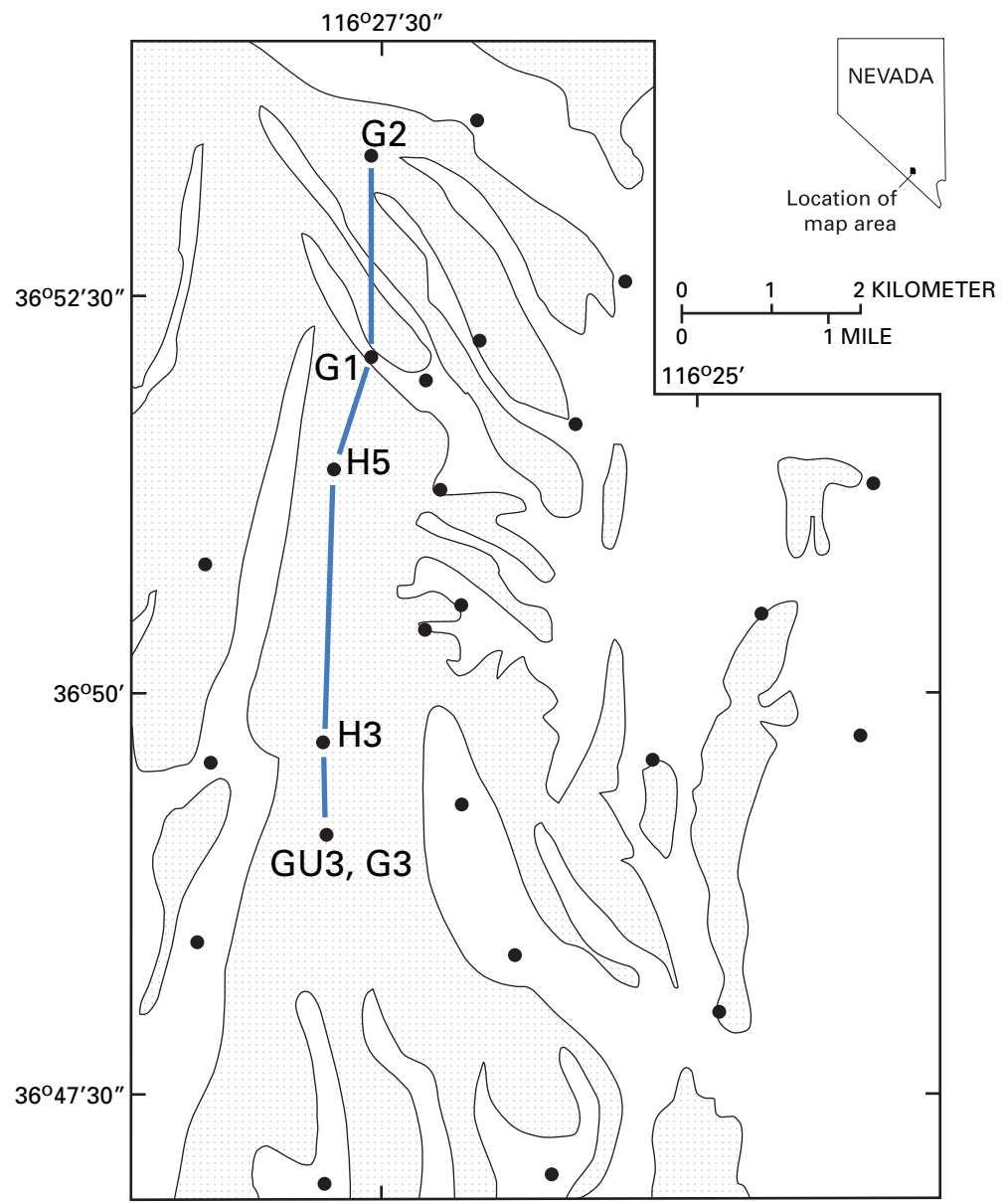
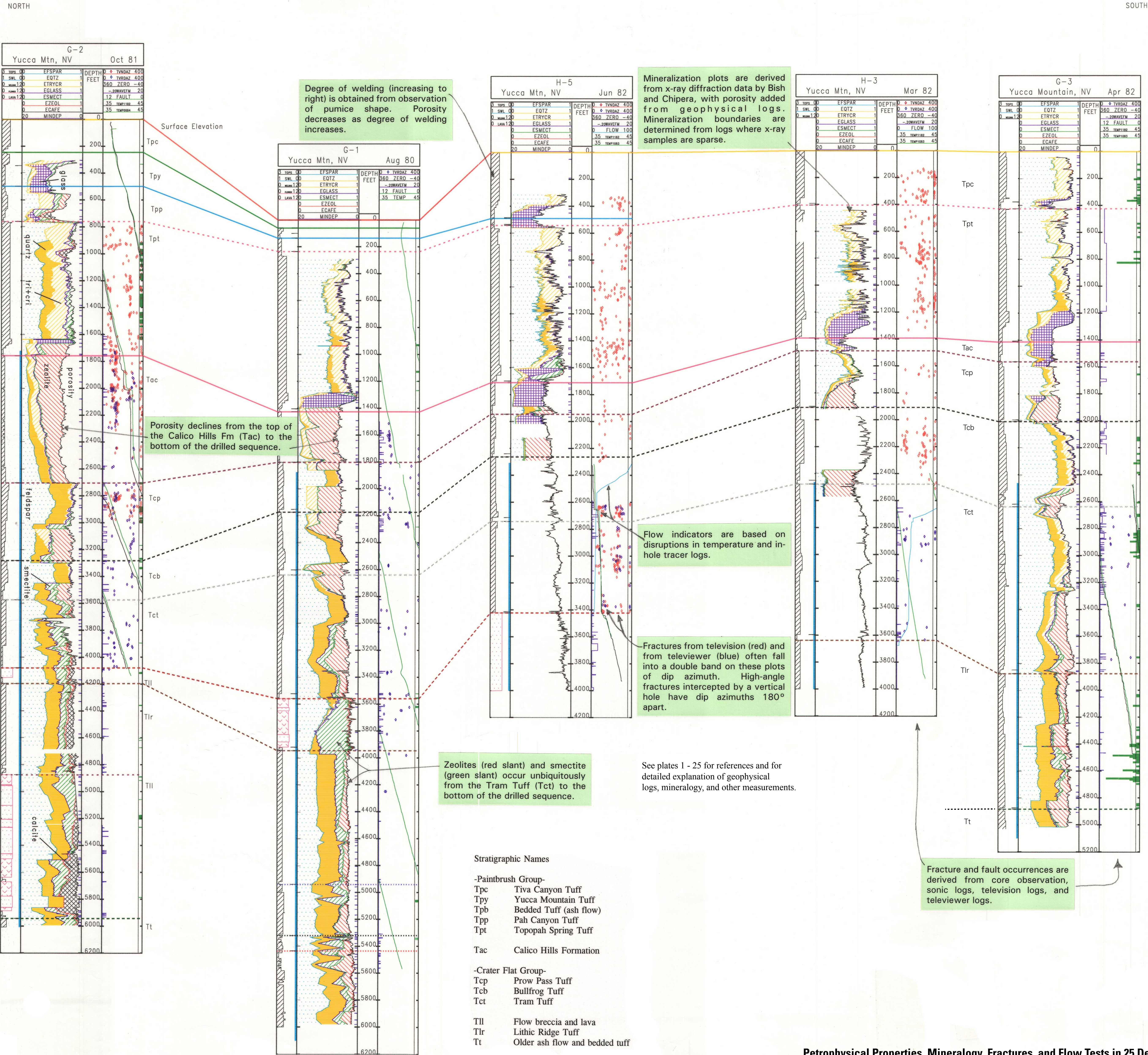


