

**U.S. DEPARTMENT OF THE INTERIOR  
U.S. GEOLOGICAL SURVEY**

To accompany the  
**Preliminary Geologic Map of the Antler Peak 7.5 Minute Quadrangle,  
Lander County, Nevada**

*by*

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**Open-File Report 92-398**

**Prepared in cooperation with the Nevada Bureau of Mines and Geology**

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**1992**

## DESCRIPTION OF MAP UNITS

- Qd**      **Mine dump material (Holocene, man-made)**--Present around Fortitude Mine open pit
- Qp**      **Placer workings (Holocene, man-made)**--Present in Copper Canyon
- Qya**      **Younger alluvium (Quaternary)**--Primarily deposits in active stream channels
- Qc**      **Colluvium (Quaternary)**--Includes talus, slope wash and other colluvial deposits. Most abundant on hill slopes below outcrops of Caetano tuff (Tc)
- Qoa**      **Older alluvium (Quaternary)**--silty and sandy gravels of alluvial fans, dissected by stream channels of younger alluvium
- Tt**      **Tuff (Tertiary)**--very light gray, nonwelded crystal-lithic ash-flow tuff. Contains quartz phenocrysts and lithic clasts of chert and sandstone of the Havallah sequence. Speckled with spots of red-brown iron-oxide after magnetite(?). Exposed only in Buffalo Valley Mine area (secs. 28, 33, and 34, T. 32 N, R. 42 E). Undated but possibly equivalent in age to Tb.
- Tb**      **Basalt (Tertiary)**--Lower black dense olivine-bearing and upper red-brown scoriaceous flow rock. Present as isolated outcrops in south part of map (sec. 35, T. 31 N, R. 42 E). May be correlative with 3.4-Ma basalt exposed east of Copper Canyon (McKee, 1992)
- Tg**      **Gravel (Tertiary)**--Poorly sorted with boulders of Pennsylvanian Battle Formation as much as 1 m in diameter. Exposed only in Buffalo Valley Mine area (secs. 28, 33, and 34, T. 32 N, R. 42 E)
- Tc**      **Caetano Tuff (Tertiary)**--Light-gray crystal-lithic welded ash-flow tuff. Contains glassy quartz phenocrysts, biotite, and lithic clasts of chert, quartzite, and sandstone of the Havallah sequence. Lower units tend to be more lithic rich and less welded. Biotite yields a 33.6 Ma age by K-Ar method (McKee and Silberman, 1970). Crops out as ridge capping unit, primarily in and around upper parts of Rocky Canyon
- Tgdc**      **Granodiorite of the Copper Canyon area (Tertiary)**--Includes altered granodiorite of Copper Canyon and altered granodiorite of Wilson-Independence Mine area (Theodore and Blake, 1975). Altered medium- to coarse-grained porphyritic biotite granodiorite with smokey gray

quartz phenocrysts, sericitized feldspar phenocrysts, stockwork quartz veining, and secondary copper oxides. Primary biotite yields 38 Ma age by K-Ar method (Theodore and others, 1973)

- Tgd15**      **Granodiorite of section 15 (Tertiary)**--Located in sec. 15, T. 31 N, R. 42 E. Fine- to medium-grained seriate to porphyritic granodiorite. Stock tends to be more leucocratic and equigranular in core and more mafic and porphyritic in perimeter areas. Stockwork quartz veining present. Well developed alteration aureole (bleached zone) present in country rock. Biotite and hornblende yield 39 Ma age by K-Ar Method (Theodore and others, 1973)
- Tgdm**      **Granodiorite of the Modoc Mine area (Tertiary)**--Cluster of dikes, plugs and a larger stock-like body in sec. 30, T. 31 N, R. 43 E. Fine- to medium-grained porphyritic hornblende-biotite granodiorite. Hornfels zone developed in adjacent country rock. Biotite and hornblende yield 39-41 Ma age by K-Ar method (Theodore and others, 1973)
- TKr**        **Rhyolite (Tertiary or Cretaceous?)**--Intrusive bodies cropping out as a dike and small plug (sec. 8, T. 31 N, R. 43 E, flow banded; sec. 30, T. 32 N, R. 43 E ?)
- TKgp**      **Granodiorite porphyry (Tertiary or Cretaceous?)**--Gray to light greenish-gray porphyritic to seriate dikes and small stock-like bodies throughout map area, though most abundant in western part and Buffalo Valley Mine area
- TKgd**      **Granodiorite (Tertiary or Cretaceous?)**--Equigranular stock-like bodies and large dikes, most abundant in western part of map area and Buffalo Valley Mine area
- Kgdt**      **Granodiorite of Trenton Canyon (Cretaceous)**--Large stock exposed in north-central part of map area. Medium-grained, equigranular to weakly porphyritic, biotite-hornblende granodiorite. Hornfels and weak skarn developed in alteration aureole in adjacent country rock. Biotite yields 87 Ma age by K-Ar method (Theodore and others, 1973)

