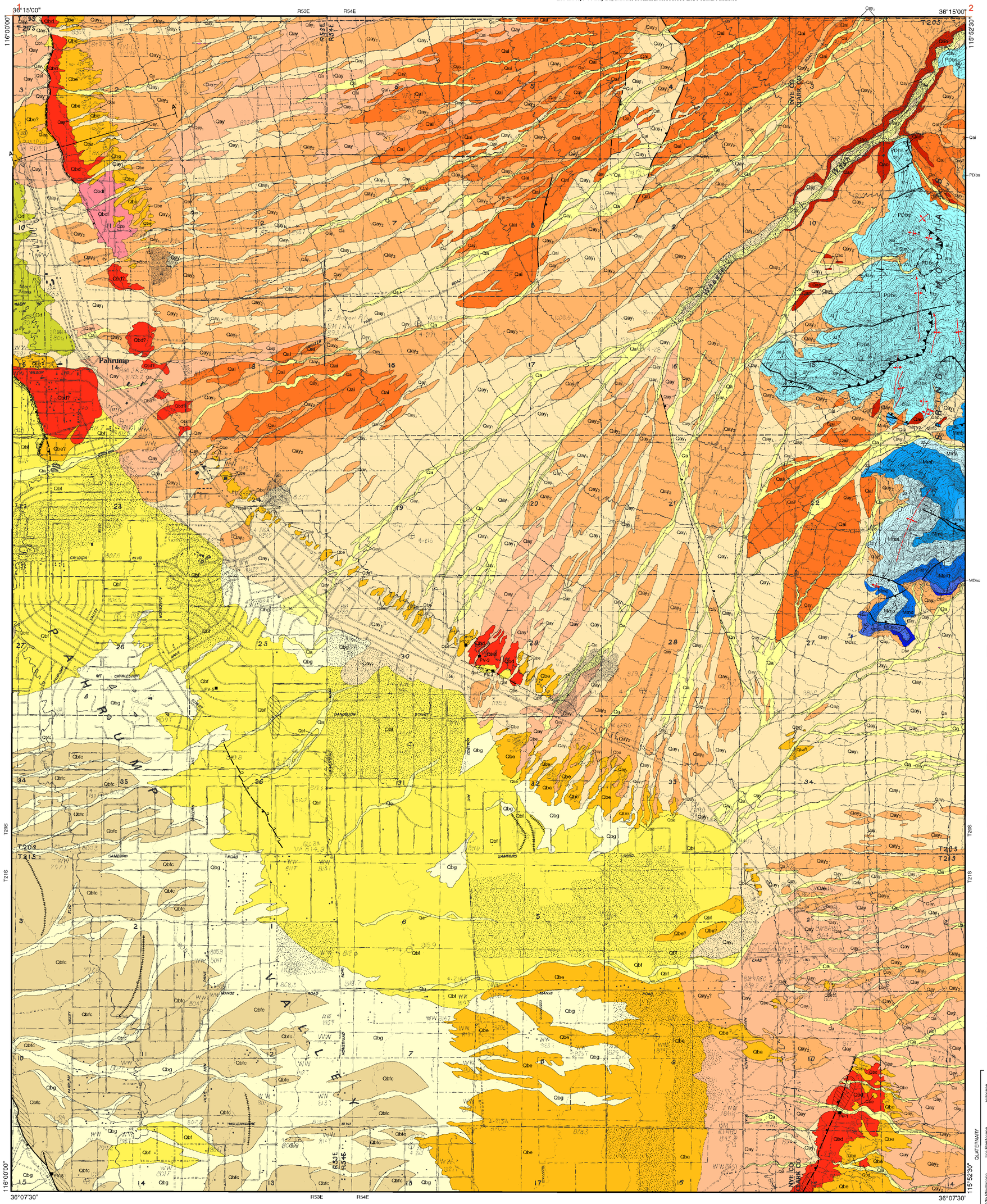
PRELIMINARY GEOLOGIC MAP OF THE PAHRUMP QUADRANGLE, NYE COUNTY, NEVADA



Surficial Deposits

Qd **Eolian dunes and deposits** Light-brown, well sorted, angular to rounded, noncemented fine sand in intermittently active to inactive dunes, partly stabilized by vegetation. Coppice dunes up to 5 m high. Latest Holocene age.

