0202

Mr. Dwight E. Shelor, Associate Director
for Systems and Compliance
Office of Civilian Radioactive Waste Management
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Dear Mr. Shelor:

SUBJECT: OFFICE OF NUCLEAR REGULATORY RESEARCH TECTONICS PROJECT

Enclosed is a description (with maps) of a project sponsored by the Nuclear Regulatory Commission's Office of Nuclear Regulatory Research. The project: "Field Measurements of Contemporary Crustal Motions in the Death Valley Region Using GPS (Global Positioning System) Interferometry," is being carried out by Dr. Brian Wernicke of the California Institute of Technology. The purpose of the project is to investigate questions about tectonic processes in the Death Valley region and is coordinated with tectonics research carried out by the Center for Nuclear Waste Regulatory Analyses. The reason for NRC funding of this work is to ensure a sufficient independent understanding of the basic physical processes taking place in the geologic setting of the proposed Yucca Mountain repository for high-level radioactive waste.

If you have any questions regarding this letter or would like to discuss this research project further, please contact Mark Delligatti, of my staff. Mr. Delligatti can be reached at (301) 415-6620.

Sincerely,

Joseph Holonich, Chief
High-Level Waste and Uranium Recovery
Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure: As stated

cc: See attached list

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
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cc: See attached list

cc: List

R. Loux, State of Nevada
T. J. Hickey, Nevada Legislative Committee
J. Meder, Nevada Legislative Counsel Bureau
R. Nelson, YMPO
M. Murphy, Nye County, NV
M. Baughman, Lincoln County, NV
D. Bechtel, Clark County, NV
D. Weigel, GAO
P. Niedzielski-Eichner, Nye County, NV
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J. Hoffman, Esmeralda County, NV
C. Schank, Churchill County, NV
L. Bradshaw, Nye County, NV

PROJECT DESCRIPTION

FIELD MEASUREMENTS OF CONTEMPORARY CRUSTAL MOTIONS IN THE DEATH VALLEY REGION USING GPS INTERFEROMETRY

ENCLOSURE

The Nuclear Regulatory Commission Office of Nuclear Regulatory Research is sponsoring a research project with the California Institute of Technology, Dr. Brian Wernicke, Principal Investigator, entitled: "Field Measurements of Contemporary Crustal Motions in the Death Valley Region Using GPS Interferometry," initiated September, 1992. The objective of the research is to investigate questions about tectonic processes in the Death Valley region. Geologic evidence suggests that the part of the Basin and Range from Death Valley to the Sierra Nevada is more geologically active than the region to the east of the Death Valley fault system. Large scale measurements of deformation using Very Long Baseline Interferometry (VLBI) indicate rates of about 9 millimeters per year across the Basin and Range. This research project aims to use Global Positioning System (GPS) interferometry to determine the partitioning of this deformation across key structures in the Death Valley region. The reason for NRC funding of this work is to ensure a sufficient independent understanding of the basic physical processes taking place in the geologic setting of the proposed Yucca Mountain repository for high-level radioactive waste. Specific questions being addressed include:

- What is the extension rate in the more active part of the Basin and Range versus the less active part?
- Which structures in the more active and less active areas accommodate the strain?
- What fraction of the VLBI-determined displacement rates are accommodated in the Death Valley region?
- Are historically aseismic major structures within the more active area accumulating strain?

This project investigates regional tectonic processes. Investigations specific to the Nevada Test Site (NTS) are being carried out by the U.S. Geological Survey (USGS) for the U.S. Department of Energy (DOE) (Figure 1). The USGS geodetic surveys are investigating the NTS but do not extend beyond Bare Mountain to the west (Figure 1). This research and the USGS studies share two common sites, the Mile benchmark at the crest of Yucca Mountain and the Wahomie benchmark in the Jackass Flats area of the NTS (Figure 2). In addition the benchmark 67TJS, about 100 meters south of the road to Yucca Mountain, just east of Forty Mile wash, on the NTS is being used by this research project (Figure 2 and Figure 3, the inset to Figure 2). These three benchmarks were previously established by the U.S. Department of the Interior and are being surveyed for one day each year for this research project. The NRC sponsored investigators have not installed any new benchmarks nor undertaken any other NTS on site activity. It is imperative that the benchmarks being used for both the USGS and NRC sponsored studies are not disturbed. If DOE activities might possibly disturb any of these sites it is imperative that the USGS and the NRC be notified to allow ample time for resurveying and establishment of auxiliary benchmarks.