**Antler sequence of Roberts (1964)**--In this area consists of:

- Pem**        **Edna Mountain Formation (Permian)**--Poorly exposed at scattered localities below sole of Golconda thrust in northeast and east-central part of area. Consists of 1) pebble conglomerate with well rounded pebbles of chert and quartzite, 2) light-brown sandstone, locally calcareous, and 3)

bluish-gray cherty limestone, in order of relative abundance.  
Brachiopod fauna yield a Lower Permian (Wolfcampian to Leonardian)  
age (Roberts, 1964)

- PIPap**      **Antler Peak Limestone (Permian and Pennsylvanian)**--Medium- to thick-bedded, light- to medium-bluish-gray limestone; locally shaly, sandy, and pebbly, and may contain thin discontinuous beds and nodules of chert. Fusulinid and coral fauna yield an Upper Pennsylvanian (late Missourian) to Lower Permian (early Wolfcampian) age (Roberts, 1964)
- IPb**        **Battle Formation (Pennsylvanian)**--Thick-bedded immature conglomerate, sandstone, shale and limestone. Conglomerate, sandstone, and shale are commonly a ferruginous reddish brown, and may be variably calcareous. Rests in angular unconformity on rocks of the Roberts Mountains allochthon. Brachiopod and fusulinid faunas yield a Lower to Middle Pennsylvanian (Morrowan to Atokan) age (Roberts, 1964; A.K. Armstrong, written commun., 1992)

#### **ALLOCHTHON OF THE GOLCONDA THRUST**

Havallah sequence of Silberling and Roberts (1962), Roberts and Thomasson (1964), Stewart and others (1977), Stewart and others (1986), and Murchey (1990).

**WEST OF WILLOW CREEK THRUST**--In this area consists of:

- hlc**        **Limestone and chert (Permian and Pennsylvanian?)**--Interbedded black sponge-spicule-bearing chert and gray limestone, locally sandy. Uppermost biostratigraphic subunit of lithotectonic unit 2 of Murchey (1990)
- hss**        **Calcareous sandstone (Permian and Pennsylvanian?)**--Light-brown to yellow-brown calcareous siltstone, sandstone, pebbly limestone, and chert pebble conglomerate. Corresponds to turbidites and debris flows of lithotectonic unit 2 of Murchey (1990)
- hcs**        **Chert and calcareous siltstone (Pennsylvanian?)**--Interbedded black, gray, green, and maroon chert and calcareous siltstone, and locally marble. Thinly bedded to laminated and commonly contains boudinage structures. Host to calc-silicate alteration proximal to granodiorite of Trenton Canyon (Kgdt) and in the Buffalo Valley Mine area

- hrc**      **Ribbon chert (Mississippian and Pennsylvanian?)**--Interbedded grayish-green radiolarian chert and lesser shale. Corresponds to chert of lithotectonic unit 2 of Murchey (1990). Mound-like diagenetic compaction features on bedding surfaces are diagnostic of this unit [referred to as Monroe structures by Snyder and Brueckner (1983); similar structures in Ordovician Valmy Formation are referred to as Doda structures by Madrid (1987)]. Franciscan-type exhalative manganese deposits (Mno) (SE 1/4, sec.34, T.32 N, R. 42 E), and deep orange-red exhalite bodies (ex) (sec. 1, T. 31 N, R. 42 E) are present within this unit
- hb**        **Basalt and gabbro (Permian, Pennsylvanian, and Mississippian?)**--Dark-green to black amygdaloidal basalt and lesser gabbro. Amygdules commonly filled with pink calcite. Locally a seemingly continuous variation from basalt to coarse-grained gabbro. Present largely as elongated faulted slivers in the upper parts of Mill and Timber Canyons (sec. 1, T. 31 N, R. 42 E and sec. 36, T. 32 N, R. 42 E)