Fine-Grained Basin Deposits

Spring, paludal, eolian, and water-laid deposits comprising extensive fine-grained valley-bottom fill and distal-fan fringe deposits in northern Pahrump Valley; related to extensive groundwater discharge during glacial/pluvial periods (Quade, 1986; Quade and others, 1995). These units correlate to the upper part of the Las Vegas Formation in northern Las Vegas Valley, and are named after the correlating members (units D, E, and F) following Haynes (1967) and Bell and others (1999). An active fine-grained deposit unit ("unit G") has been added to these. These units are informally called the fine-grained alluvium of Pahrump Valley.

Qbg **Unit G** Light-brown eolian silt, and alluvial silts and muds largely reworked from older basin deposits. Erosionally inset into older deposits in the eastern part of Pahrump Valley, and burying them in the western part of the quadrangle. Includes some areas of active overflow on the basin floor where bar-and-channel morphology is present. Thin bedded to massive, unit ranges from surficial to 0.5 m thick, and has no soil development. Active to late Holocene age. Possibly subject to intermittent flooding.

Qbf **Qbfc** **Unit F** Light-brown eolian and alluvial silts and muds, light brown to light gray sand. Much of the alluvial silts and muds is reworked from older paleospring deposits. Thin bedded to massive, deposits are friable and loose, and lack soil development. Deposits are as much as 1 to 2 m thick. Some eolian silt deposits on top of Qbe are up to 0.5 m thick. Where overlain by the red-brown clay the unit is designated as Qbfc. Mid to late Holocene age. Radiocarbon dated at 5570±40 ybp (Table 1).

Qbe **Unit E** Light-brown to yellowish-brown silt, light-brown to light-gray fine sandy silt, and light-gray organic mud, and locally light-green clayey silt. Typically 1 to 3 m thick, consisting of paleospring, paludal, eolian, and possible lacustrine deposits. In the distal-fan fringe setting, silts from Qbe are dominantly eolian, alluvially reworked older basin deposits, and phreatophyte fringe deposits, following the environments laid out in Quade and others (1995). A notable group of Qbe deposits in the south-central part of the quadrangle that lie southwestward of the general trend of the distal-fan fringe deposits have alluvial/lacustrine(?) cross-bedded sand layers a few centimeters to 10 cm thick. Qbe deposits within the basin consist of light-green clayey silt (wet meadows deposits), overlain by sandy silts (phreatophyte fringe deposits), and in turn overlain by a 0.5-m-thick, red-brown clay deposit of possible lacustrine origin. Within these deposits are light- to dark-gray organic mats. The upper part of Qbe is a light- brown, weakly to moderately indurated, eolian silt. Unit E is radiocarbon dated at 10,270±270 ybp (Table 1).

Qbd **Qbdf** **Unit D** Typically light-gray to gray organic mud, light-brown to light-gray to light-green clay, silt, fine sandy silt, and locally clay. Interbeds and lenses of well sorted, cross-bedded, pebble gravel are common. Exposed thickness is typically 3 to 4 m, with a maximum of 6+ m exposed in quarry exposures. Generally consists of massive to thick bedded mud deposits; where consisting of predominantly silts and fine sands, unit is thinly bedded and fissile. The upper 1 to 2 m of this unit is characteristically light gray, calcareous mud that is partially cemented with calcite which weathers to curving and branching platy nodules. Top of unit commonly capped by a 30 to 50 cm thick calcrete. Locally contains small molluscs, clams, and snails. Radiocarbon dated at 19,930±50 and 24,150±80 ybp (Table 1).

Alluvial Fan Deposits

Alluvial Fan Deposits of the Western Spring Mountains

Sandy coarse-pebble gravel alluvial fan deposits originating principally from Wheeler Wash and Carpenter Canyon drainages in the western Spring Mountains. In this quadrangle, includes poorly to moderately sorted, weakly to moderately imbricated, generally clast supported with minor matrix supported, subangular to rounded, gravel deposits. Thinly bedded to massive, with gravel lenses ranging from a few centimeters to 70 cm thick, and commonly 10 to 30 cm thick. Clasts are 70% to 95% Paleozoic carbonate rocks, with the remaining percentage made up of silty limestone, chert, and quartzite. Mapped deposits are early Quaternary through late Holocene age.

