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

September 14, 2004

Dear Dr. Dickman,

Pursuant to Clause 6 of the Cooperative Agreement between the National Science Foundation (NSF) and Associated Universities Inc. (AUI) for the management and operation of the National Radio Astronomy Observatory, AUI hereby requests NSF's approval to issue a subaward to VertexRSI for the acquisition of up to 32 twelve-meter antennas for the Atacama Large Millimeter Array (ALMA Project).

1.0 Project Background

The Atacama Large Millimeter Array (ALMA) is an international astronomy facility. ALMA is an equal partnership between Europe and North America, in cooperation with the Republic of Chile, and is funded by the U.S. National Science Foundation (NSF), the National Research Council of Canada (NRC), the European Southern Observatory (ESO), and the Ministries of Science and Technology and of Public Works of Spain. ALMA construction and operations are led on behalf of Europe by ESO, and on behalf of North America by the National Radio Astronomy Observatory (NRAO), which is managed by Associated Universities, Inc. (AUI).

In the late 1990's the ALMA Project grew out of two separate, but complementary, radio astronomy projects: the North American Millimeter Array (MMA) Project and European Large Southern Array (LSA) Project. Shortly before its merger into the ALMA Project, the MMA concept consisted of 40 eight-meter radio telescope antennas. Two consequences of the MMA/LSA merger affecting the antenna procurement were an increased number of antennas of a larger diameter and more demanding technical specifications.

2.0 Prototype Antenna Procurement

Because of the demanding nature of the technical specifications required to meet ALMA science goals, AUI/NRAO and ESO, the North American and European ALMA Executives, respectively, jointly decided to procure separate prototype antennas. The

technical specifications and statements of work for both procurements were essentially identical and in early 2000 AUI/NRAO issued a contract to VertexRSI, while ESO issued a contract to a consortium led originally by EIE but later by Alcatel. Delivery of the prototypes was scheduled to occur on October 20, 2001 for Vertex and 6 months later for the Alcatel consortium. Both VertexRSI and Alcatel were significantly late in delivering their antennas to the ALMA Test Facility (ATF) located at the VLA site in New Mexico. The VertexRSI prototype was provisionally accepted (i.e. with a “punch list”) on March 20, 2003 with final acceptance on October 1, 2003. Provisional acceptance of the Alcatel antenna occurred on December 12, 2003 with work still continuing on punch list items.

One of the features of each prototype contract was for the contractor to deliver, at the time when complete design documentation was delivered, a “pro forma” cost estimate for the antennas in a production environment. In Vertex’s case, this cost estimate was delivered in October 2001. Another feature of the AUI/NRAO contract was the possibility to proceed straight to production based on a sole-source negotiated procurement. A further feature of the prototype contracts was that each Executive owned the design and all related documentation from the prototypes and reserved the right to have the antenna produced by another vendor.

To determine whether the antennas met technical specifications, a joint (AUI/NRAO and ESO) Antenna Evaluation Group (AEG) was established to test both antennas using commonly agreed upon methodologies.

Due to the significant delivery delays of both antennas, and the resulting delays in the AEG testing, as well as the desire to obtain the best available price, AUI/NRAO and ESO jointly determined to forego their options to solicit “straight-to-production” bids, in favor of separate competitive procurements.

3.0 Production Antenna Procurement

In February 2003, the ALMA Board approved a resolution stating that AUI/NRAO and ESO should “procure the production antennas to a single design which has been prototyped and evaluated.” Additionally, in May 2003, the ALMA Board endorsed the ALMA Executives’ plan to seek competitive bids, to technically evaluate them jointly and to place the resulting contracts in accordance with their respective procedures and processes. To this end, during the summer and fall of 2003, the Executives developed a single set of production antenna Technical Specifications and a single Statement of Work that would be utilized in the separate AUI/NRAO and ESO procurements.

