



CORRELATION OF MAP UNITS

Qal	Holocene and Pleistocene	QUATERNARY and TERTIARY
Qbd		
Qbs		
Qc		
Qd		
Tb	Pleistocene(?) and Pliocene(?)	
Td		
Kcg	Upper Cretaceous	CRETACEOUS
Kmd		
Kmm		
Kcs		
Kcdi		
Kgm		
Km		
Kgu		
Kgl		
Km		
Kdt		
Kmc		
Kdp		
Kdc	Lower Cretaceous	
Kdo		
Kds		

DESCRIPTION OF MAP UNITS

- Qal ALLUVIUM (HOLOCENE AND PLEISTOCENE)--Composed largely of clayey silt and fine sand, locally a few coarse sand grains or pebbles. Includes extensive colluvial deposits in northeastern part of quadrangle, and recent colluvial deposits, especially on slopes of west-facing mesas. As much as 15 m exposed in gullies.
- Qbd BASALT FLOWS FROM ZUNI CENTERS (HOLOCENE AND PLEISTOCENE)--The youngest (Qbd--McCartys flow) and the oldest (Qba) of four extensive flows that originate at the Zuni volcanic centers southwest of the quadrangle (Thaden and others, 1967). The McCartys flow is apparently about 1,000 years old (Nichols, 1946). It is coarse grained, porous with small voids between groundmass plagioclase and subophitic augite. Brownish glass with microclites of Fe-Ti oxides partly fills interstices between plagioclase laths; olivine cholelith (Lipman and Moench, 1972).
- Qbs TERRACE ALLUVIUM AND GRAVEL (HOLOCENE AND PLEISTOCENE)--Composed largely of pebbles, cobbles, and boulders of volcanic and Precambrian rocks in a matrix of silt and sand.
- Qc LANDSLIDE DEPOSITS (HOLOCENE AND PLEISTOCENE)--Mostly terrace-block slides of basalt, Gallup and Dakota sandstones and Mancos Shale. Includes some rock and mud-flow slides, talus, fan accumulations and alluvium, some of which are derived from outcrops and some from landslide debris. The slides are generally older than the alluvium (Qal).
- Qd COLLUVIUM ON MCCARTYS MESA (HOLOCENE AND PLEISTOCENE)--Mantling deposits composed largely of colluvial soil, caliche, terrace sand and gravel, alluvium, and wind-blown sand. Includes local small outcrops of Mancos Shale and Twoovells Sandstone.
- Tb BASALT ON HORACE MESA (PLEISTOCENE? AND PLEISTOCENE?)--Several separate flows originating from local vents north of quadrangle. Composed of silicic alkali-olivine basalt with 1-2 percent olivine phenocrysts and a few large resorbed plagioclase grains in a groundmass of trachytic augite and plagioclase, sparse interstitial glass.
- Td DIABASE DICES (PLEISTOCENE? AND PLEISTOCENE?)--Very fine grained, subophitic, composed of randomly oriented laths of plagioclase, interstitial subhedral augite, and minor scattered small grains of magnetite and apatite. Contacts with the enclosing rock are generally marked by a thin aphanitic chill border in the dike and a hardened or silicified zone in the enclosing sandstone or shale. Range in thickness from a few decimeters to slightly more than 6 m.
- Kcg CREVASSE CHANNELS (UPPER CRETACEOUS) Gibson Coal Member--Largely covered by landslide debris, most exposures interpreted from aerial photographs; sparse data indicate thin-bedded sandstone, siltstone, and shale with numerous interbeds of highly carbonaceous shale and coal a few decimeters to a probable maximum of 1 m thick. Total thickness about 20-25 m.
- Kmd Dalton Sandstone Member--Light-gray and yellowish-gray, fine- to medium-grained thin- to thick-bedded sandstone. Thickness about 15 m.
- Kmm Stray sandstone member--Yellowish-gray, fine- to coarse-grained thin- to medium-bedded sandstone. Thickness 35-45 m.
- Kcdi Dilco Coal Member--Light yellowish-gray to white thin-bedded sandstone and siltstone with interbedded light- to dark-gray carbonaceous shale and coal beds 1/2 to as much as 1 1/2 m thick, some of which may constitute a future resource. Thickness 35-45 m.
- Kgm GALLUP SANDSTONE (UPPER CRETACEOUS) Main body--Sandstone, tan to pale brown, fine to medium grained. Upper 1 m thin bedded, has shale partings, is heavily iron stained and capped by ironstone concretions. Underlying sandstone is massive, forms prominent cliff. Lower 1-2 m is massive sandy siltstone. Thickness 20-25 m.
- Kgl Upper tongue--Sandstone, light tan to light gray, very fine to medium grained, massive, crossbedded, silty at base; lenses of calcareous sandstone and sandy limestone at top. Thickness 3.5-12 m.
- Km Lower tongue--Sandstone, light gray and tan, brown weathering, fine to medium grained, medium bedded to massive. Top 1 m resistant bed of brown weathering calcareous sandstone and sandy limestone. Lower part is interbedded siltstone and calcareous sandstone with limestone lenses. Thickness 6-20 m.

