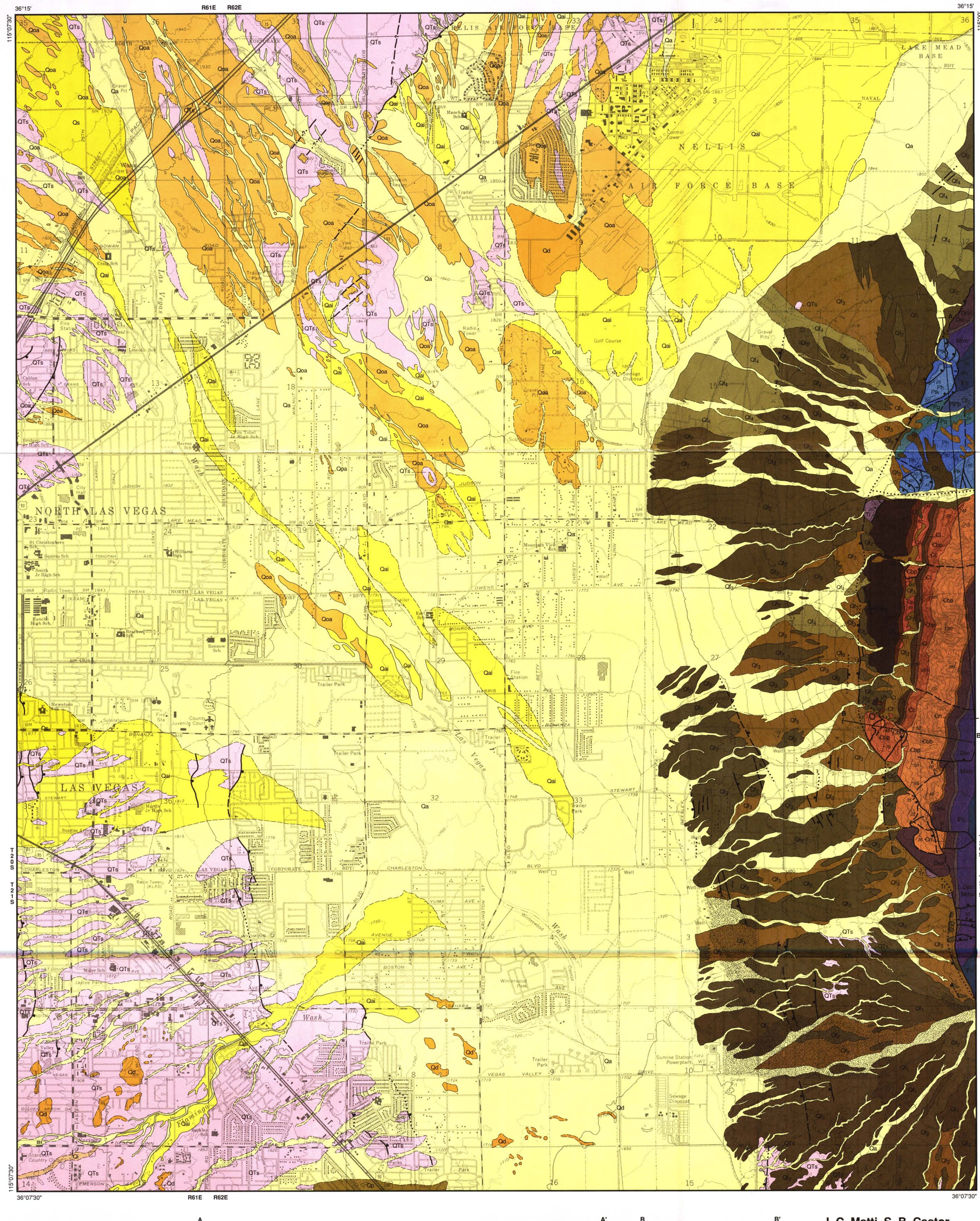
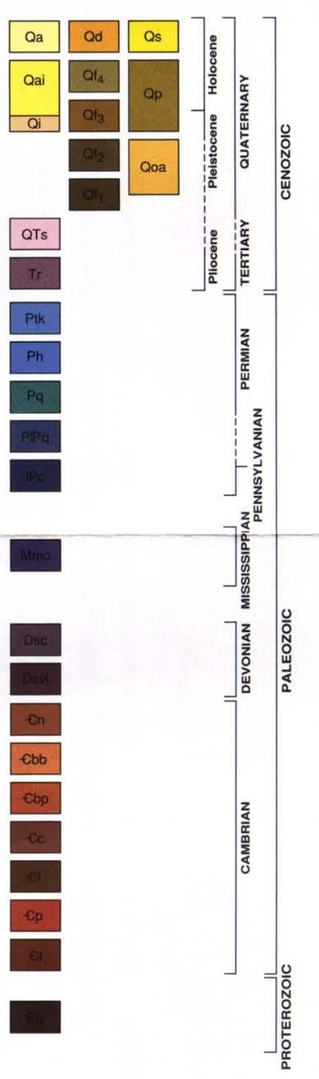
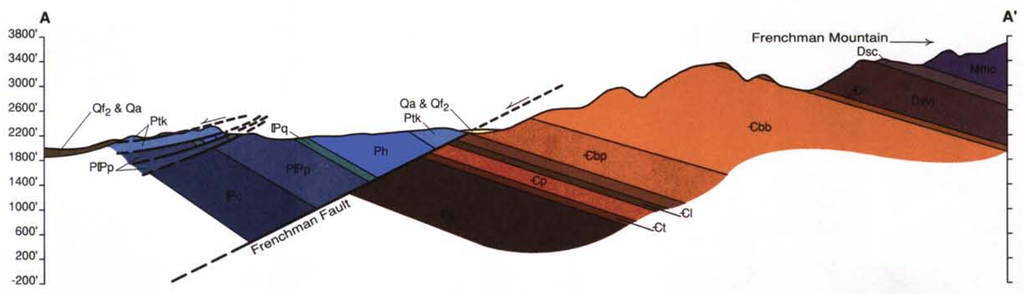
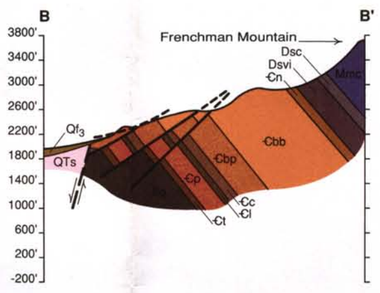
LAS VEGAS NE QUAD



