipeline upgrades for 2012.

* In 2007, personally created (maintains) a proprietary/centralized data cataloging system that is used by the science and operation teams within GBM. This system is critical to our primary mission requirement of creating the gamma-ray burst catalog, which is used by the science community at large.
* Pivotal contributing member of the GBM Instrument Operations Leadership Team. USRA provides the team's resident expert on computing requirements and associated IT aspects of daily operations.
* Extensive knowledge of the varied programming languages used by the GBM team members, to include C, C++, Perl, Python, Ruby, Java, and others, as well as the Unix operating systems

6.) Advanced Microwave Precipitation Radiometer (AMPR)

AMPR is a cross-track scanning passive microwave radiometer developed and built in the late 1980s to provide measurements of important geophysical parameters from an aircraft platform. The instrument provides information on surface temperature and near-surface wind speed, soil moisture and sea ice. AMPR data has recently become important in models which are used for flood detection. The next activity for AMPR is slated for 2013, where the instrument will be flown to provide quantitative information on precipitation processes.

For the last 2 years, USRA has provided support for the AMPR in preparation and use of the instrument in upcoming airborne field campaigns. USRA's support is embedded within the team in that past expertise with the AMPR hardware is critical to the necessary development of the detailed design and installation of instrument hardware, testing and ground support of the instrument including aircraft integration. Part of the required activity is working directly with the AMPR instrument and manipulating and implementing any necessary design changes. The USRA support is unique based on the extensive history of involvement with the development and maintenance of the AMPR instrument. USRA's experience with the instrument provides a unique understanding and it would be cost prohibitive to train new outside sources to re-learn the knowledge that USRA already possesses. USRA is positioned to provide the needed real-time support for both the development and maintenance of the AMPR instrument as it is flown on upcoming missions.

7.) High Energy Astrophysics

Astrophysics science is centered on panchromatic (sensitive to all visible colors of the spectrum) studies of star forming regions and their impact on the growth and evolution of nearby galaxies. Chandra X-Ray Observatory, Fermi Gamma-Ray Telescope, the Hubble Space Telescope and a number of ground based observatories are used to support international collaborative studies led by MSFC which discovered enigmatic and possibly paradigm-shifting flaring at gamma-ray energies from the Crab Nebula.

Following a major redesign in 1992, the Chandra X-ray Observatory was launched in 1999 and is managed by the Chandra Program Office at MSFC. USRA has been an integral part of the Chandra Project Office for over seventeen years, providing a higher degree of technical and

scientific experience than any other non-government employees within the Chandra Project science team. USRA personnel are expert in numerous unique aspects of the Chandra mission including instrument health and safety issues such as time-dependent molecular contamination, the satellite radiation environment, instrument calibration, and scientific analysis software and data pipelines. USRA has over eighty publications in refereed journals including fifty utilizing Chandra data or directly related to the Chandra satellite and its calibration.

USRA personnel at MSFC have over eighty refereed journal publications related to high energy astrophysics, including fifty utilizing Chandra data directly related to the observatory and its calibration. USRA personnel supporting these activities are considered to be world-recognized experts in the astrophysics of ultraluminous X-ray sources, a category of object uniquely suited for study with the Chandra observatory

USRA personnel are also developing a new differential coating technique to improve the smoothness of grazing incident x-ray mirrors, which is a new and promising approach that will enhance the resolution of future x-ray imaging telescopes. The unique experience and expertise provided by USRA is directly relevant to the wider ongoing efforts of the MSFC X-ray Astronomy group's instrumental development, calibration and sub-orbital scientific flight programs.

8.) Advanced Exploration Systems (AES)

USRA has been a key team participant since the Project's inception in 2011. The AES project is to advance radiation protection, measurement and warning systems for spaceflight missions. Crucial to achieving these objectives is the capability to perform detailed space radiation transport analyses and simulations characterizing the ionizing radiation environmental effects on astronauts, equipment, shielding and detectors. Objectives rely on USRA's proficiency with highly specialized radiation transport codes such as Geant4, FLUKA, HZETRN, and other computational tools. USRA has considerable expertise with these tools, is well-versed in the requirements and objectives of the Project and has therefore been able to make essential contributions.

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 in the Federal Business Opportunities. The results received in writing will be added to this document by addendum.

Market research was conducted. Because the technical areas described above are so highly specialized and have developed over several years, it is not possible to compare this activity within the marketplace. In all cases, specific USRA support was sought out to complement or supplement MSFC expertise. In addition, all of the described scope ties back to other efforts that

are specifically competed through proposal competitions. Those activities are managed via a separate procurement action. Due to the overall collaborative environment within the Earth Science and Astrophysics areas, the work described in this document is affected by those competitions.

There are no technical data packages, specifications, engineering descriptions, statements of work, or purchase descriptions suitable for full and open competition. Various published technical articles are available for general public viewing.

The estimated cost to the Government that would be duplicated is approximately $11,920,875. Details are shown below:

- SPoRT: Approx. $1,700,000
- LIS: Approx. $1,500,000
- SERVIR: Approx. $3,183,035
- GOES-R: Approx. $850,000
- GBM: Approx. $1,673,277
- AMPR: Approx. $133,000
- High Energy Astrophysics: Approx. $2,720,072
- AES: Approx. $161,491

These figures represent the investment already made in USRA's support to the technical areas described above. Further, it is impossible to know the impact on cost and schedule if outside personnel were to be brought in to replace the experienced USRA experts

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. For the above reasons, full and open competition is not feasible. Therefore, purchase of the support from USRA is the only practical approach.

This was synopsized on EPS / Fedbizopps on 4/18/2013. The synopsis closed on 5/10/2013. One inquiry was received to the synopsis from MIT –Lincoln Labs asking if this was for research. They were informed by email that it was not for research but support of existing programs and projects at NSSTC. No other responses or comments were received to the synopsis. There were no other entities with the required capabilities identified as a result of the synopsis and market research.

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.

Cindy Upton
Contracting Officer's Representative

May 14, 2013
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.

Melinda E Swenson
Contracting Officer

5/15/13
Date

Concurrence:

Kim E. Whitson
Procurement Officer

5/30/13
Date

Approved:

Lawrence D. Thomas
Center Competition Advocate

Jun 3 '13
Date