- Kmc MANCOS SHALE (UPPER CRETACEOUS) Main body--Poorly exposed, forms rubble covered slope; composed of tan and gray calcareous sandstone and siltstone, and greenish-gray fissile shale. Thickness 18-20 m.
- Kmv Main body--Includes two units that intertongue with the Gallup Sandstone, and the main body below the lowest Gallup Sandstone tongue. The upper tongue, 25-30 m thick, is greenish-gray and grayish-brown silty shale with shaly siltstone in the upper part. The lower tongue, 12-20 m thick, is dark-gray carbonaceous shale with light-gray and tan silty shale and siltstone in the upper part. The main body below the lowest Gallup Sandstone Tongue is 100-110 m thick. The upper 15 m is siltstone, light to dark gray, thin bedded calcareous carbonaceous, with lenses of fine-grained sandstone; the underlying 40 m is shale, light brown, purplish brown, purplish gray and gray, fissile to blocky with about 10 percent interbedded thin siltstone and sandstone layers. The lower 55 m is shale, dark gray to black, wavy laminated and fissile. Exposures are poor, much of the alluvium shown on the northern half of the quadrangle may be colluvium on Mancos Shale.
- Kmw Whitewater Arroyo and Clay Mesa Shale Tongues, undivided--Dark-gray shale, mapped only in southeastern corner of the quadrangle.
- Knc Whitewater Arroyo Shale Tongue--Dark-gray soft slope-forming shale and siltstone; uppermost part is light-gray silty shale and siltstone transitional into the overlying Twoovells Sandstone Tongue of the Dakota Sandstone. Contains lenticular bentonite layers and yellow-brown weathering cone-in-cone limestone concretions. Thickness 45-50 m.
- Kdc Clay Mesa Shale Tongue--Shale, medium to dark gray, silty in parts. Grayish-tan sandstone and siltstone in upper part grades into overlying Paguate Sandstone Tongue of Dakota Sandstone. Lower 15 m contains bentonite beds and brown weathering limestone concretions. Thickness about 20 m.
- Kdo DAKOTA SANDSTONE Twoovells Sandstone Tongue (Upper Cretaceous)--Sandstone, fine to very fine grained, silty, local thin lenses medium to coarse grained; light gray, weathers to grayish orange, light brown and tan; thin to medium bedded. Local thicker lenses have foreset-type crossbeds, resistant slabby beds at top grading downward to silty sandstone with thin interbeds of siltstone in lower part, contains many imprints, burrows, and trails, and disturbed bedding. Uppermost part contains "Gryphaea" newberryi Stanton (Landes and others, 1973, p. J9). Thickness 5-25 m.
- Kdp Paguate Sandstone Tongue (Upper Cretaceous)--Light brown and tan, fine to very fine grained, local lenses are medium to coarse grained, thin to medium bedded. Thickness 0-30 m. Pinches out in southeastern corner of quadrangle.
- Kde Cubero Sandstone Tongue (Upper Cretaceous)--Light grayish-tan, weathers yellowish-gray, very fine grained sandstone and siltstone. Carbonaceous plant fragments, tracks, trails, and borings are abundant, especially near top. Brown-weathering limestone concretions, locally very fossiliferous, occur in upper part of unit; lower part contains thin to very thin interbeds of very fine grained sandstone, siltstone, limestone, and shale, locally very fossiliferous. About 0.5 m exposed in southeastern part of quadrangle.
- Kds Oak Canyon Member (Upper and Lower Cretaceous)--Sandstone and siltstone, light gray and grayish tan, locally calcareous or carbonaceous; sandstone is very fine grained and thin-bedded, siltstone is generally shaly with abundant finely laminated carbonaceous material; numerous thin-bedded light-gray, brown weathering, fossiliferous limestone lenses and concretions, and limestone or aragonite cone-in-cone concretions. Thickness 15-30 m.

CONTACT

- FAULT--Dashed where approximately located; dotted where concealed; queried where uncertain. U, upthrown side; D, downthrown side. Dip of fault plane indicated by arrow.
- STRIKE AND DIP OF BEDS

REFERENCES

- Landes, E. R., Dane, C. H., and Cobban, W. A., 1973, Stratigraphic terminology of the Dakota Sandstone and Mancos Shale, West-central New Mexico: U.S. Geol. Survey Bull. 1372-J.
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- Thaden, R. E., Herrin, Seymour, and Raup, Omer B., 1967, Geologic map of the Grants SE quadrangle, Valencia County, New Mexico: U.S. Geol. Survey Geol. Quad. Map Q-682.

Base from U.S. Geological Survey, 1957.

SCALE 1:24,000

Geology mapped in 1971.

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