GEOLOGY







Qa Active alluvium Pink to pale-brown fine sand to pebble and(or) cobble gravel occurring as thin veneers in incised stream channels and on between-channel alluvial flats. Clasts mostly limestone and dolomite with subordinate quartzite. Sand-size sediment is mainly carbonate; quartz and feldspar are subordinate; and detrital gypsum is a major component locally. Mostly unconsolidated, but locally cemented by caliche. In the Frenchman Mountain area, **Qa** is mainly sediment transported and deposited in the active washes and channels of alluvial fans. Areas underlain by **Qa** are subject to flooding.

Qs Sheet-wash alluvium Active, unconsolidated to slightly consolidated, pink to pale-brown, stream- and sheet-wash deposited sediment occurring as thin veneers on between-channel flats downslope from fault scarps. The sediment consists of sand, pebble-cobble gravel, and caliche fragments recycled from rock units exposed on upthrown fault scarps. Subject to reworking by wind.

Qd Sand dunes Unconsolidated to moderately consolidated, pink to pale-brown, fine to medium sand occurring in small to large barchan dunes and dune fields. Composed mostly of detrital carbonate and gypsum with subordinate quartz and feldspar. Intermittently active to inactive and stabilized deposits derived from eolian reworking of many units including **Qa**, **Qai**, and **Qoa**.

Qai Intermittently active alluvium Slightly to moderately consolidated, pink to pale-brown sand and pebble to cobble conglomerate mainly on between-channel alluvial flats and less commonly in incised washes. Deposits are lithologically similar to, and grade laterally into **Qa**. Contacts between **Qai** and **Qa** are arbitrary in places and may shift from season to season. Contains sediment that is transported and deposited during heavy flooding.

Qi Inactive alluvium Slightly to moderately consolidated alluvium that is lithologically and sedimentologically similar to **Qa** and **Qai** but occupies a slightly higher terrace level. Unit has not been recently active, and surface clasts have a slight desert varnish.

Qp Pediment deposits of east Las Vegas Thin pediment and colluvial deposits of pale-pinkish-tan silt, sand, and pebbly sand containing reworked caliche nodules, limestone, and volcanic rock fragments.

Qoa Older alluvium of Red Rock fan and Las Vegas Wash Pink to pale-brown pebble-bearing silty sand to sandy silt and pebble to cobble gravel composed largely of sedimentary rock clasts. Commonly contains thick near-surface calcrete and locally consists predominantly of reworked caliche nodules. Surface of unit is slightly to well dissected, lacks bar-and-channel morphology, has well-developed desert pavement, and is dark and mottled on aerial photographs. Surface clasts have slight to moderate desert varnish; carbonate clasts are typically etched. Unit may locally be a deeply dissected veneer or possibly a lag deposit from **QTs**.

