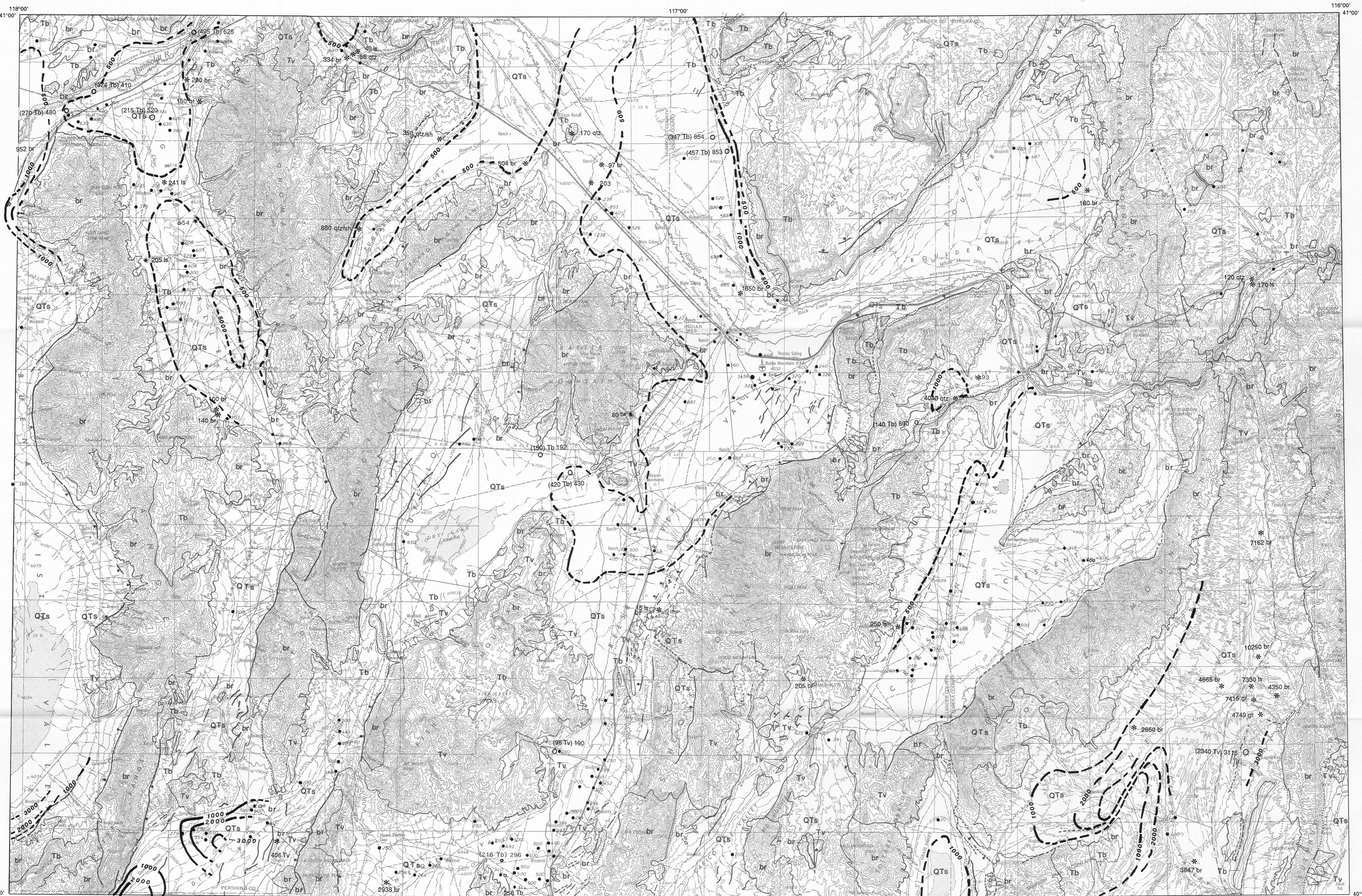

Base from U.S. Geological Survey, 1955
Universal Transverse Mercator projection

SCALE 1:250 000

5 0 5 10 15 20 MILES

5 0 5 10 15 20 25 30 KILOMETERS

CONTOUR INTERVAL 200 FEET WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

Geology simplified from Stewart and Carlson (1976b)
Data compiled 1987.

