

Potential VLBA Antenna Sites at Los Alamos

P. Napier, 6 March 1984.

On 24 February, 1984, J. Campbell, P. Napier, L. Temple and A. Thompson from the VLA visited the Los Alamos National Laboratory (LANL) to investigate possible VLBA antenna sites on LANL property. This visit was a follow-up to a visit made by B. Perry and C. Wade on 5 October, 1983. We met with Ed Sitzberger (Division Leader, Facilities Engineering Division), Richard Crombie (Supervisor, Eng 11 section (facilities planning)), Bob Turner (Eng 11 section), Ted Handel (Supervisor, Technical Security) and Bill Marsh (Frequency Coordinator).

The LANL people were extremely helpful and are quite happy with the idea of having a VLBA antenna on LANL property. The only potential problem from their point of view is that the presence of a VLBA antenna with its low noise receivers covering such a wide range of frequencies could limit some future development that LANL may wish to make in the vicinity of the antenna because of radio frequency interference (RFI) problems. This problem will have to be addressed, and we will need to give them reassurance on this point, in any Memorandum of Understanding that is generated. There are several advantages to NRAO to be gained by placing the antenna on LANL property. LANL is operated for the DOE by the University of California and has significant astrophysics and geophysics groups amongst its 8000 employees. Since it is in the business of basic research we can expect it to be a sympathetic landlord. Presumably it will be straight forward for DOE to allow NSF to use the land. There is ready access to all utilities, fire protection and security services. We will be able to rent technician time from either LANL or, more likely, one of the contractors to LANL such as Zia Corporation which has the LANL maintenance contract. From LANL there are lines of sight to at least three mountains (Tesuque, Noname and Sandia Peaks) that have existing radio sites that could be used as the first hop in a radio link back to the VLA.

The only obvious problem for NRAO with an antenna site on LANL property is the potential that exists for RFI. For example, there is a large Meson Accelerator, several small accelerators and a Laser Fusion facility all of which have high power RF pumps. Also, numerous high voltage (115KV) power lines bring power into the various instruments at the lab. However, in reviewing each of the VLBA bands with the LANL frequency coordinator, very few in-band sources of RFI that are strong enough to increase the system temperature were identified. The results of this review are as follows:

312-342 MHz. No known sources at LANL. The National Telecommunication and Information Agency study that was done for the VLBA shows an allocation for a strong source at 315.1 MHz in Los Alamos but LANL has no knowledge of this

580-640 MHz. There is an allocation for a CW transmitter in this band at LANL but it is thought to be no longer in use.

1350-1750 MHz. No known sources at LANL except possibly for a harmonic of the Meson Accelerator RF pump which has a fundamental frequency in the range 400-420MHz. There are several radio links on Tesuque Peak in this range however none of them are directed at Los Alamos. The path from Tesuque to Noname Peak would be the closest azimuth to LANL.

2.15-2.35 GHz. A 4watt radio link on a 4ft dish at 2.16 GHz directed at Santa Fe is the only known source at LANL.

4.60-5.10 GHz. No known sources at LANL.

5.90-6.40 GHz. LANL has a satellite up link at 6.2 GHz.

8.00-8.80 GHz. No known sources at LANL.

10.2-11.2 GHz. No known sources at LANL. The Los Alamos Police use 10.525GHz.

14.4-11.4 GHz. No known sources at LANL.

22.2-24.6 GHz. There is a radio link for a remote TV camera at 23.025 GHz in this band.

42.3-43.5 GHz. No known sources at LANL.