Qf4 Undissected to slightly dissected alluvial fan deposits Slightly to well consolidated, pink to pale-brown or gray, pebble-cobble gravel interlayered with sand. Alluvium unit that mainly consists of high-standing, thin sediment veneers between incised active channels. Some **Qf4** upper surfaces may be reoccupied by active washes during heavy flooding. Upper surfaces have well-preserved channel-and-bar morphology and little or no desert pavement.

Qf3 Slightly to moderately dissected alluvial fan deposits Slightly to well consolidated, pink to pale-brown or gray, pebble-cobble gravel interlayered with sand. High-standing sediment veneers that have been abandoned by active channels and occupy a slightly higher terrace level than **Qf4**. Upper surfaces have partially degraded channel-and-bar morphology and thin desert varnish.

Qf2 Well dissected alluvial fan deposits Slightly to well consolidated, pink to pale-brown or gray, pebble-cobble gravel interlayered with sand. High-standing alluvium that represents alluvial fan sediments deposited on **QTs**. Upper surfaces have degraded channel-and-bar morphology and well developed desert pavement. Disrupted by faults flanking the west face of Frenchman Mountain. Younger units (**Qf3** and **Qf4**) were deposited with buttress unconformity on terraces degraded into **Qf2** and against fault scarps in **Qf2**.

Qf1 Very well dissected alluvial fan deposits Slightly to well consolidated, pink to pale-brown or gray, pebble-cobble gravel interlayered with sand. Small remnants of high-standing terrace deposits flanked by **Qf2** in the northeast part of the quadrangle.

QTs Consolidated fluvial sediments Light-greenish-, yellowish-, and pinkish-gray to reddish-orange fine sand interstratified with silt, pebbly sand and pebble to small cobble gravel. Massive or flat-laminated to shallowly trough-laminated with local scour and fill channels. Contains moderately to well consolidated layers and local caps of caliche. Fibrous and encrusting gypsum are common. Residual surface lag deposits are difficult to distinguish from remnants of **Qoa**. In the Flamingo Wash area, unit may be covered by a veneer of reworked **QTs** equivalent to **Qaf** of Bingler (1977). Contains olive-green dolomitic claystone along Hollywood Boulevard in section 14, T21S, R62E, and white clayey dolomite in a gravel pit in section 11, T20S, R62E.

Tr Tertiary redbeds Weakly indurated, thin- to thick-bedded reddish-brown limy siltstone to medium cross-bedded sandstone with locally abundant fibrous to nodular or massive gypsum. Includes a 10-cm-thick bed of pale-green zeolitized air-fall tuff and a 7-m-thick sequence of brown siltstone and interbedded green tuffaceous layers up to 1 cm thick. Also contains a 3-m-thick sequence of pebbly sandstone in shallow channels. These redbeds are considered to be pre-Quaternary because they dip moderately, instead of having near-horizontal bedding typical of younger Las Vegas basin units. They are tentatively correlated with Miocene rocks which occur along the foot of Frenchman Mountain to the south (Longwell and others, 1965). However, they could be correlative with other Tertiary or Mesozoic redbed units that crop out to the east of the quadrangle. The presence of tuff rules out correlations with Paleozoic units.

Ptk Toroweap and Kaibab Formations Mostly thick-bedded, cliff-forming, dark-gray dolomitic limestone with abundant, thin, irregular discontinuous layers of dark-gray chert. The Toroweap Formation includes 30 m of nonresistant reddish-brown shale and fine sandstone containing gypsum beds up to 5 m thick at its base. A similar gypsum-rich redbed unit about 15 m thick near the middle of the sequence is considered to be the upper part of the Toroweap Formation by Longwell and others (1965). Together the Toroweap and Kaibab Formations are about 200 m thick in the Las Vegas NE Quadrangle.

Ph Hermit Formation Weakly indurated, white to reddish-brown limy siltstone to fine sandstone with minor gypsum. The formation is 305 m thick, including the uppermost 32 m which is clean, white to pink sandstone which may be correlative with the Coconino Sandstone.

Pq Queantoweap Sandstone Friable to indurated, fine-grained, white to light-pink or ochre, cross-bedded quartz sandstone 114 m thick. Correlative with the Esplanade Sandstone of the Supai Group on the Colorado Plateau (Rowland, 1987).

IPPp Pakoon Limestone Light-gray medium-bedded limestone and gypsum 268 m thick.

IPc Callville Limestone Thick-bedded, gray to dark-gray, fine-to medium-crystalline limestone and dolomite with minor chert. The base of the unit contains some friable sandy redbeds, and the upper part contains brown cross-bedded eolian sandstone. Unit is 297 m thick (Rowland, 1987).