3.1 Similarities and Differences in Procurement Approaches

While it had been long agreed that identical Technical Specifications and Statements of Work, as well as joint technical review processes, would be common to both procurement processes, the Executives did have certain important differences in the approach to the procurement. Among these differences were (1) the restrictions on bidders, (2) the

manner in which results of the antenna evaluation were factored into the technical evaluation, (3) interactions with the vendors during the proposal evaluation process, and (4) the differing business terms and conditions.

In its procurement solicitation, AUI/NRAO required bidders to demonstrate that they had made a significant contribution to either of the prototype antennas. In AUI/NRAO's opinion, this was the best way to meet the intent of the ALMA Board resolution to have a production antenna design which had been prototyped and evaluated. The solicitation notice indicated that this restriction did not necessarily preclude companies other than VertexRSI and Alcatel from participating because subcontracting and forming consortia remained possibilities. The emphasis on prototyping was deemed to be important, not only because of the challenging technical specifications, but also because of AUI/NRAO's belief in the importance of the linkage between the experiences gained in prototype design engineering and in production engineering and manufacturing methods. ESO chose to attempt to mitigate the engineering and manufacturing risks by providing bidders drawings and design documents for both the VertexRSI and Alcatel prototype designs.

ESO followed its procurement regulations that generally exclude bidders from non-ESO-member nations. AUI/NRAO's procurement had no restrictions on the geographical location of its bidders.

While both AUI/NRAO and ESO agreed to form a Joint Technical Evaluation Team (JTET) to assure that all proposals were reviewed on a common basis, ESO's procurement process required that the JTET first evaluate all proposals and produce a report for ESO without incorporating the Antenna Evaluation Group's prototype testing results, while AUI/NRAO's procurement process included prototype experience as a factor in proposal evaluation. After delivery of this initial JTET report for ESO purposes, the AEG report was provided to a core team of the JTET that produced a report addendum incorporating the prototype testing results for use by AUI/NRAO.

Face-to-face visits with bidders are an essential part of AUI/NRAO's bid evaluation process, but the planned face-to-face visits by the JTET with bidders had to be cancelled because of ESO's procurement procedures. To remedy this situation, AUI/NRAO's Contract Selection Committee (CSC) later conducted site visits to VertexRSI.

Finally, while AUI/NRAO's and ESO's business terms and conditions have many common elements, there are also significant differences. A principal example of such differences is that ESO requires bank guarantees and penalty provisions as incentives for performance. Because bank guarantees and penalties are either not available or are impractical in our contracting environment, AUI/NRAO has attempted to keep some degree of symmetry with ESO by including a "liquidated damages" contractual provision in the business terms and conditions. However, as a result of negotiations with VertexRSI, this provision was dropped because of the excessive costs and difficulty in proving damages.

3.2 Preliminary Inquiry and Pre-Request for Proposal (RFP) Vendor Meetings

On September 25, 2003, AUI/NRAO distributed a Preliminary Inquiry to nine vendors that either had indicated an interest in the ALMA antenna project, or were firms of mutual interest to AUI/NRAO and ESO. The inquiry requested a formal expression of their interest in the project not later than October 29, 2003, to which eight vendors responded positively. Vendor Information Meetings were held at both ESO (Garching, Germany) and AUI/NRAO (Socorro/VLA) to provide project information to interested firms prior to the release of the RFP. The Garching meeting was held 16 October 2003; the VLA meeting was held 21 October 2003.

3.3 Request for Proposal Issuance

On December 17, 2003, each Executive issued a solicitation of bid for 32 antennas. Each solicitation also asked for a separate bid for 32 antennas on the condition that an additional contract for 32 additional antennas is awarded to the same proposer.

As part of its solicitation, AUI/NRAO required bidders to submit a non-binding "intent to submit bid" notice no later than January 7, 2004. AUI/NRAO received notifications from VertexRSI, Alcatel and MAN. In mid-January 2004, joint AUI/ESO informational meetings were held in Chile to familiarize potential bidders with the ALMA Operations Site Facility where the antennas would be assembled before being accepted by the ALMA project.