**EAST OF WILLOW CREEK THRUST--In this area consists of:**

- ha**        **Argillite (Permian and Pennsylvanian?)**--Gray-green, maroon, and black argillite and siliceous argillite with lesser amounts of interbedded ( $\leq$  5 cm) black and gray chert. Corresponds to parts of lithotectonic units 1A, 1B, and 1C of Murchey (1990) and parts of subunits 1 and 2 of Miller and others (1982)
- hca**      **Chert and argillite (Permian and Pennsylvanian?)**--Interbedded black and gray sponge-spicule-bearing chert and green, black, and maroon argillite (beds generally  $\leq$  8 cm thick). This unit displays best examples of east-vergent tightly folded strata. Corresponds largely with lithotectonic unit 1B of Murchey (1990) and is part of subunit 2 of Miller and others (1982)
- hc**        **Chert (Permian and Pennsylvanian?)**--Massive to thick-bedded ( $>$  15 cm) black and gray sponge spicule chert with lesser amounts of thin-bedded ( $\leq$  5 cm) green and black argillite. Crops out as ridge and ledge forming unit capping ridge east of Willow Creek. Corresponds with west part of lithotectonic unit 1A of Murchey (1990) and west part of subunit 1 of Miller and others (1982)


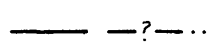


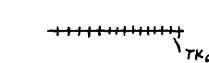
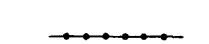
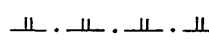
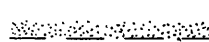




**ALLOCHTHON OF THE ROBERTS MOUNTAINS THRUST**

- Ov**        **Valmy Formation (Ordovician)**--Dark-green to black thinly-bedded cherty argillite. Present only in small area on northern margin of map (secs.

20 and 29, T. 32 N, R. 43 E). Correlates with **Ovca** unit mapped in Cottonwood/Trout Creek area by Madrid (1987), and **Ov3ca** unit of Theodore (1991)

**-Ch**      **Harmony Formation (Cambrian)**--Greenish-brown medium- to coarse-grained micaceous feldspathic sandstone and lesser shale. Crops out along eastern margin of map. Altered to biotite hornfels in Copper Canyon area

## SYMBOLS

	<b>Contact</b> --Dashed where approximately located; dotted where concealed; queried where location uncertain
	<b>Faults</b> --Dashed where approximately located; dotted where concealed; queried where location uncertain
	Normal fault-Bar and ball on down-dropped block
	Thrust fault-Sawteeth on upper plate
	<b>Dike</b> --Rhyolite dike (TKr), granodiorite porphyry dike (TKgp), granodiorite dike (TKgd)
	<b>Quartz vein</b>
	<b>Approximate location of outer limit of abundant quartz veins</b> --Hachured in direction of quartz veins
	<b>Approximate location of outer limit of alteration aureole surrounding intrusive bodies</b> --Dots indicate interior of aureole.
	<b>Altered area</b> --Silicified (SiO <sub>2</sub> ), sericitized (ser), argillized (cly), pyritized (pyr), iron stained (FeOx), skarn (skn)
	<b>Breccia</b>
	<b>Strike and dip of bedding</b>
	Inclined-Facing not always known with certainty
	Vertical



Overturned

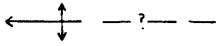


Horizontal

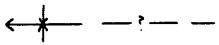


### Strike and dip of compaction foliation

**Folds**--showing trace of hinge line and plunge of axis; dashed where approximately located; queried where uncertain; dotted where concealed



Anticline



Syncline



Minor anticline, showing trend and plunge



Horizontal minor anticline, showing trend



Minor syncline, showing trend and plunge



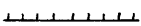
Horizontal minor syncline showing trend



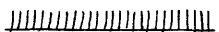
Minor coaxial folds, showing trend and plunge