Mmc Monte Cristo Formation Light-gray to gray locally fossiliferous dolomitized limestone (Rowland, 1987). The formation is 242 m thick, including the 25-m-thick Dawn Member, a conspicuously chert-rich interval beginning 50 m from the base (Rowland and others, 1990). Disconformity at base (Langenheim and Webster, 1979). Correlative with the Redwall Limestone of the Grand Canyon.

Dsc Sultan Limestone, Crystal Pass Member Finely laminated very light gray dolomitized limestone about 60 m thick (Rowland and others, 1990).

Dsvi Sultan Limestone, Valentine and Ironside Dolomite Members Mostly dark-gray cliff-forming dolomite about 130 m thick with local stromatoporoids (Rowland and others, 1990). Forms a conspicuous dark band across Frenchman Mountain. Middle part of unit contains some light-gray beds and chert layers. Locally altered to light-colored vuggy dolomite. Disconformity at base (Langenheim and Webster, 1979).

Cn Nopah Formation Dolomite and fine clastic unit 33 m thick with abundant stromatolites. A lower interval (Dunderberg Shale Member) consists of a basal 2 m of green limy siltstone overlain by 10 m of resistant, buff, fine- to medium-grained detrital dolomite with glauconite pellets, and an upper unit of nonresistant olive-green to gray-green shale and siltstone with brown dolomite interbeds. An upper interval consists of 13 m of light-gray to pale-green, thick-bedded, very fine- to medium-grained dolomite with detrital textures.

Cbb Bonanza King Formation, Banded Mountain Member Gray, thick-bedded dolomite and minor limestone unit 484 m thick that is correlative with the upper portion of the Muav Limestone and overlying unnamed dolomites of the Grand Canyon region (Rowland and others, 1990). Typical lithology is banded light- and dark-gray dolomite with bands several meters thick. Light-colored bands are generally finely laminated. Base of unit is a thick slope-forming, orange-weathering, burrow-mottled, 50-m-thick interval. Two cherty intervals are in the lower half of the unit. The upper 50 m is orange-buff-weathering eocrinoid limestone with abundant glauconite pellets at the base (Rowland and others, 1990).

Cbp Bonanza King Formation, Papoose Lake Member Gray, thick-bedded limestone and dolomite, 146 m thick (Rowland and others, 1990). Oncolitic limestone in lower 50 m. Most of unit is conspicuously burrow-mottled. Equivalent to the lower portion of the Muav Limestone of the Grand Canyon.

Cc Chisholm Shale Nonresistant greenish-gray shale 25 m thick (Rowland and others, 1990). Contains fossils of trilobite genus *Glossopleura* (Palmer, 1981). A 30-cm-thick brown cross-bedded granular limestone is present near the base of the unit, and limy shale beds occur near the top.

Cl Lyndon Limestone Resistant, thin-bedded to blocky, finely crystalline dark-gray limestone 30 m thick (Rowland and others, 1990). Light-gray and brownish-gray burrow mottling along discontinuous beds is typical; contains conspicuous thrombolites.

Cp Pioche Shale Mostly nonresistant olive-green to brown phyllitic shale. Unit is 128 m thick (Rowland and others, 1990). Olenellid trilobite fossils occur in the lower part of the unit, and are locally abundant about 70 m above the base (Pack and Gayle, 1971). Dark-reddish-brown, hematitic, fine to coarse sandstone beds up to 1 m thick are present in the lower 70 m, and about 20 m of flaggy, fine purple sandstone occur 20 m below the top.

Ct Tapeats Sandstone Highly indurated, white to brown, fine to coarse quartzitic sandstone unit with pebble beds near the base. Thickness is somewhat variable because it lies on crystalline rock; Hardy (1986) reported 48 m. Thin to very thick bedded; locally cross-bedded. Silica and(or) calcite cement that is locally hematitic at base.

Pg Gneiss Gray, fine- to medium-grained microcline-quartz-biotite-garnet gneiss interbanded with pink to white coarse leucocratic gneiss. In many places the banding is complexly folded. Discordant masses of fine- to coarse-grained biotite ± garnet granite cut the gneiss. Much of this granite appears massive and it locally contains coarse euhedral microcline phenocrysts. Small boudins of hornblende-plagioclase-quartz ± biotite ± hypersthene gneiss are also present. Mineralogy of these rocks indicates granulite-facies metamorphism. Correlated with the Vishnu Group in the Grand Canyon by Rowland (1987).

J. C. Matti, S. B. Castor, J. W. Bell, and S. M. Rowland

Scale 1:24,000
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

0 0.5 1 KILOMETER
0 1000 METERS
0 0.5 1 MILE
0 2000 4000 FEET

Contact Dashed where approximately located

Fault Dashed where approximately located, queried where uncertain, and dotted where hidden. Ball on downthrown side.

45 **Strike and dip of bedding**

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