VLB ARRAY MEMO No. 301

NATIONAL RADIO ASTRONOMY OBSERVATORY

MEMORANDUM December 9, 1983

To: VLBA Electronics and Site Groups

From: W. Brundage

Subj: Site RFI Potential—Possible On-Site Spectrum Measurements by the U.S. Department of Commerce NTIA/ITS RSMS Van

The Government Master File (GMF) of all radio transmitters authorized by IRAC and FCC will be searched to estimate the RFI potential for each VLBA site. However, the GMF is incomplete. It does not list all ground-based transmitters, may be limited to U.S. non-military satellites, and provides no time statistics.

On-site spectrum measurements provide information on RFI potential from all sources over the visible hemisphere. They are limited to the time period of the measurements, which may be short, i.e., days or weeks. However, when combined with estimates of spectrum levels from the GMF, we would have a more nearly complete estimate for the RFI potential at this time.

NRAO could build a portable spectrum monitor and have it operational for site surveys in six to nine months. Portable means packaged in five or six "suitcases" which would be shipped air freight, loaded into a rented wagon or van, and set up at site. Incidentally, it would also be a test for accessibility by operational service personnel and equipment.

As an alternative, the Department of Commerce NTIA/ITS "Radio Spectrum Measurement System" (RSMS) van could make measurements at the eight continental sites, starting in late 1984, if several favorable conditions should occur. They are:

1. The receiver, antenna and computer upgrade is completed successfully by August 1984.

2. Field tests are successful by September or October 1984.

3. The NRAO/NSF request for the van is at or next to the top priority on its schedule.

The third condition requires that:

a. Robert Matheson of ITS review, discuss and approve a preliminary request from NRAO.

b. NSF submit a formal request for NRAO to Leo Buss of NTIA/IRAC for review and approval.

c. If NTIA decides the data from VLBA site measurements has little use for NTIA, then NRAO may have to pay all or part of the RSMS operating expenses of about $10k/week.

The upgraded RSMS van will have two independently but simultaneously operating receivers. The LMR (Land Mobile Radio) receiver covers the 1 to 1000 MHz frequency range at 250 channels per second with 3 to 30 kHz bandwidth per channel. The "Radar" receiver covers 10 MHz to 18 GHz with 10 Hz to 30 MHz bandwidths. Receiver noise figures will be < 5 dB (630 K) for all frequencies. The 26-foot long van is restricted to the lower 48 states and to reasonable roads with vertical clearances > 14 feet.

Data from the RSMS can be displayed as plots of

(1) Peak and average received power vs. frequency for time periods from minutes to hours.

(2) Peak received power vs. frequency with direction of arrival.

(3) Peak received power at a fixed frequency vs. azimuth.

(4) Percentage of time received power exceeded a threshold vs. frequency.

Because of the late and uncertain availability of the RSMS van, we should consider assembling a portable spectrum measuring system and take one- to two-week snapshots of the spectral environment at each site.

WDB/cjd