Interoffice

NATIONAL RADIO ASTRONOMY OBSERVATORY

TUCSON, ARIZONA

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To: The 25-Meter Committee

From: M. A. Gordon

Subject: Site Selection

A critical part of the 25-meter proposal still undecided is the site. Mauna Kea has become first choice on the basis of a first-cut evaluation of potential sites. Because of the potential difficulties involved in operating at a high-altitude site, the NRAO has got to investigate sites more thoroughly in terms of costs and in environment, certainly before the earliest possible funding date of FY 1978.

Looking back over Tucson Operations during 1975, I'm amazed at the great effort required to maintain telescope operations at a less than perfect level. Funding and manpower levels seem reasonable now, in terms of the number of telescopes and operations supported by the total NRAO budget. Yet, breakdowns still occur which tax our staff (and astronomers) to their limits of endurance and ability. I see no reason for the situation to improve at Tucson without a massive increase in funds and manpower which the NRAO cannot afford. From my experiences here, operation of a 25-meter telescope at a high altitude site is a frightening possibility. I would guess that the NRAO would either have to consider an annual operating budget in the millions of dollars or to accept a much lower duty cycle of successful operation.

An alternative which must be considered seriously is operation from Mt. Lemmon. The available water vapor data suggests atmospheric transparancy to be comparable of that of Mauna Kea during the day. No data is available for nighttime, but Mauna Kea can be expected to be better because of greater nighttime subsidence of upper atmosphere air. Presumably, Mauna Kea enjoys a minimal "monsoon" season compared to Mt. Lemmon. In any case, it is unlikely that we shall obtain better weather and water vapor data than that now in hand!

A major objection to Mt. Lemmon has been the hostile radio environment. Yet, John Payne notes that millimeter-wave equipment can be made insensitive to interference below the first IF, now approximately 5 GHz. An initial cost of adequate shielding might be $200,000 -- far less than the incremental cost of construction on a high-altitude site. (Brunk (NASA) told me that bids for construction of the NASA IR telescope on Mauna Kea came in at $2.7M rather than the $1.5M projected by

NASA and by a private estimating firm.) Obviously, annual operating costs at Mt. Lemmon would be substantially less than those at Mauna Kea.

In short, the NRAO (and the NSF) has an obligation to use the minimum public funds to achieve the maximum astronomy. I feel we should immediately begin a thorough comparative study of Mauna Kea and Mt. Lemmon, bearing in mind that we may have to live with the outcome. While Mauna Kea is certainly a first-rate astronomical site, we must be fully aware of its budgetary impact upon the NRAO and upon the NSF astronomy section. While Mt. Lemmon may well be impossible, we should not dispose of it without considering all of our technical expertise with RF shielding.

c: J. Payne