

UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

Geologic map of the Pine Grove Hills quadrangle, Lyon County, Nevada

John H. Stewart<sup>1</sup>, and Mitchell W. Reynolds<sup>2</sup>

Open-File Report 87-658

Prepared in cooperation with Nevada Bureau of Mines and Geology

This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature

<sup>1</sup>Menlo Park, California

<sup>2</sup>Denver, Colorado

1987

## Table of Contents

	<u>Page</u>
Description of map units .....	1
References cited .....	5
Correlation of map units .....	6
Sources of mapping .....	7

## Illustration

[In pocket]

Plate 1. Geologic map of the Pine Grove Hills quadrangle, Nevada


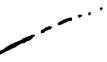


## DESCRIPTION OF MAP UNITS

<b>Qa</b>	<b>Alluvial deposits</b> --Includes several different ages of pediment gravels, alluvial fan deposits, and valley fill deposits
<b>Qt1</b>	<b>Talus</b>
<b>Qtb</b>	<b>Talus of basalt</b>
<b>Qoa</b>	<b>Older alluvial deposits</b> --Mostly pediment gravels and alluvial fan deposits
	<b>Bald Mountain complex</b> --Divided into three units:
<b>Tba</b>	<b>Andesite flows</b>
<b>Tbaa</b>	<b>Altered andesite flows</b>
<b>Tbb</b>	<b>Andesite breccia (lahar)</b>
<b>Tg</b>	<b>Gravel</b> --Cobble to boulder gravel composed mostly of granitic clasts
<b>Tr</b>	<b>Rhyolite</b> --Locally glassy and perlitic. Includes some dacite. Generally flow banded. K-Ar age of 5.7 to 7.6 Ma (Gilbert and Reynolds, 1973, table 1, recalculated using 1976 IUGS constants) in central and eastern parts of Pine Grove Hills. Not dated in southwestern part of quadrangle where it could be related to the rhyolite of Sweetwater Mountains (Miocene) of Brem (1984)
<b>Tb</b>	<b>Basalt</b> --Mostly olivine basalt. K-Ar age of 6.8 to 7.6 Ma (Gilbert and Reynolds, 1973, table 1, recalculated using 1976, IUGS constants)
<b>Tbc</b>	<b>Basalt cinder</b>
<b>Tbvb</b>	<b>Basalt vent breccia</b>
<b>Tog</b>	<b>Gravel</b> --Local unit in west-central part of quadrangle
<b>Tbt</b>	<b>Basaltic tuff and sedimentary rocks</b>
<b>Tts</b>	<b>Sedimentary rocks</b> --Undifferentiated
<b>Taf</b>	<b>Andesite flows (Age uncertain)</b> --Occurs only in northeast part of quadrangle
<b>Tban</b>	<b>Basaltic andesite</b> --Dark-gray, fine-grained basaltic andesite lava flows. Microphenocrysts and phenocrysts form 5 to 7 percent of rock and are composed of tabular plagioclase laths, stout prismatic clinopyroxene, and acicular crystals of hornblende(?) completely replaced by granular iron oxides. Holocrystalline groundmass of pilotaxitic plagioclase laths, intergranular pyroxene, and magnetite, and alkali feldspar filling

interstices or as overgrowths on plagioclase laths. Occurs only in the southeast part of the quadrangle

