STATE BUREAU OF MINES AND MINERAL RESOURCES
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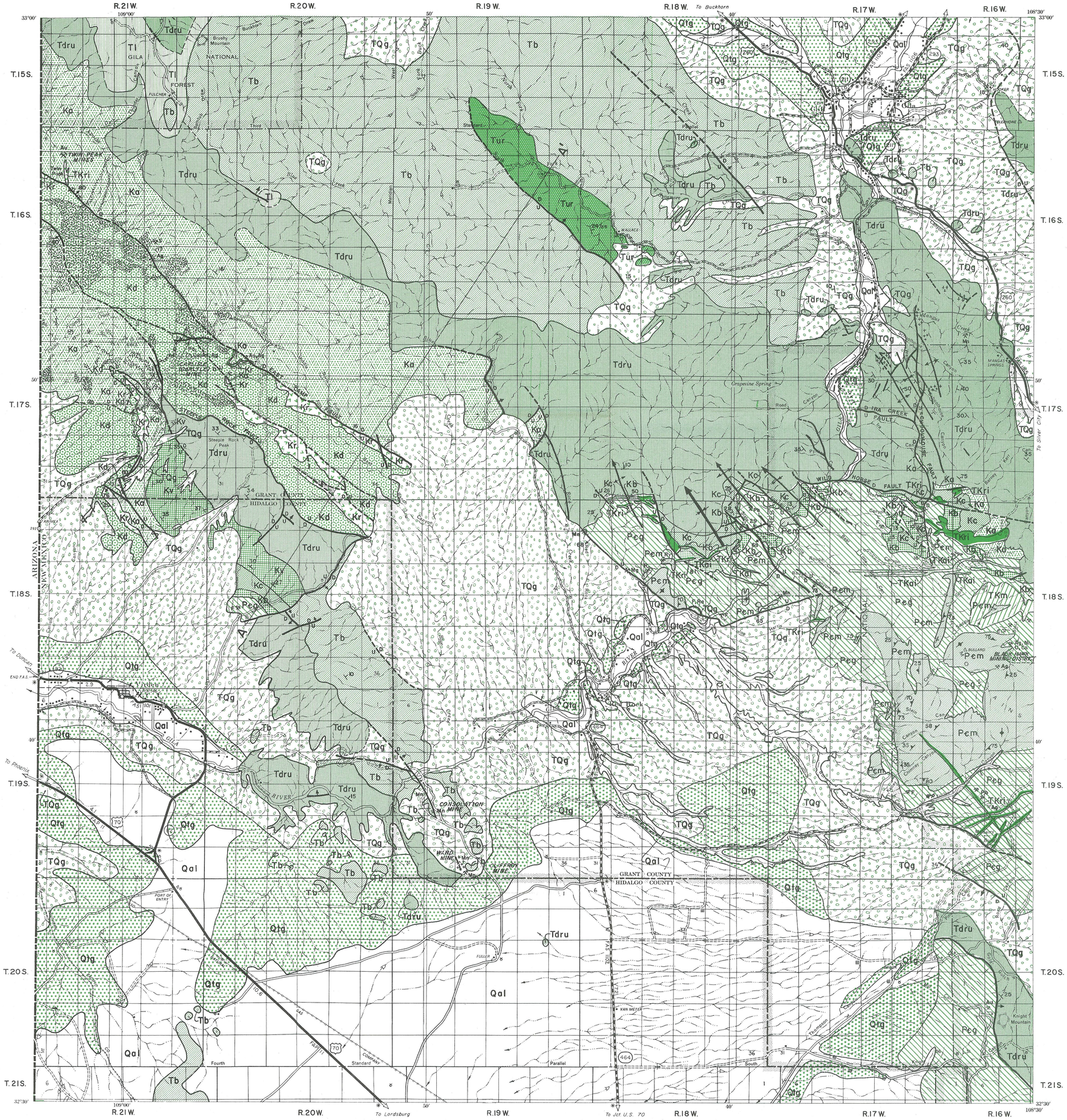
GEOLOGY VIRDEN QUADRANGLE NEW MEXICO



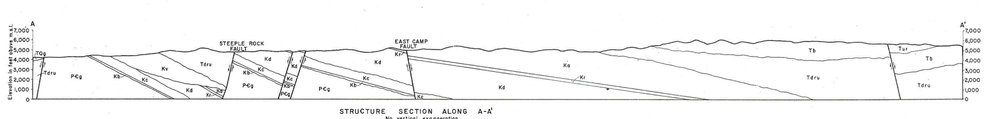
Base from Virden quadrangle of New Mexico State Highway Department.