3.4 Proposal Evaluation Process

In preparation for the proposal evaluation process, AUI/NRAO developed an ALMA Antenna Procurement Plan. In addition to documenting the solicitation process, the Plan generally outlined the process to be followed by the Joint Technical Evaluation Team, the AUI/NRAO Business Evaluation Committee and the AUI/NRAO Contract Selection Committee. Finally, the Plan generally outlines the mutually-agreed upon deadlines for AUI/NRAO and ESO to make their final procurement decisions.

3.4.1 Joint Technical Evaluation Team

On April 30, 2004 AUI/NRAO received 2 proposals; one from VertexRSI and one from the ALMA European Consortium (AEC) comprised of Alcatel, EIE and MAN. ESO received three bids, one from AEC, one from Vertex Antennentechnik, a German-based sister corporation to VertexRSI, and one from Alenia Spazio, a company that did not participate in the prototype program. Immediately upon receipt, the pricing information was escrowed and the management and technical portions of the proposals were conveyed to the JTET. From early May to mid-June, the JTET met multiple times in person at US and European locations and met multiple times by phone. On June 15,

2004, the JTET issued its basic report that did not include the results of the prototype testing and sent it to ESO and AUI/NRAO. On June 17, 2004, the JTET issued an addendum that included the AEG test results and sent it to AUI/NRAO. (Note: ESO did receive the JTET addendum, but did not incorporate its data into their subsequent evaluative processes.) Both the original JTET report and the addendum noted deficiencies with all proposals submitted, both to AUI/NRAO and to ESO. The JTET report, including its addendum, rated Vertex/RSI approximately the same as the AEC consortium.

3.4.2 Business Evaluation Committee

One of the features of AUI/NRAO's procurement process was to closely examine the business and management aspects of a proposal, without access to any pricing information. While the JTET did examine certain aspects of the bidders' management plan, AUI/NRAO additionally formed a Business Evaluation Committee (BEC) to evaluate the AUI/NRAO bidders' management structure, checked business references, analyzed financial stability, and verified responsiveness to business terms and conditions of the RFP. Also, the BEC made some initial inquiries regarding the announcement that General Dynamics would acquire Vertex and its sister companies, and the announcement that Alcatel was in merger talks with Alenia Spazio of Italy. In mid-June, the BEC issued its report to the AUI/NRAO Contract Selection Committee. The BEC rated the business and management aspects of the VertexRSI proposal significantly better than the comparable aspects of the AEC proposal.

3.4.3 Contract Selection Committee

The AUI/NRAO Contract Selection Committee (CSC) was established on March 16, 2004 and was charged with receiving and reviewing the JTET and BEC reports, recommending to the AUI President and NRAO Director the antenna proposer with whom the contract should be pursued, and negotiating the final terms of the contract. After a series of organizational teleconferences, the CSC conducted its first face-to-face meeting from June 23-28 in Charlottesville, Virginia. At this meeting the CSC also opened the price proposals.

After reviewing all aspects of the proposals, CSC members produced independently assigned scorings according to the following criteria:

- Capacity of the industrial setup to reliably produce 32 or 64 antennas over the duration of the project
- Technical performance of the proposed antenna design
- Related experience and past performance of the proposer
- Price Proposal (including business terms and conditions)

As a result of the scorings, the CSC determined that VertexRSI was generally compliant with the RFP requirements although it contained some deficiencies identified by the

CSC, the JTET and the BEC. The CSC determined that the AEC proposal contained numerous exceptions to the business terms and conditions required by the RFP, failed to provide the required firm fixed price and was not compliant with many of the RFP's Technical Specifications and Statement of Work. The CSC further determined that negotiations with AEC would not likely result in an acceptable proposal. Finally, the CSC judgment was that negotiations with VertexRSI should be pursued to determine whether deficiencies identified by the JTET, BEC and CSC could be remedied in a manner that would result in a proposal that would be acceptable to AUI/NRAO. After briefing the NRAO Director and the AUI Executive Vice President (also President-designate), on June 30, 2004, the CSC initiated negotiations with VertexRSI by the issuance of a series of questions covering technical, management and price issues. The CSC also conducted face-to-face discussion/negotiation meetings with VertexRSI on two occasions resulting in additional questions to be addressed by VertexRSI.

