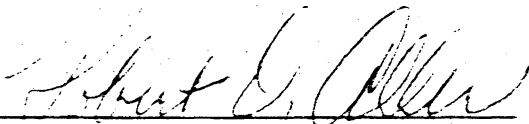


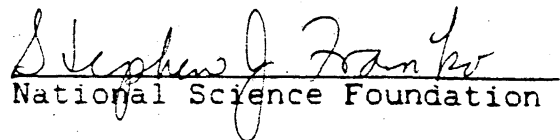
MEMORANDUM OF AGREEMENT
BETWEEN THE
NATIONAL SCIENCE FOUNDATION
AND THE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FOR SUPPORT BY THE
NATIONAL RADIO ASTRONOMY OBSERVATORY VERY LARGE ARRAY
FOR THE
VOYAGER NEPTUNE INTERSTELLAR MISSION

February 28, 1985

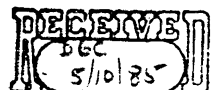
Approved by:



National Aeronautics and
Space Administration
Associate Administrator,
Office of Space Tracking and
Data Systems



National Science Foundation



1. GENERAL

This agreement between the National Aeronautics and Space Administration (NASA) and the National Science Foundation (NSF) provides for support of the Voyager Neptune Interstellar Mission by the National Radio Astronomy Observatory's Very Large Array Radio Telescope. It establishes the responsibilities for funding and coordination of activities.

NASA's contractor, the Jet Propulsion Laboratory of the California Institute of Technology, will implement this Memorandum of Agreement for NASA. NSF's contractor, Associated Universities, Inc., will implement this agreement for NSF at the National Radio Astronomy Observatory.

2. BACKGROUND

The National Radio Astronomy Observatory (NRAO) includes a Very Large Array Radio Telescope system located on the Plains of St. Agustin approximately 60 miles west of Socorro, New Mexico. This instrument, consisting of 27 operating telescopes (and a spare), is arranged on a three arm wye with 9 telescopes on each arm. Telescopes are moved along each arm of the array as the observing program dictates. The configuration of the telescopes determines the overall resolution of the instrument. Through the application of supersynthesis, the array can approximate a telescope 18 miles in diameter; its large aperture and sensitive receivers have made it among the most sensitive astronomical instruments in the world.

After instrumentation is added to receive the Voyager 2 spacecraft frequency, the signal received by the Very Large Array will be combined with identical signals received by the NASA antenna complex at Goldstone, California. In this way, the amount of vital science data that can be received from the spacecraft of the planet Neptune and its moons is greatly enhanced. Scientific objectives of this mission include: the detection of magnetic dipole field, measurement of its strength and orientation, magnetospheric and plasma studies, determination of mass, rotation period, heat balance, atmospheric composition and temperature profile, as well as morphological structure and surface features of the planet and its satellites.

3. AUTHORITY

This agreement is authorized by Section 203(c) of the National Aeronautics and Space Act of 1958, as amended, and Section 3(a) of the National Science Foundation Act of 1950, as amended.

4. TECHNICAL AND MANAGEMENT PLAN

The technical and managerial approaches and budgetary estimates will be determined jointly by NRAO and JPL and documented in a Management Plan.

The National Radio Astronomy Observatory will install the necessary equipment on the Very Large Array Radio Telescope System required to support the Voyager Neptune Interstellar Mission.

Voyager operational requirements to utilize the Very Large Array for data acquisition will commence on or after April 1, 1989, and terminate not later than October 1, 1989, during which time approximately 40 observation periods of eight and one-half hours each will be required.

Specific schedules for utilization of the Very Large Array shall be jointly developed by the National Radio Astronomy Observatory and the Jet Propulsion Laboratory.

5. FUNDING

Funding transfers shall be made by NASA to NSF for all costs which will be incurred for tasks to be performed by NRAO specifically for the Voyager Neptune Interstellar Mission. These transfers shall be in amount and schedule as determined by JPL after negotiation with NRAO.

Funds shall be made available to NSF for the first year prior to the commencement of work and annually, on or before January 1 thereafter. Associated Universities, Inc. shall keep separate accounts of funds provided by NASA through the National Science Foundation for the Voyager Program.

This Memorandum of Agreement is not a funding document for the purpose of incurring or recording NASA obligations. Such obligations will be recorded separately in accordance with appropriate NASA administrative procedures. The undertaking by NASA of the activities under this Memorandum of Agreement, ~~including any obligations after completion or termination of this Memorandum of Agreement,~~ is subject to the availability of appropriated funds.

04 23-1
4/29/89
SJB
d/r

6. ACCOUNTABILITY FOR GOVERNMENT PROPERTY

All equipment which is permanently installed on the VLA antennas to provide X-Band receiving capability, plus the machinery and test equipment acquired by NRAO to develop, install, and maintain this capability shall be retained at the National Radio Astronomy Observatory as property accountable to the National Science Foundation.

All equipment which is adjoined to the Very Large Array specifically for Voyager Neptune Interstellar Mission support shall be returned to the Jet Propulsion Laboratory upon completion of NRAO participation in the mission.

7. CONTINGENCIES AND TERMINATION

This Memorandum of Agreement shall expire sixty days following completion of scheduled support or shipment of equipment to the Jet Propulsion Laboratory, whichever is later; however, this agreement may be extended by mutual agreement of the parties.