- Tmr**      **Morgan Ranch Formation of Axelrod (1956) as modified by Gilbert and Reynolds (1973)**--Arkosic sandstone to coarse sedimentary breccia. Mostly granitic and metamorphic clasts (see Axelrod, 1956; Gilbert and Reynolds, 1973; Golia and Stewart, 1984)
- Tcv**      **Coal Valley Formation of Axelrod (1956) as modified by Gilbert and Reynolds (1973)**--Andesitic sandstone, pebble conglomerate, mudstone, and siltstone. Minor amounts of tuff and tuffaceous rocks (see Axelrod, 1956; Gilbert and Reynolds, 1973; Golia and Stewart, 1984). K-Ar age of 9.4 to 10.7 Ma (Gilbert and Reynolds, 1973, recalculated using 1976 IUGS constants). Two subunits recognized
- Tcva**      **Andesite tuff breccia**
- Tcvs**      **White, tuffaceous siltstone and shale**--Sparse limestone and tuff. "Marker shale unit" of Gilbert and Reynolds (1973)
- Tas**      **Alrich station formation of Axelrod (1956) as modified by Gilbert and Reynolds (1973)**--Carbonaceous mudstone and siltstone, diatomaceous shale, lithic arenite, pebbly lithic arenite beds; fine-grained rocks are dominant (see Axelrod, 1956; Gilbert and Reynolds, 1973; Golia and Stewart, 1984). Locally abundant tuff. K-Ar age of 9.5 to 11.4 Ma (Gilbert and Reynolds, 1973, recalculation using 1976 IUGS constants)
- Ta**      **Andesite and dacite flows and breccias (Lahar)**--K-Ar age of 15.3 Ma (Gilbert and Reynolds, 1973, table 1, recalculated using 1976 IUGS constants)
- Ts**      **Sedimentary rocks**--Mostly sandstone and conglomerate composed of andesite and dacite detritus. Interfingers with andesite and dacite flows and breccias
- Tt**      **Ash flow tuff**--Composed of several mineralogically different ash flows
- Knc**      **Porphyritic granite of Nye Canyon**--Named for exposures in Nye Canyon in the Pine Grove Hills quadrangle. In the Mount Grant quadrangle to the east, described by Nowak (1979) as composed of approximately 10 percent idiomorphic orthoclase phenocrysts as much as 5 cm long in a groundmass of quartz (12-35 percent), andesine (20-45 percent,  $An_{30-39}$ ), potassium feldspar (orthoclase, microcline, and perthite, 15-45 percent), biotite (2-10 percent), hornblende (1-7 percent), magnetite (1-4 percent), sphene (0-2 percent), and a trace of epidote. In the Nye Canyon area, K-Ar dates on the granite of Nye Canyon are 89.2 and 92.3 Ma (Krueger and Schilling, 1971, p. 11, recalculated using 1976 IUGS constants). A four-point Rb-Sr whole-rock isochron gives an age of  $84.2 \pm 6.7$  Ma (Robinson and Kister, 1986)