Minor horizontal coaxial folds, showing trend



**Perimeter of open pit mine**--Hachured on excavated side



**Mine dump**



**Portal**



**Mineshaft**



**Prospect**



**Dam**--At upper Willow Creek Reservoir

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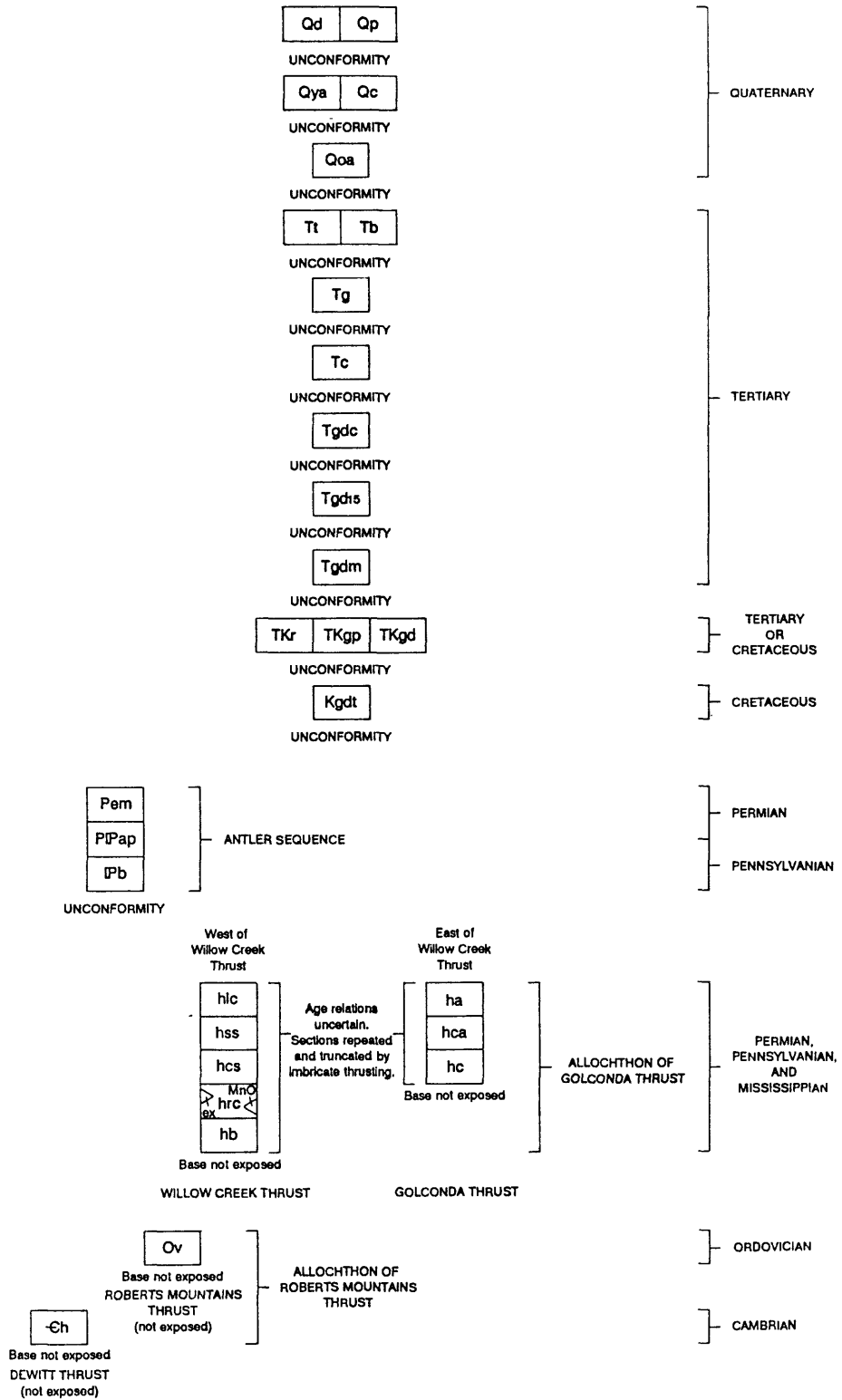
