Associated Universities, Inc.

Suite 730
1400 16th Street, NW
Washington, DC 20036
Phone: 202.462.1676
Fax: 202.232.7161

Dr. Robert L. Dickman
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

April 15, 2005

Dear Dr. Dickman,

On September 14, 2004 Associated Universities, Inc. (AUI) requested NSF approval to proceed with the award of the ALMA antenna contract subject to clarification of technical issues related to differences between test measurements of the VertexRSI prototype antenna and their finite element model (FEM), and a review of estimated life cycle costs. We are now confident that we should proceed. This letter, together with our September 14 request, forms the basis on which AUI hereby requests authorization to proceed with a subaward to VertexRSI for the production of up to 32 ALMA antennas.

At the time of our request an Antenna Technical Working Group (ATWG) jointly established by AUI/NRAO and ESO was charged with conducting analyses of the FEM and life-cycle cost issues. The ATWG report was not conclusive. In December 2004, AUI/NRAO, ESO and the JAO agreed to convene a Joint Antenna Technical Group (JATG), under the leadership of the Joint ALMA Office (JAO), to conduct a series of additional tests on both ALMA prototype antennas to address the FEM and other technical issues raised by the Project.

In April 2005, the JATG issued its report which states that "...both prototype antennas meet the ALMA antenna specifications under direct consideration (surface accuracy at all elevations, all-sky absolute pointing performance) under the environmental conditions encountered during the testing and that the productions antennas based on these designs can also be expected to meet these specifications." (Note: The JATG investigated and satisfactorily resolved some other questions that arose in the course of the testing.)

The CSC recommended that, whilst power consumption was not cited as a selection criterion, the detail design process should pay careful attention to power consumption because of its implications upon operations costs.

Having made a determination that the outstanding technical issues identified in AUI's September 14 letter to NSF have been successfully resolved, the CSC has recommended to the NRAO Director and AUI President that the contract be awarded to VertexRSI.

AUI/NRAO ALMA Antenna Procurement Summary

The events leading up to our request to proceed with issuance of an ALMA antenna contract have been complex. To facilitate an understanding of the AUI/NRAO process, we have developed the attached "AUI/NRAO ALMA Antenna Procurement Summary". This document describes the process by which AUI/NRAO's Contract Selection Committee (CSC) recommended to the NRAO Director and AUI President that a contract be awarded to VertexRSI. The attachments to this document, particularly the "Joint Technical Evaluation Team (JTET) Report", the "Vertex Actions Regarding JTET-identified Deficiencies" and the "Joint Antenna Technical Group Test Results" report were used by AUI/NRAO to provide reasonable assurance that VertexRSI will be able to successfully execute the contract. As discussed in our September 14 letter, the JTET, composed of North American and European representatives, examined and rated all management and technical proposals received by NRAO and ESO. In its discussions with Vertex, the CSC requested that Vertex remedy the deficiencies noted in the JTET report. Vertex's actions addressing these deficiencies are noted in the document titled "Vertex Actions Regarding JTET-Identified Deficiencies". Most recently, the "Joint Antenna Technical Group Test Results" report was endorsed by the CSC as the basis for resolving the technical question regarding the Finite Element Model issue.

ALMA Board Resolutions and ASAC Recommendation

The proposed contract is consistent with the overall policy and recommendations of the ALMA Board. On three occasions, the ALMA Board and/or its ALMA Science Advisory Committee have provided direction regarding the antenna contact. In June 2003 the Board approved a resolution endorsing the Executives' goal to procure antennas based on a single tested design. In its February 2005 report, the ALMA Science Advisory Committee reported that while a reduction in scope to a 50-antenna array would lengthen the time required to conduct experiments, it would not preclude the Project from achieving its Level 1 scientific goals. Finally, in April 2005 the Board approved a resolution stating that each Executive should procure at least 25 antennas.

Joint Negotiations with Contractor

Assuming that ESO proceeds with a similar contract, AUI, ESO and the JAO will conduct final contract negotiations as part of a joint AUI/ESO/JAO team. AUI and ESO will use the same Statements of Work and Technical Specifications. These documents have been approved by the ALMA Change Control Board and the JAO. Due to different legal regimes and business practices, AUI's and ESO's business terms and conditions will vary.