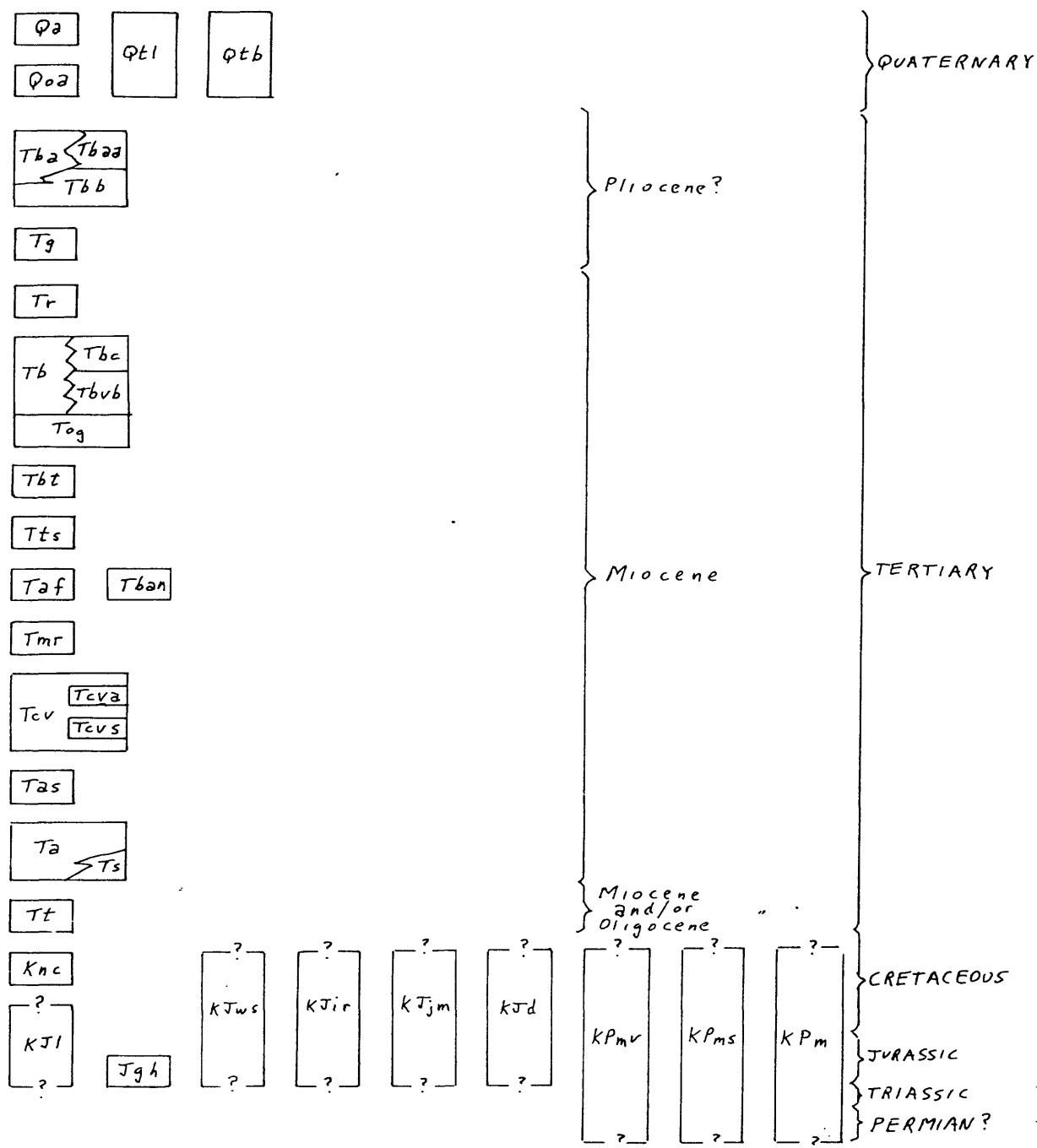
- KJws Granite to granodiorite of Wedertz Spring**--Light- to medium-gray, spheroidal-weathering, hypidiomorphic-granular to porphyritic biotite hornblende granite to granodiorite. Locally sparsely porphyritic with coarse-grained tabular potassium feldspar phenocrysts (John, 1983); in southern part of stock, phenocrysts are coarse-grained plagioclase. Groundmass is medium-grained and has the following composition expressed in percent of total rock: 27 percent irregular to tabular, intergranular, potassium feldspar; 41 percent tabular euhedral plagioclase; 18 percent irregular equant grains of quartz intergranular to feldspar, and intergrown with mafic minerals; 8 percent stout prismatic to irregular grains of hornblende; and 3 percent tabular books and irregular aggregates of biotite
- KJir Granite of Ivy Ranch**--Reddish-gray, medium-grained porphyritic hornblende biotite granite. Average mineral composition, in percent of total rock: potassium feldspar (27), plagioclase feldspar (41), quartz (21), and mafic minerals (11). Oligoclase or sodic andesine crystals are subhedral to euhedral, as long as 6 mm, and have myrmekitic borders. Microcline crystals are subhedral and as long as 8 mm. Quartz forms anhedral crystals as large as 2 mm in diameter. Mafic minerals average 4 percent hornblende, 6 percent biotite, and 1 percent magnetite. Corroded brown to green hornblende and brown biotite plates are as long as 2 mm
- KJjm Granite of Jackpot Mine**--Light-pink-gray, angular weathering, medium-grained hypidiomorphic-granular amphibole granite. Composed of 34 percent tabular, gray, plagioclase set in slightly finer aggregate that has following composition expressed in percent of total rock: 32 percent bipyramidal subhedral quartz; 30 percent orthoclase, which occurs as irregular grains intergranular to quartz and plagioclase; and 5 percent amphibole (actinolite?), dark green, fibrous subhedral interstitial to felsic minerals. Small outcrop along western border of northwest part of quadrangle
- KJd Diorite and related rocks**--Small outcrop in southwest part of quadrangle
- KJl Granodiorite of Lobdell Summit**--Named for Lobdell Summit in the Pine Grove Hills quadrangle. In the Mount Grant quadrangle to the east, described by Nowak (1979) as granular and rich in mafic minerals. Consists of plagioclase (50-80 percent, An<sub>28-40</sub>), hornblende (10-30 percent), potassium feldspar (2-15 percent), quartz (5-10 percent), sphene (1-2 percent), and opaque minerals (1-2 percent). Plagioclase and hornblende are commonly greater than 1 cm in maximum dimension, whereas potassium feldspar, quartz, sphene, and opaque minerals range in size from less than 1 mm to greater than 1 cm, averaging about 2 mm. Older than porphyritic granite of Nye Canyon