Approximate Mean Declination, 1959

Scale: 1: 126,720

1 0 1 2 3 4 5 6 7 8 Statute Miles

1960

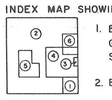


STRUCTURE SECTION ALONG A-A'
No vertical exaggeration

RECONNAISSANCE GEOLOGIC MAP OF VIRDEN THIRTY-MINUTE QUADRANGLE

By Wolfgang E. Elston

INDEX MAP SHOWING SOURCES:



1. Ballmann, D.L., 1960, Geology of the Knight Peak area, Grant County, New Mexico: N. Mex. Inst. Min. and Technology, State Bur. Mines and Mineral Res. Bull. 70, 39 p.

2. Elston, W.E., this map.

3. Gillerman, Elliot, and Whitebread, D.H., 1956, Uranium-bearing nickel-cobalt-silver deposits, Black Hawk district, Grant County New Mexico: U.S. Geol. Survey Bull. 1009K, p. 283-313.

4. Hewitt, C. H., 1959, Geology and mineral deposits of the northern Big Burro Mountains-Redrock area, Grant County, New Mexico: N. Mex. Inst. Min. and Technology, State Bur. Mines and Mineral Res. Bull. 60, 151p.

5. Pradhan, B.M., and Singh, Y.L., 1960, Geology of the area between Virden and Red Rock, Hidalgo and Grant Counties, New Mexico: Univ. New Mexico, M.S. thesis, in preparation. Also, Elston, W.E., this map.

6. Wargo, J.G., 1959, Geology of the Schoolhouse Mountain quadrangle, Grant County, New Mexico: Univ. Arizona, Ph.D. thesis, unpublished.

Geologic cartography by E.S. Holman.

EXPLANATION

QUATERNARY

Qal — Alluvium and bolson deposits
Silt, sand, and gravel in modern streams and in surficial deposits on undissected plains. Max. thickness 100 feet.

Qtg — Terrace gravels
Unconsolidated gravels in stream terraces and older bolson deposits that are exposed on dissected edges of bolson plains. Attitude nearly horizontal. Max. thickness 30+ feet.

UNCONFORMITY

LATE TERTIARY (MIOCENE? - PLIOCENE?)

TQg — Gila conglomerate
Semiconsolidated or consolidated conglomerate, fanglomerate, sandstone, diatomite, and clay. Faulted and tilted. Mineralized by epithermal (hot spring-type) manganese vein deposits in Red Rock area. Includes several members locally separated by angular unconformities. Older units interbedded with basalt (Tb) are mapped as Gila cg. where sediments exceed volcanic rocks in outcrop area. Max. thickness 1,000+feet.

Tur — Upper rhyolite
Rhyolite flows and plugs with crystalline and perlitic facies; rhyolite tuffs. Interbedded with Gila cg. Younger than Tertiary basalts (Tb). Much of this unit consists of perlite. Max. thickness 200+ feet.

LOCAL UNCONFORMITY

Tb — Basalt and basaltic andesite
Basalt, olivine basalt, and basaltic andesite chocolate brown to black. Plagioclase phenocrysts common. Locally interbedded with Gila conglomerate. Mapped as Tb where volcanic rocks exceed sediments in outcrop area. Probably includes some post-Gila Quaternary basalt in the SW. part of the quadrangle. Max. thickness 500+ feet.

Tl — Latite
Purple, gray, or reddish porphyritic rock characterized by andesine phenocrysts up to one inch long. Grades upward into basaltic andesite (Tb). May be a large differentiated sill. Max. thickness 300 feet.

UNCONFORMITY

TERTIARY

Tdru — Datil formation, undifferentiated
Rhyolite flows, tuffs, welded tuffs, interbedded with fined-grained brown or gray andesite and latite porphyry. Host to manganese mineralization in Cliff-Gila area. Includes small intrusive bodies. Max. thickness 9,000 feet.