This NRC research is very closely coordinated with the Tectonics research project of the Center for Nuclear Waste Regulatory Analyses (the Center). A Center staff member was present on the latest field trip in October, 1993, and data will be immediately incorporated in the Center's data base on tectonics and volcanism. This research is not being conducted by the Center because the sponsorship of this research arose from an unsolicited proposal from Dr. Wernicke who had unique ideas and capabilities.

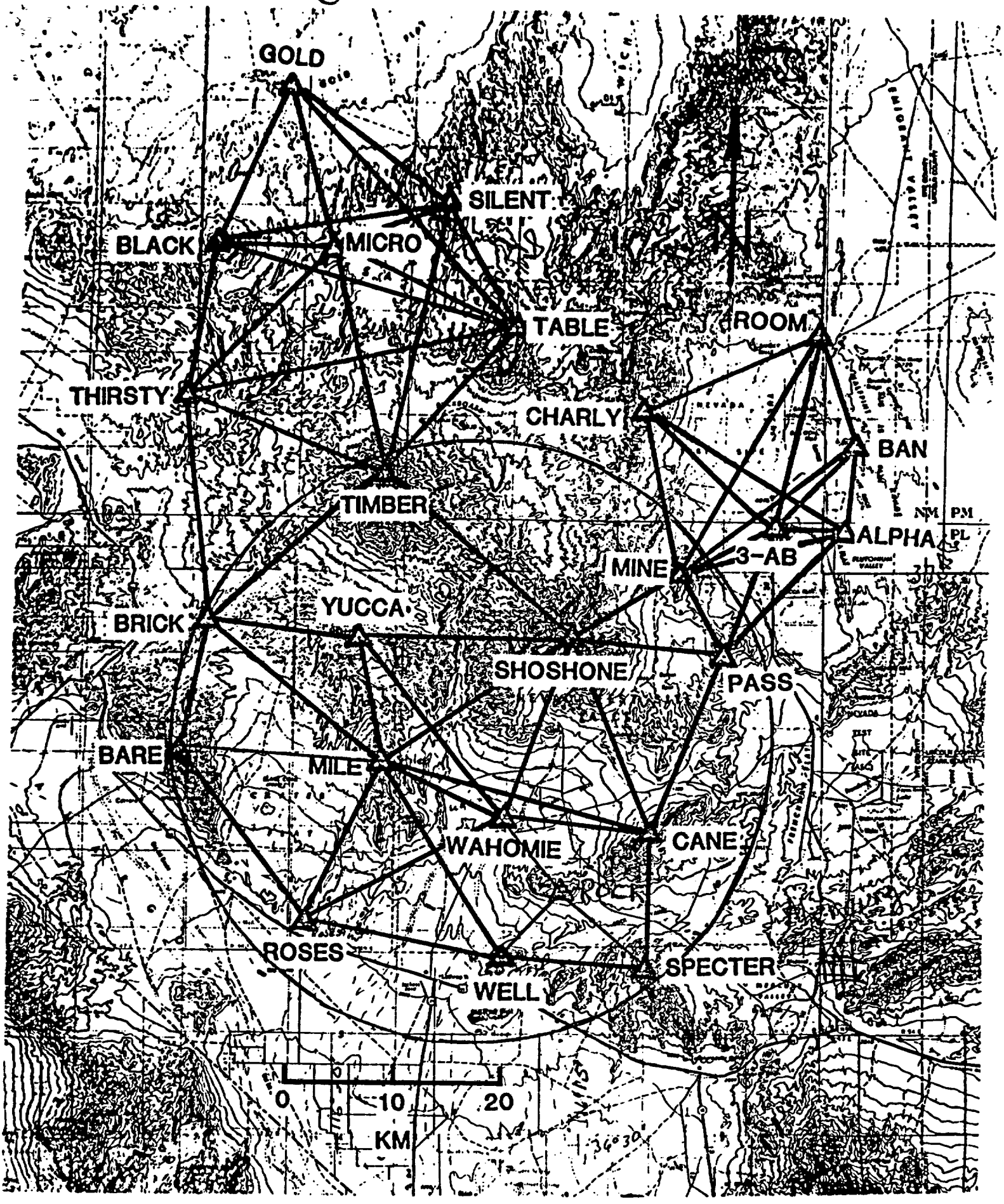


Figure 1. The Yucca Mountain trilateration network (within circle) near Mercury, Nevada. Station Mile is on Yucca Mountain.