If events beyond the control of either party or both parties to the Memorandum of Agreement that negate the purpose of this agreement, including but not limited to Voyager spacecraft failure, technical problems, and reductions in obligation authority, either party shall provide a minimum of 90 days advance written notice to the other party of the effective date of such termination. NASA shall provide funds as necessary for the National Science Foundation to effect an orderly termination of its obligations in connection with this Memorandum of Agreement. In the event of an early termination, it is the intent to maximize the utility of the accrued investment toward providing NRAO with a viable scientific instrument for its use.

Notwithstanding the reasons for completion or termination of this Memorandum of Agreement, NASA shall continue to be responsible for costs attributable to this program.

46. Taxes.

a. In general, taxes which the organization is required to pay and which are paid or accrued in accordance with generally accepted accounting principles, and payments made to local governments in lieu of taxes which are commensurate with the local government services received are allowable, except for (i) taxes from which exemptions are available to the organization directly or which are available to the organization based on an exemption afforded the Government and in the latter case when the awarding agency makes available the necessary exemption certificates, (ii) special assessments on land which represent capital improvements, and (iii) Federal income taxes.

b. Any refund of taxes, and any payment to the organization of interest thereon, which were allowed as award costs, will be credited either as a cost reduction or cash refund, as appropriate, to the Government.

47. Termination costs. Termination of awards generally give rise to the incurrence of costs, or the need for special treatment of costs, which would not have arisen had the award not been terminated. Cost principles covering these items are set forth below. They are to be used in conjunction with the other provisions of this Circular in termination situations.

a. **Common items.** The cost of items reasonably usable on the organization's other work shall not be allowable unless the organization submits evidence that it would not retain such items at cost without sustaining a loss. In deciding whether such items are reasonably usable on other work of the organization, the awarding agency should consider the organization's plans and orders for current and scheduled activity. Contemporaneous purchases of common items by the organization shall be regarded as evidence that such items are reasonably usable on the organization's other work. Any acceptance of common items as allocable to the terminated portion of the award shall be limited to the extent that the quantities of such items on hand, in transit, and on order are in excess of the reasonable quantitative requirements of other work.

b. **Costs continuing after termination.** If in a particular case, despite all reasonable efforts by the organization, certain costs cannot be discontinued immediately after the effective date of termination, such costs are generally allowable within the limitations set forth in this Circular, except that any such costs continuing after termination due to the negligent or willful failure of the organization to discontinue such costs shall be unallowable.

c. **Loss of useful value.** Loss of useful value of special tooling, machinery and equipment which was not charged to the award as a capital expenditure is generally allowable if:

(1) Such special tooling, machinery, or equipment is not reasonably capable of use in the other work of the organization.

(2) The interest of the Government is protected by transfer of title or by other means deemed appropriate by the awarding agency.

d. **Rental costs.** Rental costs under unexpired leases are generally allowable where clearly shown to have been reasonably necessary for the performance of the terminated award less the residual value of such leases, if (i) the amount of such rental claimed does not exceed the reasonable use value of the property leased for the period of the award and such further period as may be reasonable, and (ii) the organization makes all reasonable efforts to terminate, assign, settle, or otherwise reduce the cost of such lease. There also may be included the cost of alterations of such leased property, provided such alterations were necessary for the performance of the award, and of reasonable restoration required by the provisions of the lease.

e. **Settlement expenses.** Settlement expenses including the following are generally allowable:

(1) Accounting, legal, clerical, and similar costs reasonably necessary for:

(a) The preparation and presentation to awarding agency of settlement claims and supporting data with respect to the terminated portion of the award, unless the termination is for default. (See paragraph 4.a. of Attachment L, OMB Circular No. A-110; and

(b) The termination and settlement of subawards.

(2) Reasonable costs for the storage, transportation, protection, and disposition of property provided by the Government or acquired or produced for the award; except when grantees are reimbursed for disposals at a predetermined amount in accordance with Attachment N of OMB Circular A-110.

(3) Indirect costs related to salaries and wages incurred as settlement expenses in subparagraphs (1) and (2) of this paragraph. Normally, such indirect costs shall be limited to fringe benefits, occupancy cost, and immediate supervision.

f. **Claims under subawards.** Claims under subawards, including the allocable portion of claims which are common to the award, and to other work of the organization are generally allowable. An appropriate share of the organization's indirect expense may be

NATIONAL SCIENCE FOUNDATION
WASHINGTON D C 20550

APR 23 1985

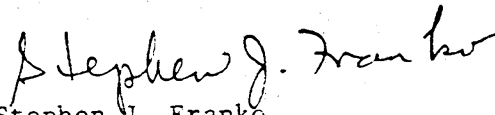
Mr. Harold L. Theiss
Systems Program Manager
Deep Space Network
NASA Headquarters
600 Independence Avenue, SW
Washington, DC 20546

Dear Mr. Theiss:

Enclosed are two copies of the Memorandum of Agreement between the National Science Foundation and the National Aeronautics and Space Administration for support by the National Radio Astronomy Observatory Very Large Array for NASA's Voyager Neptune Interstellar Mission. We have executed this agreement subject to NASA's accepting the deletion contained in Section 5 - Funding. If this deletion is acceptable to NASA, you are requested to have Mr. Robert O. Aller, or his designee, initial the deletion on both copies and return one copy to NSF.

If there are any questions regarding this matter, please feel free to contact Mr. Stanky Dobson on 357-9630 or Dr. Ludwig Oster on 357-9857.

Sincerely yours,


Stephen J. Franko
Contracting Officer

Enclosure

Copy to: Dr. Vanden Bout, Director, NRAO

86 Dec 08: W. BRUNDAGE
R. SRAMEK

RECEIVED
MAY 16 1985