- Jgh**      **Granite of Gray Hills**--Considered to be a part of the Gray Hills pluton of Binger (1978). Grayish-red medium-grained equigranular hornblende granite. Average mineral composition in percent: potassium feldspar (33), plagioclase feldspar (40), quartz (19), and mafic minerals (8). Locally altered to white, porphyritic, pyroxene (diopside?)-bearing albitite. Oligoclase or sodic andesine crystals are subhedral, as large as 4 mm long, normally zoned, and weakly sericitized. Potassium feldspar crystals are subhedral and as long as 6 mm. Quartz crystals are anhedral and as large as 2 mm in diameter. Green hornblende crystals are as long as 4 mm, are partially chloritized, and have a corroded appearance. Minerals present in minor amounts include chlorite, magnetite (along rims of hornblende), sphene, epidote, and spatite
- KPmv**      **Metavolcanic rocks**--Mostly andesitic(?) lava flows with laths of plagioclase in aphanitic matrix. Age uncertain
- KPms**      **Metasedimentary rocks**--In west-central part of quadrangle consists of hornfels, calc-hornfels, marble, schistose quartzite, and schist. In northwest part of quadrangle, consists of dense quartzite, laminated to very thin bedded hornfels, siliceous hornfels, marble, and minor metavolcanic rock. Age uncertain
- KPm**      **Metamorphic rocks**--Consists of hornfels and abundant epidote-garnet skarn, and minor amounts of metavolcanic rock. Occurs only in southeast part of quadrangle. Age uncertain
-       **Contact**--Dashed where inferred. Queried where approximately located or uncertain
-       **Fault**--Dashed where inferred or approximately located. Dotted where concealed. Bar and Ball on downthrown side
-       **Strike and dip of beds**
-       **Strike and dip of flow banding in rhyolite or foliation in metamorphic rock**