3.4.4 Best and Final Offer

As a result of its discussions and written responses to the questions, in late August the CSC determined that there was sufficient basis to issue a letter requesting that VertexRSI submit to AUI/NRAO its "Best and Final Offer" (BAFO). In addition to requesting that their BAFO response be consistent with the terms of the RFP, VertexRSI was requested to provide cost information regarding options that could offer potential cost savings associated with certain changes to the Statement of Work, Technical Specifications, and business terms and conditions. These potential optional changes were coordinated in advance with ESO and the Joint ALMA Office. The most prominent option was the potential change in the number of antennas that might be procured, necessitated by the significantly higher bid costs than had been anticipated by ESO and AUI. The BAFO letter also stated that AUI/NRAO could accept VertexRSI's BAFO proposal with or without further negotiation.

On September 8, 2004 VertexRSI submitted its BAFO response that was then evaluated by the CSC. Based upon the additional information provided by VertexRSI and assuming the successful resolution of a few unresolved technical items, the CSC determined that VertexRSI had sufficiently addressed the previously-identified deficiencies and that their proposal was now substantially compliant with the RFP's requirements. After scoring the VertexRSI proposal as amended by its BAFO, the CSC decided to recommend to the NRAO Director and AUI President that the antenna procurement be awarded to VertexRSI with terms generally described in the "Contract Summary" (Attachment A).

3.5 Pricing

The following chart summarizes the beginning and ending price history of the proposals received by AUI/NRAO

Bidder	April 30, 2004 Price		Current Base Price		Comments
	If AUI/NRAO only buys 32	If both AUI/NRAO and ESO buy 32 each	If AUI/NRAO only buys 25	If both AUI/NRAO and ESO each buy 25 with options for up to 32 antennas	
AEC Consortium	\$256.M	\$244.4M	Not Applicable		Not Applicable
VertexRSI	\$209.M	\$185.0M	\$152.8M Floor Price \$172.5M Cap Price	\$136.9M Floor Price \$160.0M Cap Price	*Floor prices include guaranteed price for AUI's first 12 antennas and indexed price for antennas 13-25. See "Contract Summary" Attachment A for details.

Pricing is based on a "cost optimized" delivery schedule with the last antenna delivered in 2010 instead of 2011 as cited in the current version of the ALMA Project Plan. AUI/NRAO believes the additional cost associated with a 2011 end date is at least \$8.8M.

3.6 Funding

AUI/NRAO's ALMA budget will support the acquisition of 25 antennas at VRSI's floor price without using contingency but assuming that the funds for the electronic components for the antennas not built are utilized for the antenna procurement. The acquisition of the full complement of 32 antennas would depend upon the identification of additional funding. A funding profile is contained in Attachment B.

4.0 AUI/NRAO and ESO Procurement Coordination

The original procurement schedule was developed by AUI/NRAO, ESO and the JAO in November 2003 and was most recently re-affirmed by the Executives to the ALMA Board at its June 2004 meeting. The procurement schedule identified July 22 as the date

at which both AUI/NRAO and ESO would have concluded their respective contractor selections, and initiated each Executive's respective contract approval processes, which would culminate in ALMA Board concurrence. This July 22 milestone was not met.