Estimated Prices vs. Bid Prices

Despite the fact that bids were obtained through a competitive procurement, the cost of the proposed contract is significantly higher than was anticipated in the original 2001ALMA budget. The difference between the expected price ($2.9M/unit in $Y2000) and the current VRSI pricing proposal (~$5.9M/unit for units 1-8) is due to a variety of reasons which are summarized here and explained in more detail in the enclosed "AUI/NRAO ALMA Antenna Procurement Summary Report".

- The original cost estimate on which the original ALMA budget was prepared was based on vendor quotations before the prototype antenna contracts were issued.
- Due to significant delays in the delivery of the prototype antennas, the vendor quotation were delivered before the contractors could fully incorporate their prototyping experiences into the quote.
- The pricing of material, particularly of carbon fiber and steel, has dramatically increased over the past several years.
- The Statement of Work in the proposed contract contains items that were not included in the originally planning.
- The original pricing estimate did not have a significant factor for Euro-Dollar currency fluctuations because it was based on essentially all work being done in the US.

Proposed VertexRSI Price

On April 1, 2005 VertexRSI submitted revised pricing information upon which AUI has based this request. AUI proposes to procure 25 antennas for a price not to exceed $169.7M with an option to procure up to 32 antennas priced according to a specific formula. Within the $169.7M, the first 8 antennas will be procured at a firm fixed price with the price for the remaining 17 antennas subject to an indexing formula but with the price for all 25 antennas capped at $169.7M. The indexing formula is a composite of the cost of living, metal and fuels indices as identified in the draft contract document. A history of proposed pricing is included in the "AUI/NRAO ALMA Antenna Procurement Summary Report". Assuming that AUI/NRAO and ESO receive their respective approvals to proceed with their respective contracts, it is AUI's intent to undertake additional price negotiations in conjunction with ESO and the JAO.

Revised Draft Contract Document

The attached revised draft contract has been modified in several ways to reflect comments received from NSF last fall, intervening discussions with Vertex, and additional AUI legal review. A summary of the principal changes from the prior contract version are summarized on the cover page to the draft contract. Some suggested changes could require modification to the Statement of Work and, therefore, will be addressed in coordination with ESO and the JAO as a prelude to joint negotiations with the contractor.

Contractual Options

The attached revised draft contract contains a series of options identified in Annex I. The most significant option pertains to enabling the Project to acquire the full complement of 64 antennas (32 each by North American and Europe). As currently structured in the draft contract, AUI/NRAO could order up to 7 additional antennas in one-antenna increments at any time before the delivery of the 12th NRAO ALMA. Pricing of additional antennas would be determined by the cost indexing formula identified in Annex H. These additional units would not be subject to a cost ceiling.

Another option contained in Annex I pertains to a cabin wall cooling system. As a result of the Project's testing of the VRSI prototype, a technical question arose as to whether the lack of a receiver cabin wall cooling system on VertexRSI's proposed production design might affect its ability to meet the ALMA specification of maintaining a maximum 25 micron surface accuracy through all operating conditions. (Note: The VRSI prototype included a cooling system as a means of achieving a 20 micron surface accuracy.) The AUI/NRAO CSC believes that, based on JATG test data, such a cabin wall cooling system is not needed to meet the ALMA specification and AUI/NRAO should not mandate that VRSI include a cabin wall cooling system. However, if AUI/NRAO, ESO and the JAO make a collective decision to include a cooling system on up to 3 AUI/NRAO antennas, it would be made clear that the inclusion of cooling systems does not relieve VertexRSI from meeting ALMA specification even for production units that do not include this feature.

NSF Review and Approval

To allow us sufficient time to negotiate a contract before present pricing expires, AUI requests that NSF approval is given no later than May 13, 2005. Please do not hesitate to request any additional information necessary for NSF review and approval.

Award of this contract will be coordinated with the ALMA Director and the ALMA Board consistent with the terms of the Bi-lateral ALMA Agreement.

Best Regards,

Ethan J. Schreier
President
Associated Universities Inc.

cc.: F. Lo
T. Kashmer DCCA/NSF
J. Jones DCCA/NSF

Attachment A: Contract Summary
Attachment B: AUI/NRAO ALMA Procurement Summary Report
Attachment C: Revised Draft Contract