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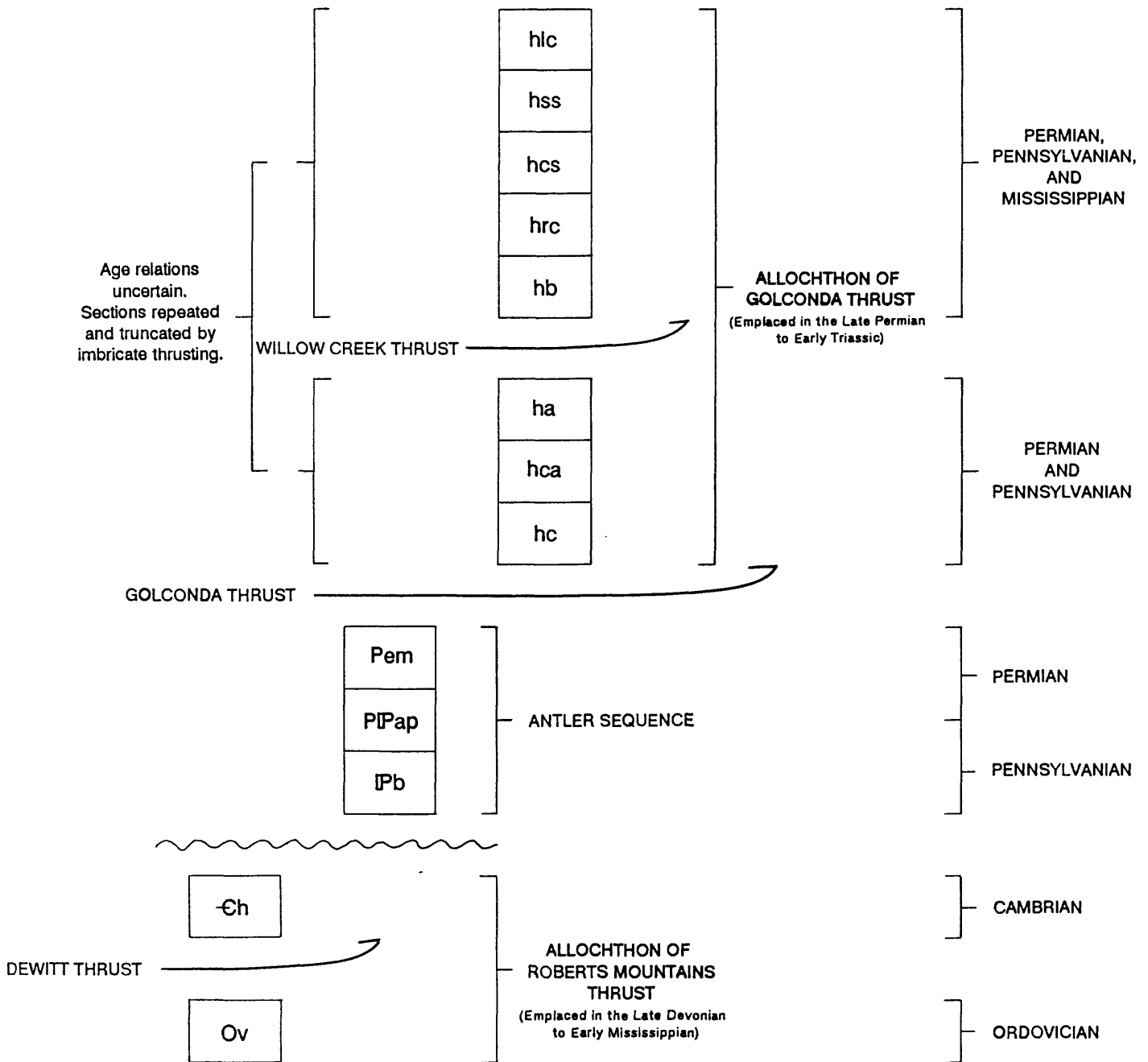
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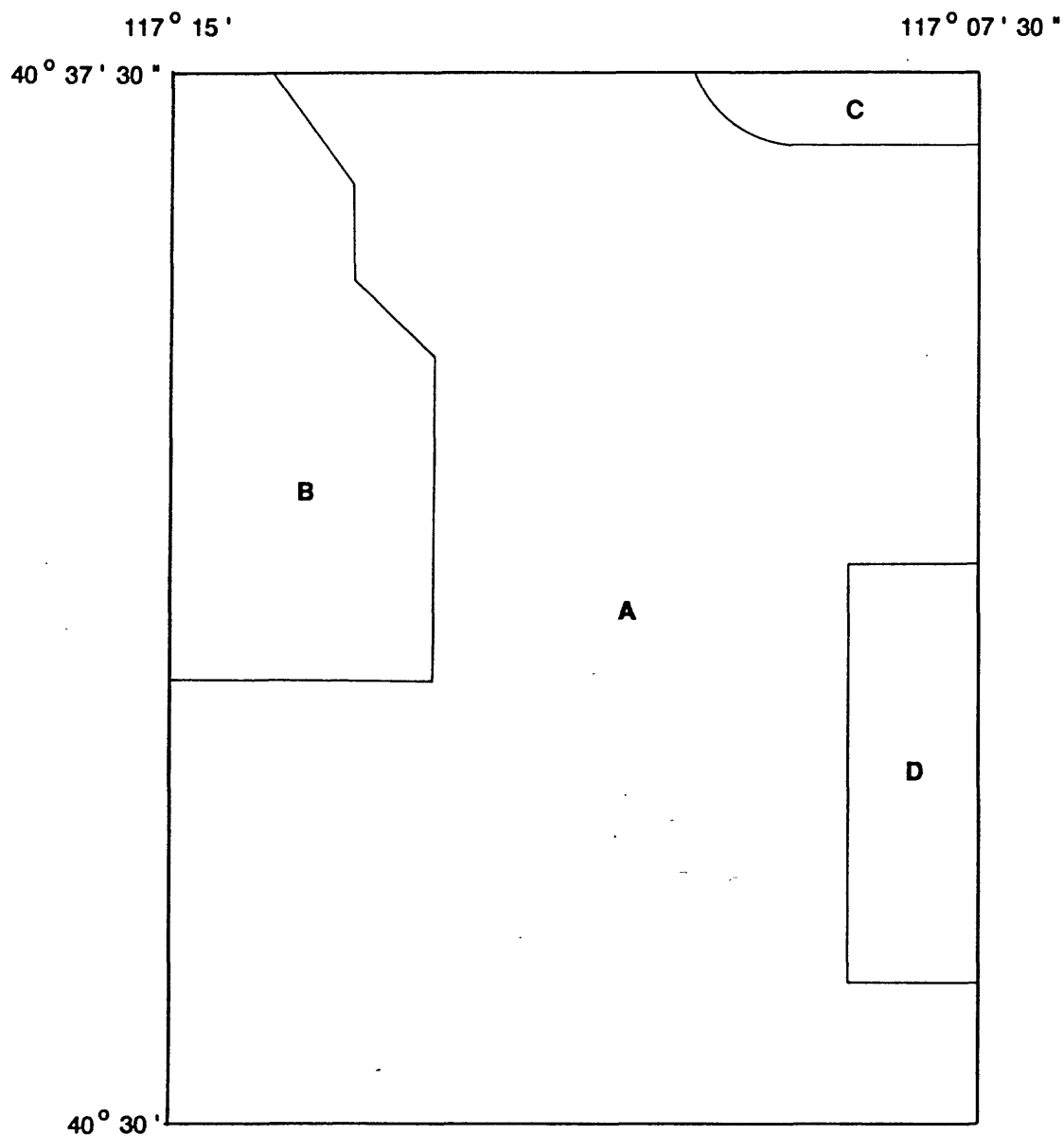
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# CORRELATION OF MAP UNITS



# GENERALIZED PALEOZOIC TECTONOSTRATIGRAPHY





#### **SOURCES OF GEOLOGIC DATA**

- A) J.L. Doebrich, mapping, 1991-92
- B) Modified after R. Luethe, unpubl. mapping, 1989
- C) Modified after Madrid (1987)
- D) Modified after Theodore and Blake (1975) and Battle Mountain Gold Company, written commun., 1992)