

JUSTIFICATION FOR OTHER THAN FULL AND OPEN COMPETITION

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

I recommend that NASA, George C. Marshall Space Flight Center (MSFC) negotiate with ECLS Technologies LLC for the support needed in research, design, development, testing, and system maintenance of Air Revitalization Systems (ARS) such as, but not limited to Sorbent Based Atmosphere Revitalization (SBAR), Carbon Dioxide Reduction (CDRe) Assemblies, and International Space Station (ISS) sustaining engineering tasks.

This contract shall have a base period of one year (12 months) with a one year (12 month) option.

The total estimated cost of this effort is approximately \$447K with the base year period of performance at approximately \$ 220K with option 1 at approximately \$ 227K.

The following justification provides the rationale for contracting by other than full and open competition for services to be provided by ECLS Technologies LLC which includes continuation of research, design, development, testing, and system maintenance of ARS such as, but not limited to CDRe and adsorption system support previously and currently provided by ECLS Technologies LLC.

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. ECLS Technologies LLC has a unique background with over 15 years experience in ARS and the required technical expertise needed to provide support for the MSFC ARS. ECLS Technologies LLC provides the required technical expertise needed by MSFC ARS in the specific areas of:
 - Development of facilities that incorporate precise system air supply control (with temperature).
 - Implementation of techniques for Carbon Dioxide (CO₂) and water vapor (H₂O) partial pressure control.
 - Design of test systems capable of operating with sub-ambient pressure control to less than 4 Pounds per Square Inch Absolute (psia).
 - Implementation of methods for control of valving with high speed transition and full position indication.
 - Development of instrumentation and control techniques and software models to perform real-time dynamic control of CO₂ and H₂O partial pressure to simulate crew metabolic changes.
 - Implementation and optimization of dual-computer DAC (data acquisition and control) to allow high frequency system control.
 - Design, development, and integration of ARS test articles that incorporate technologies and processes to include molecular sieve adsorption, catalytic reaction, and microwave plasma Pyrolysis.

- Generation of test approaches, methods, software, and procedures for evaluating ARS technologies and components in the context of potential spacecraft ECLS architectures and missions.
 - Analysis and evaluation of test data to include investigation of anomalies.
2. ECLS Technologies LLC is on-site at NASA MSFC and has, for the last three years been funded by MSFC and this is a follow-on effort of the work under contract NNM08AA46C and 2 previous purchase orders with ECLS Technologies LLC (previously known as Lee Miller Consulting).

This follow-on effort is a continuation of the research, design, development, testing, and system maintenance of Air Revitalization Systems (ARS). During the last 2 years under contract NNM08AA46C this company has provided significant expertise and unique engineering skills in the development of life support systems. ECLS Technologies LLC has successfully completed two years of research, design, development, testing, and system maintenance of various ARS and has a thorough understanding and knowledge base of the SBAR, Carbon Dioxide Reduction Assemblies, simulated suit loop testing, and Environmental Control Life Support Systems (ECLSS) instrumentation and testing.

Furthermore, only ECLS Technologies LLC possesses the required experience and technical expertise that is needed for NASA MSFC in the following areas:

Research

- Identification and evaluation of materials, mechanisms, and processes to improve and advance the spacecraft ARS technologies currently being tested at MSFC that include the molecular sieve adsorption based SBAR system, the catalytic reaction based Sabatier Carbon Dioxide Reduction Assembly, and the microwave plasma pyrolysis based Microwave Plasma Hydrogen Recovery System.
- Investigation of approaches for improved integration of the ARS components located at MSFC by utilizing data and analysis obtained during previous testing.
- Investigation of potential modifications to the existing real-time measurement and control systems to encompass a larger range of spacecraft cabin conditions and ARS operational parameters.
- Identification of advanced instrumentation and control devices and techniques to lower cost while improving performance of the existing test facilities while also maintaining safety.

Design

- Design of modifications to the ARS test articles, subsystems, and components currently located at MSFC to incorporate enhancements as identified through analysis performed during previous and ongoing testing.
- Design of new and modified test facilities to expand on current capabilities and incorporate enhancements such as the vacuum piping and valve configuration improvements that are being identified through the use of the VacTran™ software modeling and evaluation tool.
- Design of interface hardware and software for integrating the MSFC ARS subsystems with each other and with the existing test stands and MSFC facility data, power, vacuum, and fluid resources.

