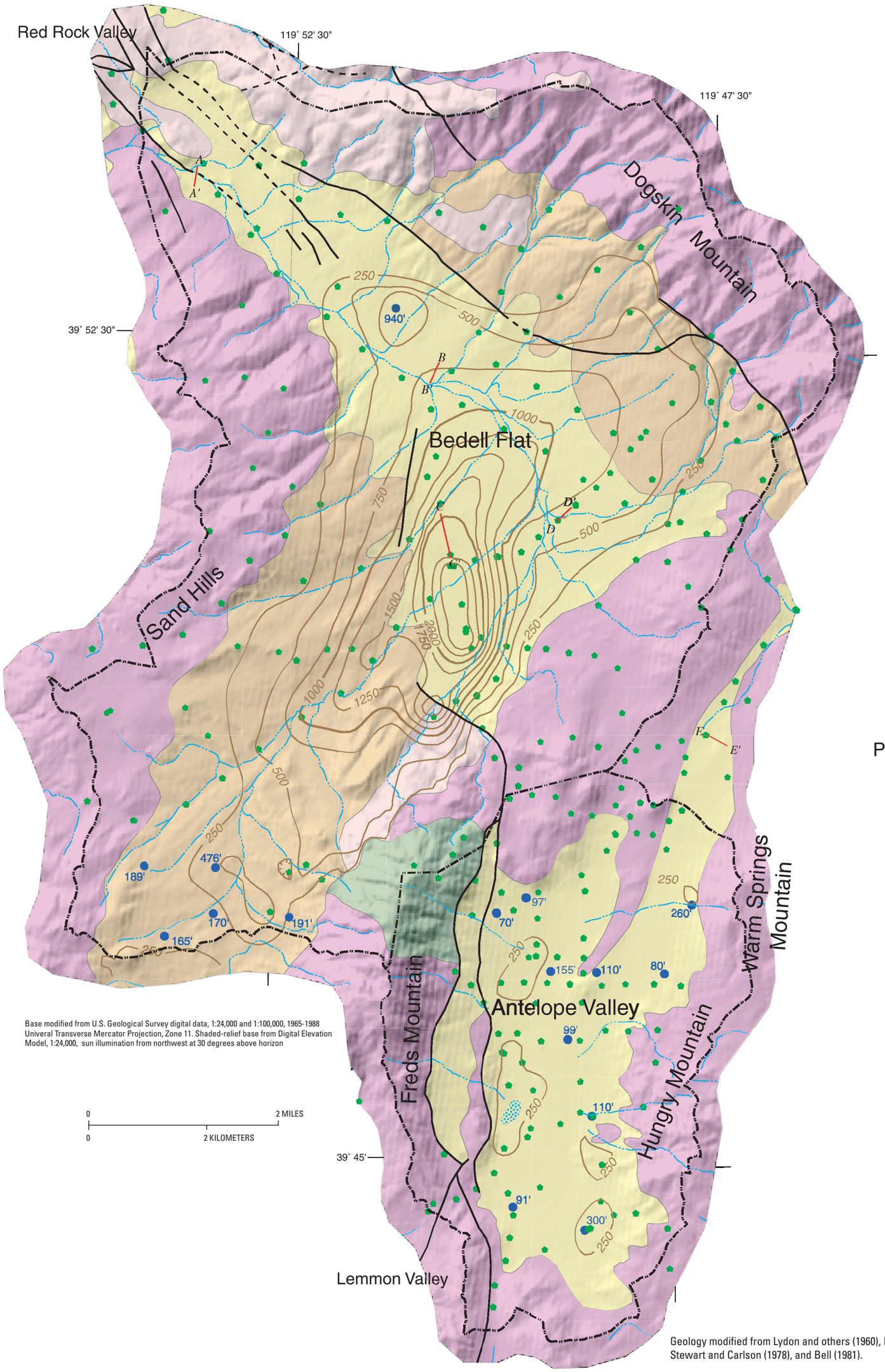
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in Cooperation with the
Washoe County Department of Water Resources

WATER-RESOURCES INVESTIGATIONS REPORT 01-4220
Berger, D.L., Ponce, D.A., and Ross, W.C. , Hydrogeologic Framework of
Antelope Valley and Bedell Flat, Washoe County, West-Central Nevada, 2001



Base modified from U.S. Geological Survey digital data, 1:24,000 and 1:100,000, 1965-1988
Univeral Transverse Mercator Projection, Zone 11. Shaded-relief base from Digital Elevation
Model, 1:24,000, sun illumination from northwest at 30 degrees above horizon

Geology modified from Lydon and others (1960), Bonham (1969),
Stewart and Carlson (1978), and Bell (1981).