85 GHz approx. No known sources at LANL.

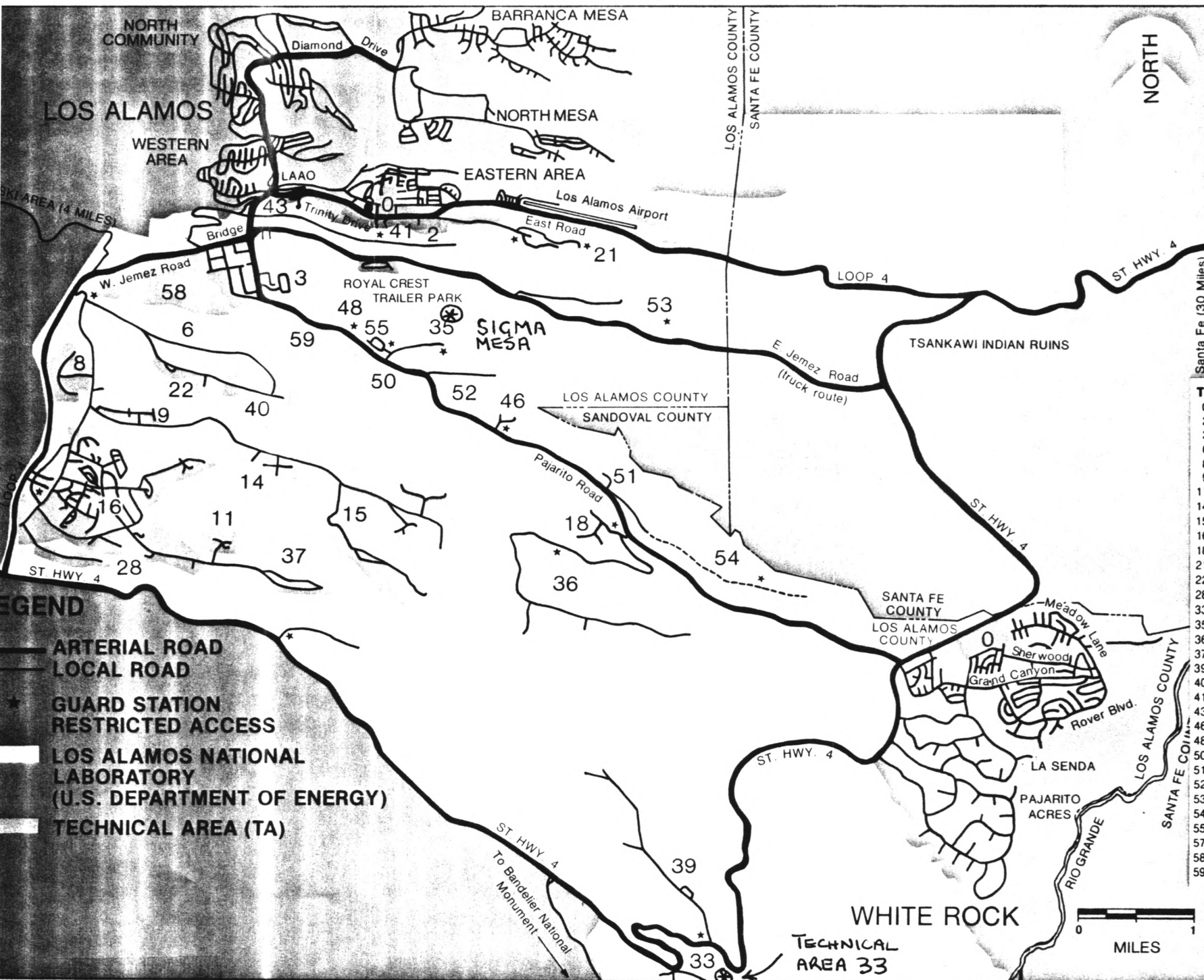
Two potential sites, Sigma Mesa and Technical Area 33, were examined in some detail during the visit. Both sites have acceptable horizon elevations, good access, available utilities and good foundation rock of volcanic tuff. Further details of the two sites are as follows (see attached map for locations).

Sigma Mesa This area is in the northern part of LANL on one of the less used mesas at an altitude of 7200ft. It is surrounded by some of the more heavily used areas of the lab and is only 1 mile from the Meson Accelerator. Sandia and Tesuque peaks are visible. There is the possibility of new high voltage power lines running through the area.

Technical Area 33 This area is at the southernmost edge of LANL on a mesa at an altitude of 6450ft overlooking the Rio Grande river. It has the advantage that it is as far as possible from the bulk of LANL and in an area that is less likely to be developed further in the future. Furthermore, an antenna near the southern edge of the LANL area will be pointed away from the experimental facilities for much of the time, and away from the nearest power line (115 kv) which runs about one mile north of the site. For these reasons this location is probably to be preferred over Sigma Mesa. Sandia, Tesuque and Noname Peaks are visible. The antenna would have to be placed far enough back from the edge of the mesa so that it could not be seen by rafters on the Rio Grande. A potential RFI source in the area is an ionospheric radar located about half a mile away. The radar is a swept frequency transmitter operating in the frequency range 2.5 to 25 MHz at a power of 1kw. The radar was used infrequently and

we do not yet have any information on its expected future use.

Conclusion It was agreed with the LANL people that the next step is to give them, in writing, a general description of the requirements for a VLBA antenna site so that they can determine whether sites other than the two mentioned above exist on LANL property. We should also ask about future development plans for the two sites at this time. As soon as the RFI trailer which is currently being developed at the VLA is operational it will be taken to the two sites to sample the RFI environment. LANL have agreed to supply power for the tests. These tests should coincide with the major LANL instruments such as the Meson Accelerator and Laser Fusion device being in operation. At this time it seems reasonable to assume that a suitable site for the VLBA antenna will be found on LANL property in time for the proposed 1986 antenna construction.



**TA Nomenclature**

0	Unassigned Land Reser
2	Omega Site
3	South Mesa Site
6	Two-Mile Mesa Site
8	Anchor Site West
9	Anchor Site East
11	K-Site
14	Q-Site
15	R-Site
16	S-Site
18	Pajarito Laboratory
21	DP-Site
22	TD-Site
28	Magazine Area A
33	HP-Site
35	Ten Site
36	Kappa Site
37	Magazine Area C
39	Ancho Canyon Site
40	DF-Site
41	W-Site
43	Health Research Labora
46	WA-Site
48	Radiochemistry Site
50	Waste Management Site
51	Radiation Exposure Faci
52	Reactor Development Sit
53	Meson Physics Facility
54	Waste Disposal Site
55	PF-Site
57	Fenton Hill Site
58	Two-Mile North Site
59	OH-Site

**LEGEND**

- ARTERIAL ROAD
- LOCAL ROAD
- GUARD STATION
- RESTRICTED ACCESS
- LOS ALAMOS NATIONAL LABORATORY (U.S. DEPARTMENT OF ENERGY)
- TECHNICAL AREA (TA)



NORTH

Santa Fe (30 Miles)

WHITE ROCK  
TECHNICAL AREA 33