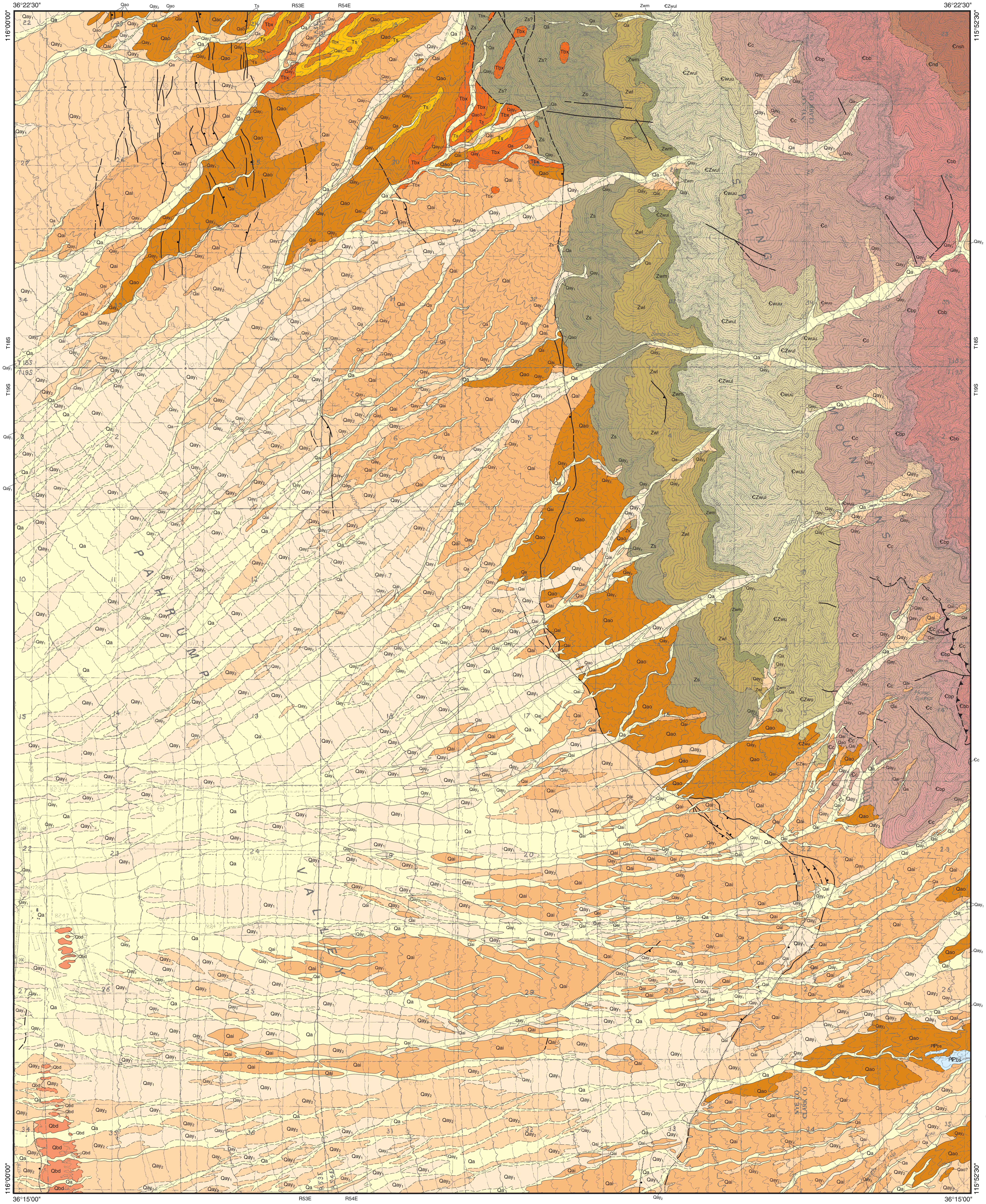
Prepared as part of the STATEMAP component of the National Cooperative Geologic Mapping Program in cooperation with the U.S. Geological Survey
and in cooperation with the Nye County Department of Natural Resources and Federal Facilities



Alluvial Fan Deposits

Sandy, coarse-grained alluvial fan deposits originating from drainages along the western side of the Spring Mountains. Includes poorly to moderately sorted, rounded to subangular, sandy pebble-cobble gravels of Wheeler Wash, and poorly to moderately sorted, subrounded to angular, sandy pebble-boulder gravels of smaller unnamed drainages. Thinly bedded to massive, with gravel lenses commonly 10 to 30 cm thick. Clast compositions are dominantly Paleozoic carbonate rocks, with the remainder consisting of silty limestone, chert, and quartzite. Mapped deposits range from early Quaternary to late Holocene in age.