Qa **Active alluvium** Dominantly cobbly, pebbly, sandy gravel within active washes in the fans. Intercalated with layers of reworked silts where streams cross the basin fringe deposits near the toes of fans, and dominated by gravelly silt deposits within the basin. These become dominatly silt on the basin floor. Anastomosing bar-and-channel network with no pavement or soil development. Subject to intermittent flooding.

Qay **Younger alluvium (undifferentiated)** Fan remnants characterized by surfaces ranging from subdued bar and channel to fully smoothed with well-developed pavements. Commonly includes earlier younger alluvium (Qay_1) with interspersed, later younger alluvium (Qay_2) making delineation difficult. Latest Pleistocene to late Holocene age. Subject to intermittent flooding in places.

Qay_1 **Later younger alluvium** Fan remnants characterized by subdued bar–and–channel morphology, incipient desert pavement, weak rock varnish, and no to slight etching of carbonate surface clasts. Soils are typically A-C and A-Bk-C profiles with a 1- to 5-cm-thick, light brown, eolian epipedon (Av) and a 5- to 20-cm-thick, weak or nonexistent calcic horizon (Bk) with Stage I carbonate development. Mid to late Holocene age.

Qay_2 **Earlier younger alluvium** Fan remnants characterized by well-developed, moderately to tightly packed desert pavement, weakly to moderately well developed rock varnish, incipient to moderate etching of surficial carbonate clasts. Soils are typically A-Bw-Bk-C profiles with a 2- to 15-cm-thick, light brown silt eolian epipedon (Av), a 10- to 20-cm-thick roddened, silt infiltrated, cambic horizon (Bw), and a 30+ cm calcic horizon with Stage I and II carbonate development. These deposits both overlie and are inset into Qbe deposits. Latest Pleistocene to mid Holocene age.

Qai **Intermediate age alluvium** Fan-terrace remnants characterized by tightly packed desert pavement, dark rock varnish on non-carbonate clasts, and very strongly etched carbonate clasts. Flat topped surfaces are quite prominent in this unit that is commonly well dissected and elevated above surrounding fan surfaces. Unit typically contains a soil exhibiting a 5- to 10-cm-thick, light brown eolian silt epipedon (Av), 10-30 cm redded and well-structured argillic horizon (Bt), and 100-150 cm thick calcic horizon (Bk) with up to Stage IV carbonate. Upper soil horizons may be erosionally stripped in some areas. Late Pleistocene age.

Qao **Older alluvium** Fan-terrace remnants characterized by deep dissection and discordant rounded remnants (ballenas), moderately to well developed pavement with whitish, calcrete litter abundant, and deeply etched limestone and dolostone surficial clasts. Outcrops of massive calcic cementation are common. Unit has been thoroughly infiltrated by silt and carbonate. Calcic horizons are several meters thick with development of Stage V (massive) carbonate, with horizontal layers of calcic deposits near the tops of deposits.Other upper soil horizons have been stripped. Middle Pleistocene age.

Paleozoic Sedimentary Rocks

PDbs **Bird Springs Formation** Consists of distinct, variably alternating beds of medium- to dark-gray, thinly to thickly bedded (0.1-4 m beds), medium to coarsely bioclastic, micritic limestone; light-brown to light-gray (weathers to prominently beds of rust orange), thinly to thickly bedded (0.1-6 m beds), silty limestone; dark-gray to brown black, thinly bedded, secondary chert nodules and layers; and minor(?), medium-gray, medium- to coarsely crystalline dolostone. Fossils are common throughout the formation including corals, crinoids, brachiopods, and gastropods. Neither the base nor the top of the of the Bird Springs Formation are exposed on the quadrangle. Total thickness is difficult to estimate without more detailed study because of the complex structure, but appears to be greater than about 400 m.

Monte Cristo Formation

Composed of light- to dark-gray, commonly bioclastic limestone, and light-brown dolostone, with occasional intercalated, dark-brown and black chert layers. The formation consists of five members (from youngest to oldest) the Yellow Pine, Arrowhead, Bullion, Anchor, and Dawn Members (Hewett, 1931). All except the Arrowhead Member are exposed in the quadrangle.