Mineralogy, Porosity, Welding, and Fracture Flow in Deep Boreholes



SUMMARY

We have compiled geophysical logs, core measurements, hydrological test results, fracture counts, X-ray diffraction mineralogy, and geological data from Yucca Mountain, the site of a potential nuclear waste repository in volcanic tuffs. These data were acquired by numerous workers from the USGS, DOE National Labs, and various contractors during the years 1978 to 1984. The data are presented as comprehensive data sets on a hole-by-hole basis and as selected subsets on cross sections of five to ten boreholes.

Water content and porosity are computed from epithermal neutron logs, density logs, and grain-density data from core. In the Topopah Spring Tuff, water content is found to be remarkably constant above the static water level. Variations in water saturation are primarily due to variations in large air-filled pores, or lithophysae. Separation between total porosity and water content is a good indicator of lithophysal zones. Zones of alteration are revealed where water content exceeds total porosity.

Mineralogy from X-ray diffraction is converted to volume percent and combined with the total porosity log. Alteration contacts revealed on geophysical logs are inserted into the mineralogical log. The result is a continuous log of porosity and whole-rock mineralogy, grouped into feldspar, quartz, tridymite/cristobalite, smectite, and zeolite components. Stratigraphy and a graphic log of the degree of welding complement the mineralogical log.

Fracture data were collected from borehole television, televiwer, core observation, and sonic waveform disruptions. Shallow invasion of drilling fluid revealed by neutron and density logs reveals a few zones of high matrix permeability. However, hydraulic conductivity profiles from hydraulic tests show that most highly permeable zones occur where the borehole intersects faults or fracture zones.