Qa **Active alluvium** Sandy gravel deposits within active washes. Intercalated with fine-grained deposits near fan toes in southwest corner of quadrangle. No soil development. Surfaces commonly display unmodified anastomosing bar-and-channel network with no pavement or varnish development. As mapped, includes many small anastomosing remnants of Qay_1. Subject to intermittent flooding.

Qay_1 **Later young alluvium** Alluvial fan remnants characterized by partially to completely subdued bar-and-channel surface morphology, incipient to well-developed desert pavement, weak to moderate rock varnish, and slight etching of surface carbonate clasts. Soils range from A-C profiles with a <5-cm-thick, light brown eolian silt horizon (Av) and a 30- to 40-cm-thick calcic horizon (Stage I Bk with filaments to thin coatings) to profiles exhibiting a 5- to 10-cm-thick Av horizon, 10- to 20-cm-thick, slightly reddened cambic horizon (Bw), and 20+ cm-thick calcic horizon (Stage I Bk with continuous thin coatings). Middle to late Holocene in age.

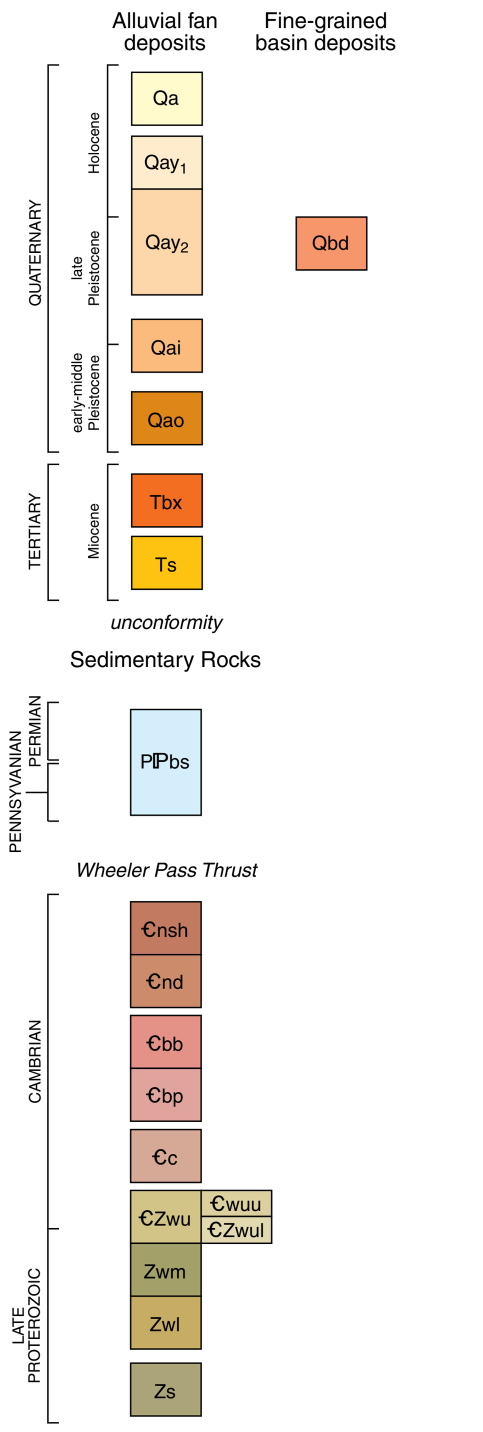
Qay_2 **Earlier young alluvium** Alluvial fan remnants characterized by well-developed, tightly packed desert pavement, dark rock varnish, and moderately to strongly etched surface carbonate clasts. Soils typically contain a 5- to 15-cm-thick, light brown eolian silt horizon (Av), a 20- to 30-cm-thick prominently reddened cambic horizon (Bw), and 30+ cm-thick calcic horizon (Stage II Bk with 2-3 mm thick clast rinds). Late Pleistocene to early Holocene in age.

Qai **Intermediate age alluvium** Alluvial fan remnants characterized by tightly packed desert pavement, dark rock varnish, and very strongly etched carbonate clasts. Flattish surfaces are commonly well dissected and elevated above surrounding fan surfaces. Soils typically contain a 5- to 15-cm-thick, light brown eolian silt horizon (Av), a 10- to 30-cm-thick prominently reddened and well structured argillic horizon (Bt), and a 1- to 1.5-m-thick calcic horizon (Stage III-IV Bk). Upper soil horizons erosionally stripped in some areas, especially near terrace edges. Middle to late Pleistocene in age.

Qao **Older alluvium** Alluvial fan remnants characterized by deep dissection and discordant rounded remnants (ballenas), moderately to well developed pavement containing abundant whitish calcrete litter, and deeply etched carbonate clasts. Massively cemented outcrops are common. Calcic horizons are several meters thick with Stage IV-V development. Upper soil horizons are typically stripped. Early to middle Pleistocene in age.