Mmyp **Yellow Pine Member** Medium- to dark-gray, thinly to thickly bedded (0.5-2 m beds), medium to coarsely bioclastic, micrite; weathers to steep slopes. Occasional large rugose corals up to a few centimeters in diameter visible. Abrupt, faulted lower contact with the Bullion Member; if the Arrowhead Member was present where this contact is visible, it appears to have been faulted out. Upper contact is faulted against the Bird Springs Formation. The total unit is not exposed on the quadrangle but is about 50 m in the eastern Spring Mountains (Bell and others, 1997).

Mmb **Bullion Member** White to light brown, thinly to thickly bedded (0.5-1 m thick), locally massive, medium to coarsely crystalline dolomite; weathers to steep slopes and is a common cliff-former. Upper contact with the Yellow Pine Member is abrupt and faulted. The lower contact with the Anchor member is fundamentally a roughly bedding parallel dolomitization front generally about 5 m wide, but can be as sharp as 1 m. This lower contact also coincides with an abrupt increase in the amount of secondary chert in the unit, the Bullion Member having relatively little secondary chert. The thickness of the Bullion Member is about 100 m.

Mma **Anchor Member** Medium- to dark-gray, thinly to thickly bedded (0.5-1 m thick), fine- to coarse-grained bioclastic micrite and biomicrite, with black, intercalated secondary chert beds, lenses, and nodules, and white to light brown dolostone. Abundant secondary chert is characteristic of the unit and locally comprises up to 40% of the unit. Base of the unit is an 8-m-thick chert layer that forms a distinct slope above the Dawn Member; contact with the Dawn Member is marked by abrupt disappearance of the chert over a 1 to 2 m interval. Near the top of the Anchor Member are intertonguing pods and layers of dolostone indicating a larger transition zone to the dolostones of the Bullion Member above than the gradational contact mapped. Total thickness of the Anchor Member is about 130 m.

Mmd **Dawn Member** Medium- to dark-gray, thinly to thickly bedded (0.1-1 m thick), medium to coarsely bioclastic, fine to medium grained micrite and biomicrite, light- pink-tan to medium-gray, medium to coarsely crystalline dolostone, and minor, white orthoquartzite near the base. Upper part contains a coarse bioclastic fossil hash that includes crinoid stems up to 1 cm in diameter. Base of unit has 20 to 30 m of dolostone, with local "zebra rock" texture, and local lenses of orthoquartzite that lie immediately above the lower contact with the Crystal Pass Member of the Sultan Formation. Generally weathers to sleep slopes and cliffs. Sharp upper contact with the Anchor Member and sharp lower contact above the Crystal Pass Member. Total thickness of the Dawn Member is about 130 m.

Sultan Formation

Composed of light- to medium-gray limestones and dolostones. Consists of three members (from youngest to oldest); the Crystal Pass, Valentine, and Ironstone Members (Hewett, 1931). Only the Crystal Pass and Valentine Members are exposed in the Pahrump Quadrangle. Total thickness of the Sultan Formation measured in the eastern Spring Mountains is about 175-200 m (Axen, 1985).

MDsc **Crystal Pass Member** Light- to medium-gray, thinly to thickly bedded (0.2 to 2 m thick), fine to medium crystalline, pure micritic limestone and sparry calcite; locally weathers to thin plates. Well-bedded limestones weather to steep slopes and cliffs. Base of the unit is transitional with the Valentine Member, consisting of intercalated dolostones and limestones. The top of the unit is a fairly abrupt contact with the dolostones and pure, channel-fill quartzites of the Dawn Member of the Monte Cristo Formation. The thickness of the unit is approximately 70 m.

Dsv **Valentine Member** Light- to medium-gray, occasionally sandy and silty, micritic limestone and medium to coarsely crystalline sparry calcite intercalated with light brown, medium to coarsely crystalline dolostone; weakly fossiliferous. Moderately well bedded limestones and dolostones weather to steep slopes. Top of the unit is transitional with the Crystal Pass Member. Minimum thickness from mapped relations is 20 m.

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Lithologic contact Dashed where inferred or approximately located, dotted where concealed.

Normal-slip fault Ball on downthrown side; dashed where inferred or approximately located; queried where uncertain; dotted where concealed; buttress contact where dotted combined with dashed.