- Design of algorithms that enhance the current real-time instrumentation and control systems to accommodate a broader range of test parameters and to incorporate added functions such as expanded gas constituent analysis and control functions.
- Design of new and modifications to current electrical interface circuits to allow integration of new instrumentation with the existing facilities and data resources.

Development

- Fabrication and assembly of modifications to the ARS as verified through integration with the existing and modified test facilities.
- Implementation of mechatronic system functions using the LabVIEW™ programming language as well as the languages native to the valve actuator embedded controllers, intelligent instrumentation, and the ARS subsystems such as PLC ladder logic while utilizing bus architectures to include Ethernet, RS-485, RS-232, and USB.
- Development of software algorithms in the LabVIEW™ programming language that perform high-speed instrumentation and control functions while simultaneously performing real-time mathematical analyses from data provided by intelligent instrumentation such as a Quadrupole Mass Spectrometer.
- Implementation and verification of test facilities through fabrication, assembly, hardware integration, software integration, subsystem checkout, and facility checkout.
- Verification of ARS test articles, subsystems, and components as integrated with the test facilities using established techniques such as mass balance calculations, redundant instrumentation, secondary measurements, and model predictions.

Testing

- Generation of test approaches, methods, and procedures for evaluating ARS technologies and components in the context of potential spacecraft ECLS architectures and missions while meeting the life support requirements established in the Human-Systems Integration Requirements (HSIR) document.
 - Development of test and real-time workspace files for integration with PACRATS™, the MSFC provided data recording and archiving software utility.
 - Test operations support to allow 24/7 testing over full mission length scenarios.
 - Performance of anomaly investigations and analyses to determine the root cause of anomalies, determine the appropriate corrective action, and to assess if the issue has the potential to impact the use of the technology in spacecraft ARS.
3. The existing ARS schedule is baselined with fixed deliverables and a prohibitive amount of money and time would be required to prevent schedule impacts and replace the extensive technical expertise provided by ECLS Technologies LLC. Moreover, the MSFC customer (Program/Project Office) would have to approve missed deliverables and any additional funding that may be required due to contract disruptions.
 4. In addition, ECLS Technologies LLC has specific knowledge and technical expertise in the operation, maintenance and the necessary upgrades of complex life support systems and the required knowledge of the designs including each of the system aspects. Furthermore, ECLS Technologies LLC possesses the knowledge-base and technical expertise for the implementation of Technical Readiness Reviews (TRR's). Quality, Safety, and the advancement of Technical

Readiness Level (TRL's) needed for the research, design, development, and testing of Air Revitalization Systems.

5. Finally, ECLS Technologies LLC is a small veteran-owned business that has made significant contributions to the ARS, which has led to the successful advancement of TRL's for major hardware development and successfully met multiple major milestones with NASA MSFC. Therefore, NASA MSFC will take advantage of their expertise in the field of life support system development.

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

Based on market research there is no company with the experience and technical expertise to meet the current deliverables and if another company was selected, the time and money needed to bring on another company would result in a failure to deliver the current and future Program/Project deliverables.

There exists no technical data packages, specifications, engineering descriptions, or purchase descriptions suitable for full and open competition for this acquisition since this acquisition is for specific services and not for manufacturing of hardware.

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 these services from ECLS Technologies LLC (previously known as Lee Miller Consulting) is the only practical approach.

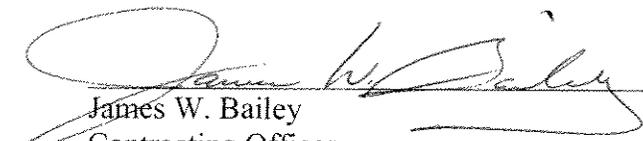
I hereby certify the facts in this justification and any supporting data used for this justification are accurate and complete to the best of my knowledge.



Monserrate Roman/VP33
ELS Project Manager

4-7-10
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.


James W. Bailey
Contracting Officer

4-06-2010
Date

Approved:


Mark Stiles
Office Manager,
Institutional Support Office

4/7/2010
Date