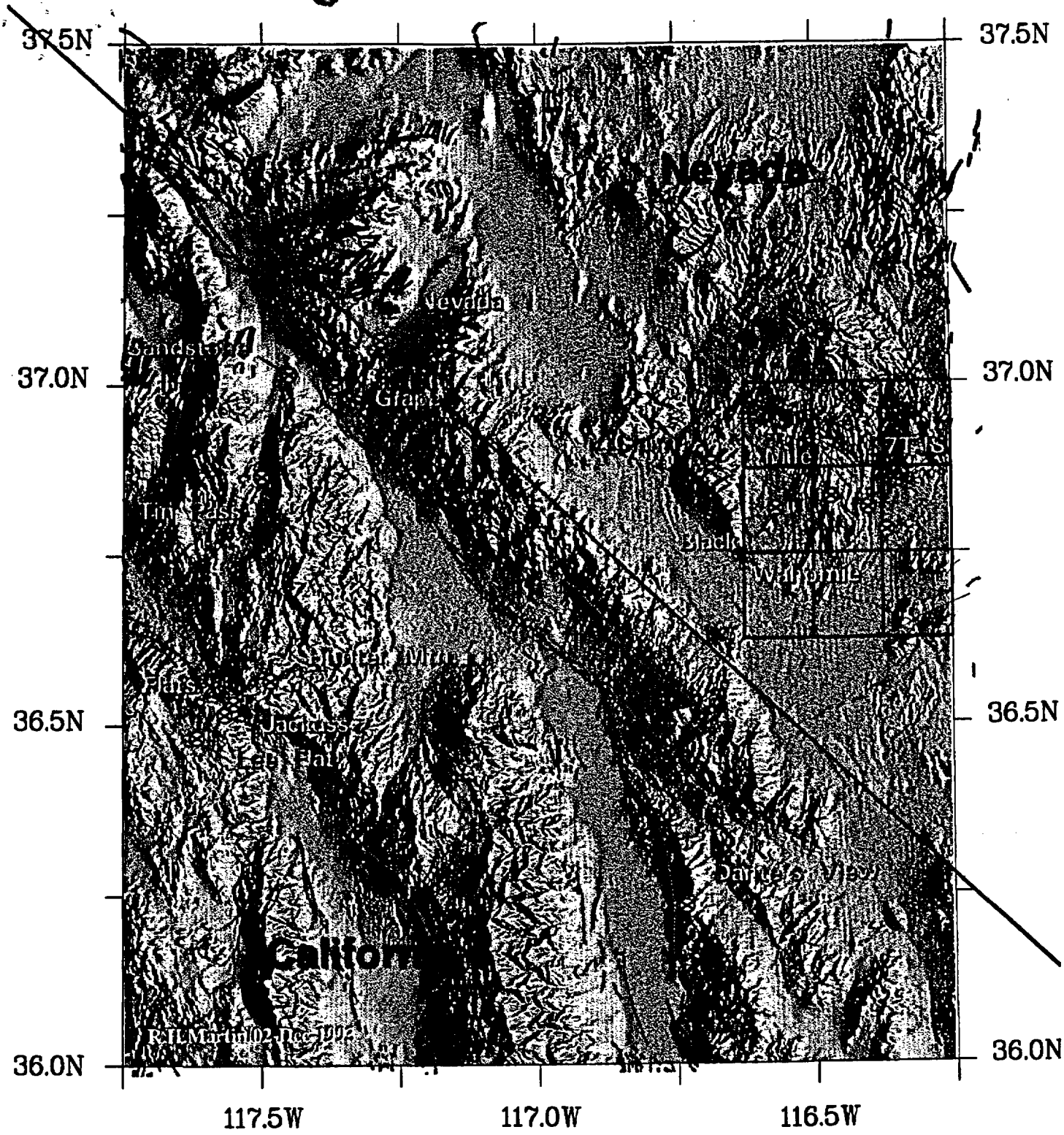
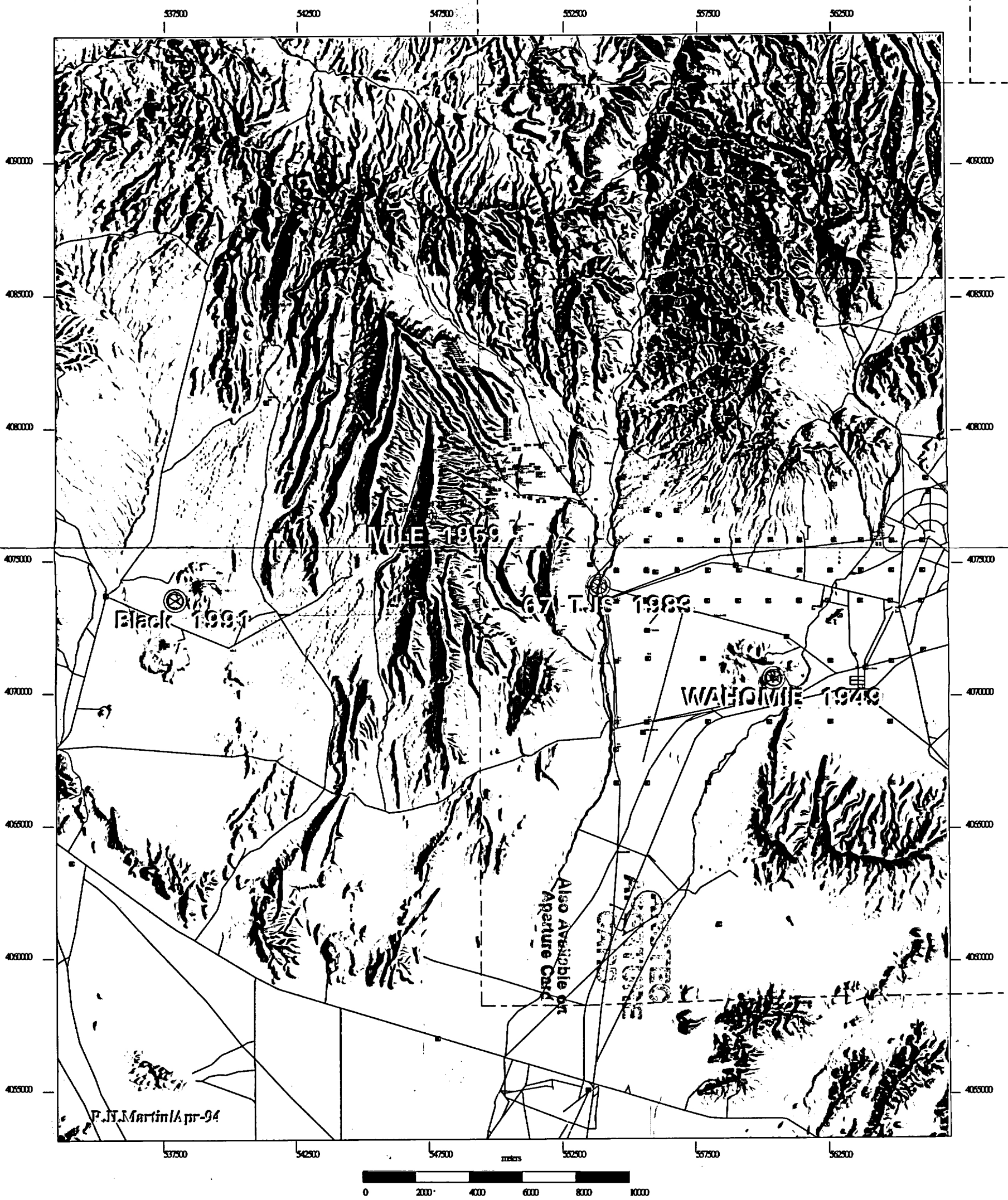


Figure 2. Global positioning satellite (GPS) stations. Faults are from sources noted in Figure 9-1. Yucca Mountain is located at the center of the nine square grid. Map projection is UTM.

U.S. NRC GPS RESEARCH PROJECT

Mapscale : 206000
Map projection : Projection UTM
Mapdatum : Datum NAD27
Units METERS Spheroid CLARKE1866
R.H.Martin : Mon May 9 13:34:19 CDT 1994

Center for Nuclear Waste Regulatory Analyses
Tectonics Research Geographic Information System



GPS)(Global Positioning System) stations used to characterize rates of tectonic deformation in the Yucca Mountain, Nevada area (J. Davis pers. comm., 1994). GPS stations coregistered with bench marks and borehole locations from DOE GIS database. Digital elevation and roads from USGS. Boreholes are marked by plus signs, benchmarks by boxes with diagonal cross.

Figure 3