CORRELATION OF MAP UNITS

Map units	Age
QTs	Quaternary and Tertiary
Tb, Tr, Tv	Tertiary
br	Mesozoic and Paleozoic

DESCRIPTION OF MAP UNITS

QTs — **Sedimentary rocks (Quaternary and Tertiary)**—Valley-fill deposits composed of alluvial and lacustrine sediments, but may locally Cenozoic volcanic rocks

Tb — **Basalt (Tertiary)**—Basalt, basaltic-andesite flows, locally may include Quaternary basalt

Tr — **Rhyolite (Tertiary)**—Flows and domes generally associated with basalt

Tv — **Volcanic rocks (Tertiary)**—Silicic air-fall and ash-flow tuff

br — **Bedrock (Mesozoic and Paleozoic)**—Undivided sedimentary and igneous rocks; locally may include small areas of Tertiary volcanic rocks, Tertiary basalt, and Cenozoic sedimentary rocks

Contact—Dashed where approximately located; dotted where concealed

Basin and Range fault—Dashed where approximate located; dotted where concealed. Ball and bar on down-thrown side

Well site

• 300 — Footage to bottom of hole

○ (140 Tb) 600 — Footage to top of volcanic (**Tv**) or basaltic (**Tb**) marker unit and bottom of hole

* 250 ls — Footage to top of bedrock; ls, limestone; qtz, quartzite; sh, shale; cht, chert; gr, granitic rock; br, undivided bedrock

2000 — **Isopach contour**—Well constrained by well logs or geophysical models; dashed where extensions are largely constrained by gravity data. Thickness in feet

INTRODUCTION

The purpose of this map is to aid in the mineral-resource assessment and exploration of covered host rocks by displaying and interpreting data that can be used to estimate the depth of basin fill in the Winnemucca 1° by 2° quadrangle, Nevada. Publicly available information used in making this map includes water, petroleum, and geothermal well data, gravity data and models, seismic profiles, and geologic and geomorphic reports.

Wells logs used for this map of the Winnemucca quadrangle are from the following sources: (1) logs of more than 1,000 water wells reported to the State of Nevada Division of Water Resources, which are on file with them in Reno and at the with U.S. Geological Survey in Carson City, (2) 44 petroleum wells collected by the Nevada Bureau of Mines (Lintz,1957; Schilling and Garside, 1968; Garside and Schilling, 1977; Garside and others, 1977; 1988), and (3) Two geothermal wells reported in Zoback (1979) and Flynn and others (1982). Data from isostatic residual and Bouguer gravity maps by Wagini (1985) contributed to the interpretation of basin configuration. Gravity models of Dixie Valley (Schaefer, 1982, and Speed, 1976) and Grass Valley (Grannell and Noble, 1977) and seismic profiles of Grass and Pine Valleys (Potter and others, 1987) helped refine basin interpretations in those areas. The geologic base map of Paleozoic and Mesozoic igneous and sedimentary rocks, Tertiary volcanic and sedimentary rocks, and Cenozoic structures was simplified from Stewart and Carlson (1976b).

GEOLOGIC FRAMEWORK

The bedrock of the Winnemucca 1° by 2° quadrangle comprises Paleozoic, Mesozoic, and Tertiary sedimentary, volcanic, and plutonic rocks, which are inferred to overlie a Precambrian craton in the eastern third of the quadrangle (Farmer and De Paolo, 1983). Early work by Roberts and others (1958) divided the Paleozoic rocks in the eastern part of quadrangle into eastern miogeosynclinal, western eugeosynclinal, and central transitional assemblages. Although in detail the outcrop patterns are complex, Silberling and others (1984) divided the pre-Cenozoic rocks of the quadrangle into four tectono-stratigraphic terranes from east to west: the North American, Roberts, Golconda, and Jungo terranes. The North American terrane largely consists of early Paleozoic carbonate and quartzitic strata of the Cordilleran miogeosyncline. Rocks of the Roberts terrane are Devonian and older, marine to continental rocks of the Roberts Mountain allochthon and upper Paleozoic nonmarine to shallow-water marine strata that were deposited on the allochthon prior to the emplacement of the structurally higher Golconda allochthon. The Golconda terrane consists of deformed slices of upper Paleozoic marine strata of the Golconda allochthon and Triassic, largely postaccretionary strata that overlie the allochthon. The Jungo terrane largely consists of Late Triassic to Early Jurassic fine-grained turbiditic sedimentary rocks that structurally overlie the Golconda terrane. All of these terranes have been intruded locally by plutonic rocks ranging from ultramafic to granitic and of Triassic to Tertiary age.