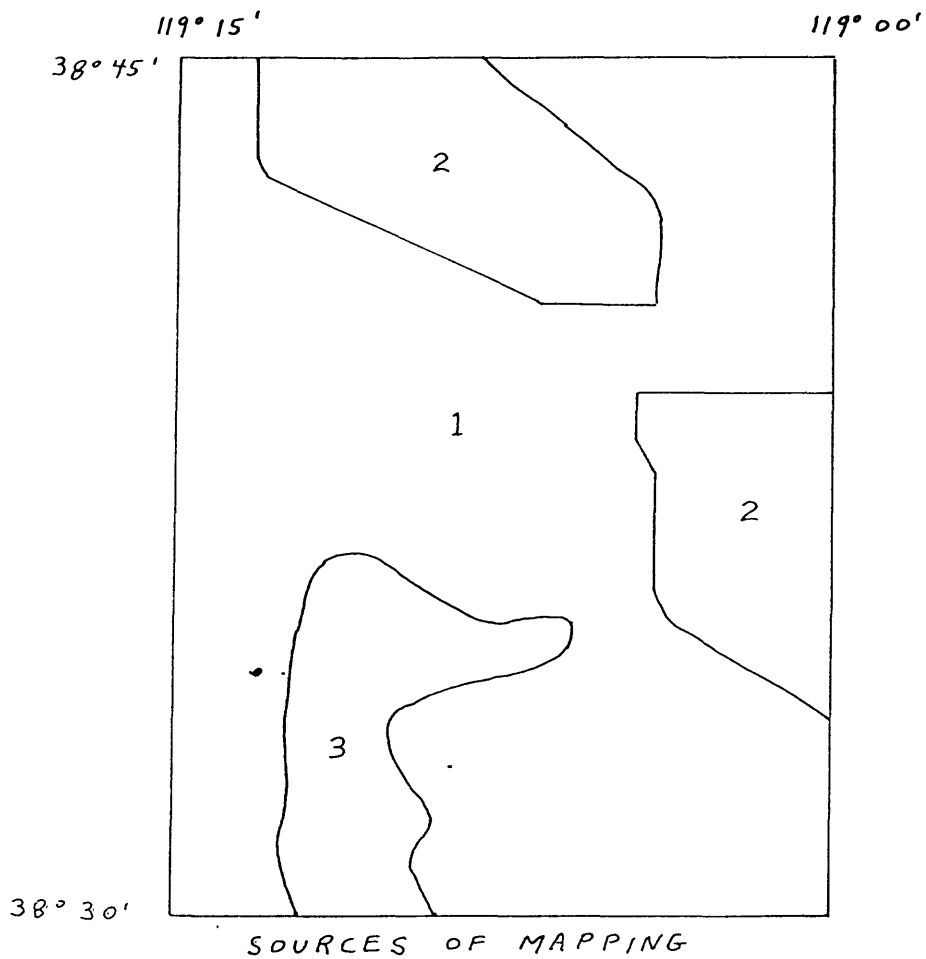
### References cited

- Axelrod, D.L., 1956, Mio-Pliocene floras from west-central Nevada: University of California Publications in Geological Sciences, v. 33, p. 1-322.
- Bingler, E.C., 1978, Geologic map of the Schurz quadrangle: Nevada Bureau of Mines and Geology Map 60, scale 1:48,000.
- Brem, G.F., 1984, Geologic map of the Sweetwater Roadless area, Mono County, California and Lyon and Douglas Counties, Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-1535-B, scale 1:62,500.
- Gilbert, C.M., and Reynolds, M.W., 1973, Character and chronology of basin development, western margin of the Basin and Range province: Geological Society of America Bulletin, v. 84, p. 2489-2510.
- Golia, R.T., and Stewart, J.H., 1984, Depositional environments and paleogeography of the upper Miocene Wassuk Group, west-central Nevada: Sedimentary Geology, v. 38, p. 159-180.
- Krueger, H.W., and Schilling, J.H., 1971, Geochron/Nevada Bureau of Mines K-Ar age determinations, list 1: Isochron/West, no. 71-1, p. 9-14.
- John, D.A., 1983, Map showing distribution, ages, and petrographic characteristics of Mesozoic plutonic rocks in the Walker Lake 1° by 2° quadrangle, California and Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-1382-B.
- Nowak, Gregory, 1979, The geology and uranium occurrences of the Washington mining district, Lyon County, Nevada: Reno, University of Nevada, M.S. thesis, 92 p.
- Robinson, A.C., and Kistler, R.W., 1986, Maps showing isotopic dating in the Walker River 1° by 2° quadrangle, California and Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-1382-N, scale 1:250,000.

# CORRELATION OF MAP UNITS







1. J. H. Stewart, assisted by Jerry Infeld, C. Banister, and D. C. Johannesen, 1977-1981
2. Gilbert and Reynolds (1973)
3. M. W. Reynolds with additions by J. H. Stewart