Strike-slip fault Arrows indicate sense of strike separation; dashed where inferred or approximately located; dotted where concealed.

High-angle reverse-slip fault Arrow on hanging wall with dip indicated by number.

Low-angle reverse-slip fault (thrust fault) Arrow on hanging wall, number indicates dip; dashed where inferred or approximated.

Boundary of landslide deposit Hachure mark on deposit side of boundary; dashed where inferred or approximated.

Monocline axial trace Dashed where inferred or approximated.

Syncline axial trace Showing plunge.

Anticline axial trace Showing plunge.

Strike and dip of bedding

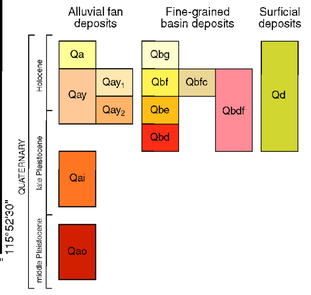
Inclined — Vertical

PV-1 **Radiocarbon sample location**

Areas disturbed by plowing or quarrying in 1952 photography.

Small elongate rises or mounds, possible dune forms.

Fissure zone Discontinous ground cracks, sinkholes and/or subsurface tunnels associated with groundwater-induced subsidence. Boundaries are approximate and enclose mapped and inferred fissure extent.



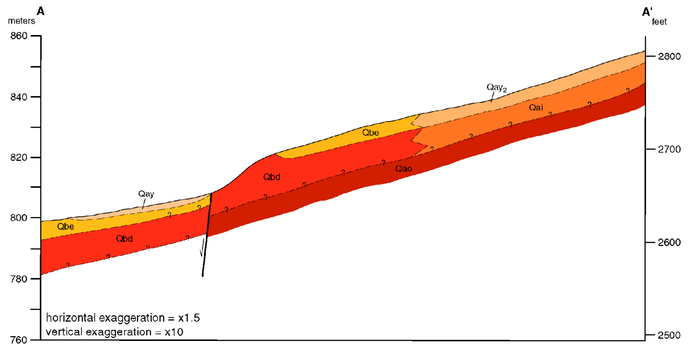


Table 1. Radiocarbon ages from the Pahrump Quadrangle (this study)

Sample No.	Unit	Material	^{14}C Age (ybp)	Lab #	Calibrated ^{14}C Age* (cal ybp ± 2σ)
PV-1	Qbd	small shells	24,150±80	GX-25541**	***
PV-2	Qbe	organic sediment	10,270±270	GX-25542	11,228–12,836 (1.0)
PV-3	Qbd	small shells	19,930±50	GX-25543**	22,915–[24,333]*** (1.0)
PV-4	Qbf	organic sediment	5,570±40	GX-25544**	6,290–6,410 (0.980)
PV-5	Qbf	organic sediment	2,910±130	GX-25974	2,780–3,355 (1.0)
PV-6	Qbfc	organic sediment	1,930±75	GX-25975	1,698–2,044 (0.989)

* Calibrated from Stuiver and Reimer (1993) using Stuiver and others (1998a and 1998b) dataset; 200 year moving average; rounded to the nearest decade. Value in parantheses is the relative area under the probability distribution (see Stuiver and Reimer, 1993).

** AMS age.

*** beyond maximum calibration range; Stuiver and others (1998a and 1998b) data set goes to 24,000 cal ybp (~20,265 ybp).

Craig M. dePolo, Alan R. Ramelli, and John W. Bell
1999

Scale 1:24,000
0 0.5 1 kilometer
0 0.5 1 mile
0 1000 2000 3000 4000 5000 feet
CONTOUR INTERVAL 10 METERS
SUPPLEMENTARY CONTOUR INTERVAL 5 METERS

Base map: U.S. Geological Survey Pahrump 7.5' Quadrangle, 1984
Digital Raster Graphic (DRG)

Field work done in 1998.

DRAFT

Preliminary geologic map. Has not undergone office or field review. May be revised before publication.

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Nevada Bureau of Mines and Geology
University of Nevada, Mail Stop 178
Reno, Nevada 89557-0088
(775) 784-6691, ext. 2
www.nbmg.unr.edu nbmgsales@unr.edu