During July and August 2004 AUI/NRAO and ESO kept each other informed of the status of their respective negotiations. This coordination consisted of almost daily telephone calls between members of the CSC and the ESO Contract Award Committee (CAC), exchange of written materials received from the proposers with whom each Executive was negotiating, and three face-to-face meetings: two in Europe and one in the US.

While AUI/NRAO seeks approval authority from NSF, ESO is still negotiating with its three bidders. ESO's current expectation is that authority to enter into a contract will be granted by the ESO Council Finance Committee on November 15, 2004, which is after the October 31, 2004 expiration date of the proposals received by AUI/NRAO and ESO. Because the prices of certain materials (principally nickel steel and carbon fiber) used in all proposals have risen substantially since the proposals were submitted to AUI/NRAO and ESO, any post-October 31 re-pricing by VertexRSI will reflect the price increases passed on to them by their material suppliers.

In seeking NSF's approval to issue a subaward to VertexRSI prior to an ESO down-select decision, AUI/NRAO recognizes that the original plan to issue contracts simultaneously will not be achieved. However, given the impending price increases for materials, AUI/NRAO believes that proceeding forward is in the interests of the Government and the overall ALMA Project. VertexRSI's best pricing for the acquisition of 32 antennas for AUI/NRAO is predicated on execution of a similar contract by ESO not later than December 15, 2004. *(Note: Vertex's current pricing to ESO also expires on October 31 so an ESO contract executed after that date would be at a higher price reflecting the increased cost of material.)* Based on extensive Executive-to-Executive discussion, it is believed that AUI/NRAO and ESO convergence on a single antenna contractor is highly likely, although not a certainty. In recognition of this lack of certainty, the proposed VertexRSI contract will be structured to have the AUI/NRAO pricing, which is predicated upon ESO issuing a contract to VertexRSI's German sister corporation (Vertex Antennentechnik), revert to a higher pricing that does not reflect the sharing of non-recurring costs if ESO does not issue such a contract. Alternatively, at the direction of NSF, the subaward could be terminated by AUI/NRAO under the "Termination for Convenience" contract clause.

5.0 Other Information

5.1 Joint Antenna Technical Working Group

During the ALMA Executives procurement coordinating meetings, AUI/NRAO and ESO agreed to form an antenna Technical Working Group (TWG) to review a small number of

outstanding technical questions identified by AUI/NRAO's CSC and ESO's CAC in their evaluation of the designs submitted by the proposers with whom each Executive is negotiating. For example the TWG is reviewing the estimated life-cycle costs of proposed designs. The TWG is also reviewing an apparent discrepancy between VertexRSI's prototype testing measurements and their finite element model. The TWG report is due on September 17, but AUI recommends that the approval process continue in parallel with the technical review and that the contract not be executed until this clarification has been addressed to AUI/NRAO's satisfaction.

5.2 General Dynamics Acquisition of VertexRSI

In June 2004, VertexRSI's parent company, TriPoint Global Communications Company announced it was being acquired by General Dynamics Corporation. The merger has recently been approved by the U.S. Department of Justice, and the formal acquisition is scheduled to take place in mid-September 2004. As part of its due diligence, the AUI/NRAO Business Evaluation Committee was reassured by TriPoint Global that the acquisition would preserve their subsidiary companies, including VertexRSI and its Vertex Antennentechnik, as independent operating units. Additionally, AUI is scheduled to meet with General Dynamics management to discuss its reasons for acquiring TriPoint Global, its short and long term business plans for VertexRSI and management continuity plans. It is AUI's opinion that as a General Dynamic company, VertexRSI will have access to substantially more corporate resources that will enhance its ability to successfully produce the ALMA antennas. As an additional measure of risk mitigation, AUI has requested that General Dynamics provide a performance guarantee for VertexRSI.