Fine-Grained Basin Deposits

Qbd **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.



Tbx **Breccia deposits (Miocene?)** Coarse-grained, angular breccia deposits; contain blocks up to several meters wide; block size increases toward rangefront; occur as three or more distinct sheets up to 10 m thick; individual sheets are monolithologic, being composed of either carbonate or quartzite; thoroughly cemented by same material as clasts; interbedded with sand, tuffaceous sediments, and gravel (Ts).

Ts **Tertiary sediments (Miocene?)** Well-sorted sand, tuffaceous sediment, and coarse-grained gravel; generally poorly exposed; interbedded with breccia deposits (Tbx).

Paleozoic Sedimentary Rocks

PPbs **Bird Springs Formation (Permian/Pennsylvanian)** Variably alternating beds of tan to gray, thin- to medium-bedded limestone and dolostone, orange-weathering silty limestone and dolostone, and orange-weathering siltstone; chert layers and nodules are common; cross-bedding and other sedimentary features are common; fossils are common throughout the unit and include corals, spirifer brachiopods, gastropods, crinoids, and abundant fusilinids which are characteristic of the unit.

Nopah Formation Consists of three members (from youngest to oldest): the Smoky, Halfpint, and Dunderberg Shale Members. Total formation thickness is about 350 m.

Ꞓnsh **Smoky and Halfpint Members (undivided) (Cambrian)** Light- to medium-gray, thickly bedded to massive saccharoidal dolostone. Forms distinctive whitish to very-light-gray steep, blocky slopes or cliffs. Thickness is about 300 m.

Ꞓnd **Dunderberg Shale Member (Cambrian)** Greenish-brown, platy shale, light- to medium-brown silty dolostone, and medium- to dark-gray, thinly bedded limestone. Slope former. Thickness is about 50 m.

Bonanza King Formation (Cambrian) Cliff-forming, light- to dark-gray dolomite and limestone divided into two members: the Banded Mountain and Papoose Lake Members.

Ꞓbb **Banded Mountain Member** Light- to dark-gray, medium- to thick-bedded, fine- to medium-crystalline dolomite and limestone; locally thinly bedded and laminated. Upper part appears as three prominent bands of approximately equal thickness. Lower part appears as distinctively striped, alternating light- to dark-gray bands ranging from 0.5 to 5 m thick. Contains nodular chert masses ranging from 1 to 10 cm in diameter. Minimum thickness in the adjacent La Madre Mountain area is about 450 m (Gans, 1974).

Ꞓbp **Papoose Lake Member** Cliff-forming, white to dark-gray dolomite and limestone intercalated with sparse but distinctive yellowish-orange silty and sandy intervals.

Ꞓc **Carrara Formation (Cambrian)** Greenish-, yellowish-, to brownish-gray shale and interbedded gray and orange limestone; also contains minor amounts of sandstone and siltstone. Upper part dominated by limestone; lower part by shale. Basal part is a transition from Zabriskie Quartzite, consisting of alternating beds of sandstone, siltstone, shale, and limestone. Highly faulted and folded in the map area. Thickness is about 450 m (Cornwall, 1972).

Wood Canyon Formation (Cambrian and Late Proterozoic) Thin-bedded quartzitic sandstones, sandy shales, and a few limestone beds. Total thickness is 640 m in Wood Canyon, about 2 km north of the map area (Nolan, 1929).

ꞒZwu | **Ꞓwuu** / **ꞒZwul** **Upper member** Grayish-olive siltstone, shale and yellowish-gray, fine-grained quartzite with trilobite scraps and *Scolithus* tubes in the upper part; contains one to five beds of light-brown-weathering limestone or dolomite, partly oolitic, with pelmatozoan plates and archeocyathids. Top of unit includes undifferentiated Zabriskie Quartzite (about 6 m thick).

Zwm **Middle member** Grayish-red quartzite, partly conglomeratic, and a little siltstone. At the base, the quartzites are coarser grained, locally pebbly.

Zwl **Lower member** Brown to grayish-olive micaceous siltstone with some thin beds of yellowish-gray quartzite. Basal contact is gradational and is marked where quartzite becomes predominant.

Zs **Stirling Quartzite (Late Proterozoic)** Thick-bedded, gray to pink quartzite with minor conglomerate, siltstone, and shale. Beds in the middle and lower sections are thinner-bedded and weather to reddish or purplish brown. Cross-bedding is common. Thickness is about 1,100 m (Nolan, 1929).

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Lithologic contact Dashed where inferred or approximately located.

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

Low-angle reverse-slip fault (thrust fault) Dashed where inferred or approximately located.

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

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

Field work done in 2001.

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

PRELIMINARY GEOLOGIC MAP OF THE HORSE SPRINGS QUADRANGLE, CLARK AND NYE COUNTIES, NEVADA

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

2003