UNCONFORMITY

LATE CRETACEOUS OR EARLY TERTIARY

TKri — Intrusive rhyolite
Rhyolite porphyry plugs and dikes. Age uncertain.

TKm — Monzonite porphyry
Intrusive stock in Burro Mtns. Age uncertain.

TKai — Intrusive andesite
Andesite porphyry plugs and dikes in Burro Mtns. Age uncertain.

UPPER CRETACEOUS

Kv — Virden formation
New formation name. Type locality in sec.16, T.18 S., R.20W. Fanglomerate, fluvial conglomerate, tuffaceous sandstone, and gray shale. Contains plant fossils tentatively dated as late Cretaceous. Contains boulders of Cretaceous volcanic rocks altered by Stage 1 hydrothermal alteration. Max. thickness 4,000 feet.

UNCONFORMITY

Ka — Andesite
Flows, tuffs, and flow breccias. Commonly vesicular, amygdaloidal, porphyritic, with small phenocrysts of altered plagioclase and ferromagnesian minerals; chocolate brown, purple, or gray. Partly altered to epidote, sericite, quartz, calcite. Interbedded with rhyolite tuffs and aphanitic latite flows with small biotite phenocrysts. Mineralized in Steeple Rock district. Max. thickness 3,000 feet.

Kr — Rhyolite
Porphyritic rhyolite flows or welded tuffs, locally underlain by conglomerate or fanglomerate. Max. thickness 200 feet.

Kd — Dacite
Flows, tuffs, flow breccias. Upper part grayish green, coarsely porphyritic, with conspicuous phenocrysts of andesine, hornblende, biotite. Lower part is darker, has smaller phenocrysts, and is intruded by diabase dikes. Dacite is host to most of the mineralization and Stage 1 hydrothermal alteration in Steeple Rock district.

UNCONFORMITY

Kc — Colorado shale
Marine gray shale and sandstone; contains marine fossils of Coloradoan age. Max. thickness 800 feet.

Kb — Beartooth quartzite
Orthoquartzite, white or pink, unfossiliferous, well-rounded and sorted. Max. thickness 60 feet.

UNCONFORMITY

PRECAMBRIAN

Peg — Granite
Coarse microcline granite; includes undifferentiated Precambrian in SE. corner of quadrangle.

Pem — Metamorphic rocks
Schist, gneiss, hornfels, and migmatite. Includes Bullard Peak and Ash Creek series of Hewitt (1959).

Mine or prospect

Ag Silver
Au Gold
Co Cobalt
Cu Copper
F Fluorspar
Mg Magnesite
Mn Manganese
Ni Nickel
Pb Lead
Ra Radioactive minerals
R Ricolite (serpentine ornamental stone)
S Stone
U Uranium
Zn Zinc

Note: Diatomite occurs in Gila cg NW. of Cliff, clay in Gila cg on S. side of Gila River opposite Virden, perlite in upper rhyolite (Tur) W. of Cliff.

Normal fault, dashed where inferred. Each unconformity is believed related to a period of normal faulting.

Reverse fault

Axial trace of anticline

Axial trace of syncline

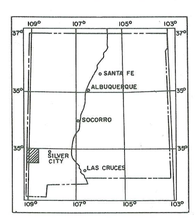
Dip and strike of sedimentary and volcanic rocks

Dip and strike of foliated rocks

Strike of vertical foliated rocks

Stage 2 hydrothermal alteration (Late Tertiary or Quaternary). Associated with manganese mineralization. Bleaching, iron staining, silicification, clayey alteration of Tertiary rhyolite (Tr) southeast of Cliff; opalization of Gila conglomerate (Tg) west of Red Rock. Alteration of Tr and Tg may have occurred at different times. Alteration not associated with intrusive rocks, but occurs with hot-spring travertine in Tg.

Stage 1 hydrothermal alteration (Late Cretaceous). Associated with Cu, Zn, Pb, Au, Ag mineralization in Steeple Rock mining district. Affects dacite (Kd) and andesite (Ka). Silicification and brecciation near veins; widespread sericitization. Intimately associated with small plugs and dikes of banded intrusive rhyolite, not separately mapped.



INDEX MAP OF NEW MEXICO