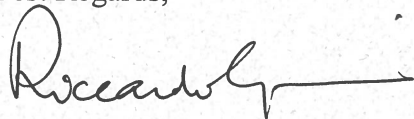
6.0 Conclusion

It is AUI's opinion that approval of this subaward to VertexRSI is in the best interests of the ALMA Project. Upon approval from NSF, AUI/NRAO will proceed to conclude final negotiations with VertexRSI. If the final terms and conditions of the subaward differ substantially from the description contained in the "Contract Summary", AUI will notify NSF.

NSF's approval is requested in time to permit the contract to be executed no later than October 31, 2004.

Please do not hesitate to request any additional information necessary for NSF review and approval.

Best Regards,

A handwritten signature in black ink, appearing to read 'Riccardo Giacconi', with a long horizontal flourish extending to the right.

Prof. Riccardo Giacconi
President
Associated Universities Inc.

cc.: F. Lo
E. J. Schreier
T. Kashmer DCCA/NSF
P. Williams DCCA/NSF

Attachment A: Contract Summary
Attachment B: Funding Profile
Attachment C: Draft Antenna Contract

Contract Summary

		Comment
Term	10/31/04 to 12/31/10	Current ALMA Project Plan predicated on 32 nd antenna delivery in 2011.
Contract Type	Floor price with index pricing subject to firm fixed price cap. Build to performance specification.	One half of antennas will be delivered within floor price. Remaining half of antennas subject to indexed pricing not to exceed price cap.
Number of Antennas	25 with options for up to 32.	Options for >25 antennas must be exercised within 4 months of contract execution.
Contract Value for 25+25 antennas	\$136.9M floor price with \$160.0M price cap. <i>Note: For quantities between 25 and 32, the "per antenna" floor pricing price is ~\$4.0M. The per antenna cap price is ~\$6.9M</i>	If ESO fails to execute contract with Vertex Antennentechnik by 12/15/04, AUI floor price becomes \$152.8M with \$172.5M price cap.
Index formula	Blended rate of Consumer Price Index (CPI), Producer Price Index (PPI), Metals Index and Fuels Index.	
Termination for Convenience	Contract may be terminated at the convenience of AUI or the U.S. Government.	
Phased Funding	Authorization to proceed with antenna quantities is exercised in phases as funding from NSF becomes available.	
Options to Changes in Statement of Work and Technical Specifications	Exercising options could yield an ALMA Project savings of approximately ~\$1.0M.	Exercise of Technical Specification and Statement of Work options subject to coordination with ESO and JAO.

Funding Profile September 2004

Budget Calculations:

- The budget for production antennas was set at \$91.06M in year 2000 dollars without contingency
- Annual inflation escalators provided by the NSF are:

Year	Cumulative Inflation Escalator
FY2001	1.04700
FY2002	1.08570
FY2003	1.12370
FY2004	1.16190
FY2005	1.20260
FY2006	1.24590
FY2007	1.29080
FY2008	1.33590
FY2009	1.38400
FY2010	1.43250
FY2011	1.48260

- The lowest pricing option of the BAFO provides a price for 25 antennas for a total floor price of \$136.9M. The table below shows the estimated annual commitment as well as the value of these commitments when deflated into Y2000 Dollars.

Year	Commitment Amount	Value in \$Y2000
2005	30,000,000	24,945,950
2006	28,000,000	22,473,714
2007	28,000,000	21,691,974
2008	27,000,000	20,211,094
2009	12,000,000	8,670,520
2010	11,862,032	8,280,651
Total	136,862,032	106,273,903

Attachment B

The price for 25 antennas is thus \$15.2M Y2000 above the antenna budget. However, the reduction to a total of 50 antennas will generate savings from the reduced quantity of ALMA hardware installed on the antennas. The approximate value of this hardware (and the effort to install it) is approximately \$2.2M Y2000 per antenna, split approximately equally between North America and Europe. The savings in North America for fourteen antennas is thus approximately \$15.4M Y2000. Applying \$15.2M of these savings to the antenna IPT covers the antenna floor cost and returns 0.2M Y2000 to contingency.