EXPLANATION

Cenozoic Rocks

Younger basin-fill deposits (Quaternary)—Unconsolidated to poorly consolidated interbedded clay, silt, sand, gravel, and boulders of predominantly fluvial origin. Materials generally are moderately to well-sorted and form lenticular bodies. Deposits make up alluvial fans around margins of valleys, cover basin-lowland areas and low divides between adjacent areas. Surface exposures cover more than 50 percent of Antelope Valley and about 25 percent of Bedell Flat. These deposits make up the principal basin-fill aquifers where saturated. Permeability ranges from low to high. Zones of high permeability are sand and gravel deposits. Transmissivity ranges from 300 ft^2/d for fine-grained materials to nearly 13,000 ft^2/d for sand and gravel (Harrill, 1973, p. 26; SEA Engineers/Planners, 1978, p. 12–14).

Older basin-fill deposits (Quaternary and Tertiary)—Unconsolidated to partly consolidated silt, sand, and gravel that form terraces and alluvial fans in Bedell Flat and probably underlies younger basin-fill deposits elsewhere. Not exposed in Antelope Valley. Uplifted areas generally have been deeply dissected by stream erosion (Bonham, 1969, p. 41). These deposits are older than the late Pleistocene deposits of Lake Lahontan and exhibit deep soil development (Thompson and White, 1964, p. 25–26). Deposits may transmit moderate-to-large amounts of water; permeability typically decreases with depth. Low permeabilities generally associated with partly or semi-consolidated (cemented) deposits. Faults in these deposits may form barriers to ground-water movement (Harrill, 1973, p. 32).

Volcanic rocks (Tertiary)—Predominantly ash-flow tuffs, variably welded, ranging from rhyolite to quartz latite (Bonham, 1969, p. 23). Thin lenses of conglomerate, sandstone, and shale are interbedded locally. Includes Hartford Hill Rhyolite which overlies Mesozoic rocks with angular unconformity (Bonham, 1969, p. 23). Exposed in an isolated area northwest of Freds Mountain and in north part of Bedell Flat. Virtually no interstitial porosity except where vesicular. May transmit moderate amounts of water through fractures and joints sets. Interbedded sedimentary rocks may have high porosity due to generally fine-grained texture, but have low permeability (Berger and others, 1997, p. 18). Transmissivity for fractured rhyolite in adjacent Lemmon Valley, reported by Harrill (1973, p. 20) ranges from about 150 ft^2/d to nearly 400 ft^2/d. Not used as an aquifer in study area.

Pre-Cenozoic Rocks

Plutonic rocks (Jurassic–early Tertiary ?)—Undifferentiated plutonic rocks, principally biotite-hornblende granodiorite in composition (Bonham, 1969, p. 8). May be continuous with Sierra Nevada batholith. Generally forms mountains that border Bedell Flat and Antelope Valley. Exposed in Dogskin Mountain, Sand Hill, southern extension of Freds Mountain, Hungry Mountain, and unnamed mountains north and south of Antelope Valley. Virtually no interstitial porosity or permeability; locally may transmit moderate-to-large amounts of water if highly fractured or weathered. When highly fractured or weathered, producing wells can be developed where saturated. Numerous small springs occur in unit where structural and topographic conditions are favorable. Reported transmissivities for granitic-type rocks range from 30 ft^2/d to 1,000 ft^2/d (Harrill, 1973, p. 20).

Metamorphic rocks (Triassic and Jurassic)—Regionally and thermally metamorphosed volcanic flow, breccias, and pyroclastic and associated clastic sedimentary rocks (Bonham, 1969, p. 7; Harrill, 1973, table 2). Exposed as a small isolated roof pendant in northern extension of Freds Mountain, along hydrographic-area boundary between Bedell Flat and Antelope Valley. The pendant consists of schist, amphibolite, and cataclasite (McJannet, 1957). Low interstitial porosity and per-meability. May transmit water through fractures and bedding-plane features. Not important as an aquifer in study area.

Playa

Intermittent streams

250 — **Line of equal combined thickness of basin-fill deposits and volcanic rocks**—Shows combined thickness, in feet, of younger and older basin-fill deposits and volcanic rocks. Interval 250 ft. Hachures indicate local closed basement high.

Boundary of hydrographic area—Modified from Rush (1968).

Fault—Dashed were approximately located or concealed.

E — E′ **Location of seismic-refraction profile**—See figure 2.

940' **Well that penetrates to the base of basin-fill deposits and volcanic rocks**—Number indicates combined thickness, in feet, of basin-fill and volcanic units. Thicknesses obtained from well drillers' reports.

Gravity station—Location of gravity measurement sites used in computing thickness of basin-fill deposits and volcanic rock.

HYDROGEOLOGIC FRAMEWORK OF ANTELOPE VALLEY AND BEDELL FLAT, WASHOE COUNTY, WEST-CENTRAL NEVADA

By
David L. Berger, U.S. Geological Survey, Carson City, Nevada
David A. Ponce, U.S. Geological Survey, Menlo Park, California
Wyn C. Ross, Washoe County Department of Water Resources, Reno, Nevada

2001