The Cenozoic cover rocks in the Winnemucca quadrangle can be divided according to age and rock type. Before the initiation of basin-and-range faulting approximately 17 m.y. ago, silicious ash-flow tuffs, minor sedimentary rocks, and andesitic flows accumulated on a terrain of low to moderate relief (McKee and Noble, 1986; Stewart and Carlson, 1976a; Stewart, 1980; and Zoback and Thompson, 1977). With the onset of late-Cenozoic basin-and-range crustal extension, rocks of basaltic or bimodal basalt-rhyolite compositions became the dominant volcanic products found in the region. The basin-and-range faulting and tilting rotated fault blocks as much as 40° (Stewart, 1982). The combination of tilting and faulting produced structural basins containing fill that is now locally in excess of 10,000 ft deep and consists of pre-17 m.y. tuffs and sedimentary rocks and younger alluvial, lacustrine, and basaltic rocks.

Within this geologic framework, porphyry copper and gold, polymetallic skarn, low-fluorine porphyry molybdenum, carbonate-hosted gold, epithermal gold and silver, Golconda-type-hot springs manganese-tungsten, Cyprus massive sulfide, bedded barite, and other ore deposits are present. Models of these deposits are described in Cox and Singer (1986). Paleozoic, Mesozoic, or Cenozoic domains permissive for the occurrence of these types of deposits are found within basins covered by fill of various thicknesses.

DISCUSSION AND INTERPRETATION OF DATA

The primary data base for this map is from well logs of more than 1,000 water, petroleum, and geothermal wells drilled in the quadrangle. Depths of water wells range from a few tens of feet to more than 1,650 ft. Forty-four petroleum wells are reported to have been drilled in the quadrangle (Garside and others, 1988). Most of these wells were drilled in Pine Valley in association with the active Blackburn field. Additional wells have been drilled in Humboldt Valley, Dixie Valley, and Antelope Valley. Depths of the petroleum wells range from a few hundred feet to more than 10,000 ft. The geothermal wells reached depths from 360 ft to more than 4,000 ft.

The quality of water logs ranges from highly suspicious to very good; the petroleum and geothermal lithologic logs are generally very good. For each section of the quadrangle, the deepest and most reliable wells were selected from the logs, and their locations plotted to the nearest section. Reliability was judged by consistency with other nearby wells and the local geology. Bottom depths, and where applicable, tops of volcanic marker units or basement contacts and lithologies were plotted at well locations. The vast majority of reported wells bottom in Cenozoic alluvial and lacustrine rocks and thereby give minimum thicknesses of cover. Forty-four wells spudded in valley fill appear to have reached Paleozoic or Mesozoic basement. Twelve additional wells appear to have reached Tertiary volcanic rock but failed to enter pre-Cenozoic rock.

The gravity data were used in two ways: models interpreting depths of valley fill of Buena Vista Valley (Speed, 1976), Dixie Valley (Schaefer, 1982), and Grass Valley (Grannell and Noble, 1977) were used directly, and gravity maps (Wagini, 1985) were used as guides to extend approximate isopachs by broadly paralleling gravity contours from points constrained by well logs, seismic profiles, or gravity models. Seismic profiles across Grass Valley and Pine Valley in the southeastern part in the quadrangle indicate both valleys are asymmetrical with 1,000- and 3,000-ft minimum fills, respectively, along the east side of each of the valleys at range-front faults (Potter and others, 1987).

Approximate isopachs were constructed where a reasonable synthesis of the meager depth constraints could be made. In the vicinity of wells that intercepted bedrock, isopach locations are linear interpolations of the depth of the bedrock at the well site based on the distance to the nearest mountain front. Elsewhere, depth to bedrock was approximated at well sites that intercepted volcanic marker units by adding the thickness of the cover units exposed in nearby outcrops to the depth to the top of the marker unit. These depths, in combination with gravity maps (Wagini, 1985) were then used for constructing approximate partial isopachs. Users of this map should note the paucity of well-constrained depths available in making this map.

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MAP SHOWING DRILL-HOLE DEPTHS, LITHOLOGIC INTERCEPTS, AND PARTIAL ISOPACHS OF BASIN FILL IN THE WINNEMUCCA 1° BY 2° QUADRANGLE, NEVADA

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