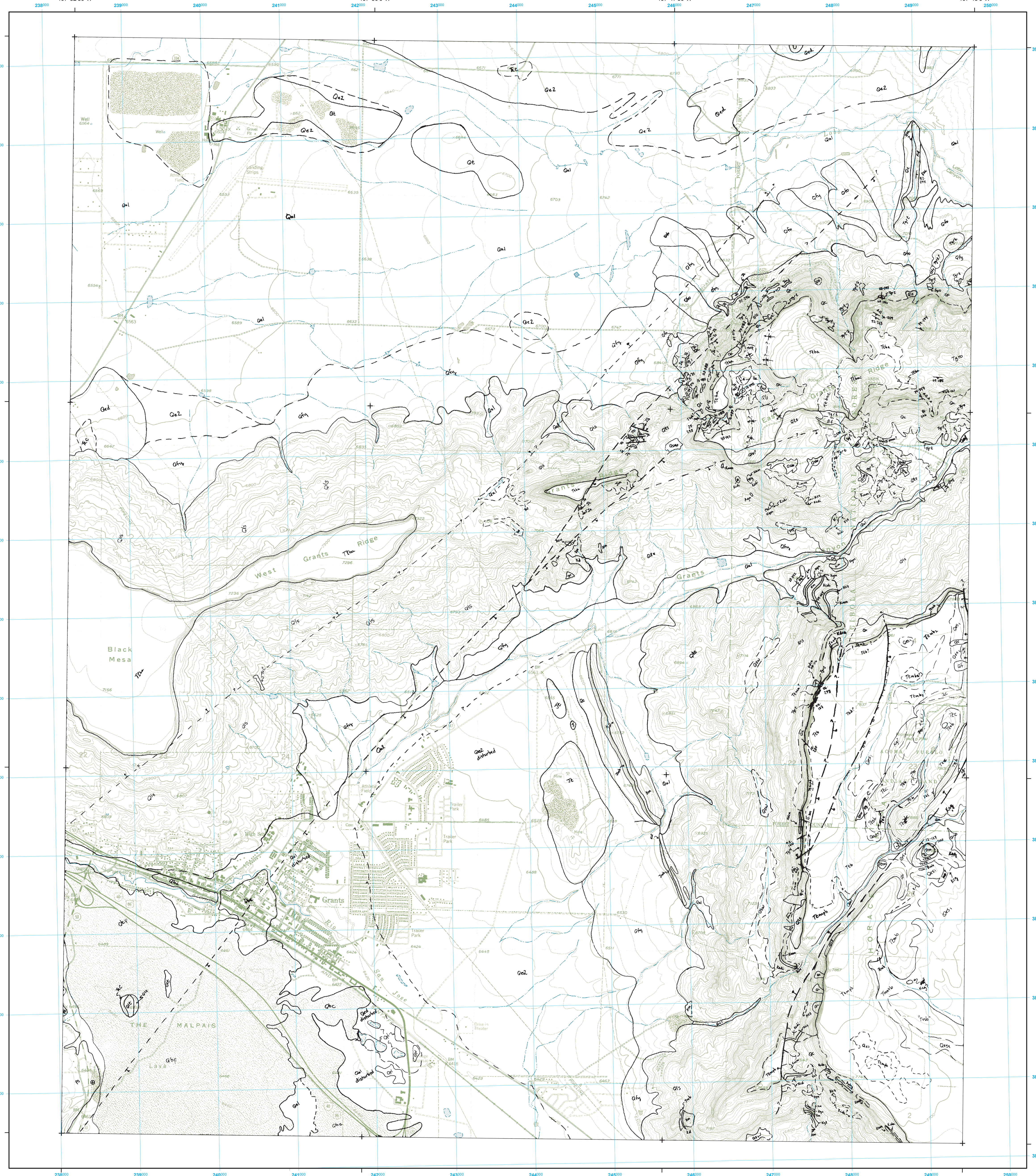

Base map from U.S. Geological Survey 1957, from photographs taken 1955, field checked in 1957. Photorevised in 1981. 1927 North American datum, Polyconic Projection. Reprojected to UTM projection -- zone 13N. 1000-meter Universal Transverse Mercator grid, zone 13, shown in red

1:24,000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Magnetic Declination April, 2010 9° 51' East At Map Center

QUADRANGLE LOCATION

New Mexico Bureau of Geology and Mineral Resources
Open-file Geologic Map 224

Mapping of this quadrangle was funded by a matching-funds grant from the STATEMAP program of the National Cooperative Geologic Mapping Act, administered by the U. S. Geological Survey, and by the New Mexico Bureau of Geology and Mineral Resources, (L. Greer Price, *Director and State Geologist*, Dr. J. Michael Timmons, *Geologic Mapping Program Manager*).

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This and other STATEMAP quadrangles are available for free download in both PDF and ArcGIS formats at:

http://geoinfo.nmt.edu

Geologic map of the Grants quadrangle, Cibola County, New Mexico

June, 2012

by
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This draft geologic map is preliminary and will undergo revision. It was produced from either scans of hand-drafted originals or from digitally drafted original maps and figures using a wide variety of software, and is currently in cartographic production. It is being distributed in this draft form as part of the bureau's Open-file map series (OFGM), due to high demand for current geologic map data in these areas where STATEMAP quadrangles are located, and it is the bureau's policy to disseminate geologic data to the public as soon as possible.

After this map has undergone scientific peer review, editing, and final cartographic production adhering to bureau map standards, it will be released in our Geologic Map (GM) series. This final version will receive a new GM number and will supercede this preliminary open-file geologic map.

DRAFT

COMMENTS TO MAP USERS

A geologic map displays information on the distribution, nature, orientation, and age relationships of rock and deposits and the occurrence of structural features. Geologic and fault contacts are irregular surfaces that form boundaries between different types or ages of units. Data depicted on this geologic quadrangle map may be based on any of the following: reconnaissance field geologic mapping, compilation of published and unpublished work, and photogeologic interpretation. Locations of contacts are not surveyed, but are plotted by interpretation of the position of a given contact onto a topographic base map; therefore, the accuracy of contact locations depends on the scale of mapping and the interpretation of the geologist(s). Any enlargement of this map could cause misunderstanding in the detail of mapping and may result in erroneous interpretations. Site-specific conditions should be verified by detailed surface mapping or subsurface exploration. Topographic and cultural changes associated with recent development may not be shown.

Cross sections are constructed based upon the interpretations of the author made from geologic mapping, and available geophysical, and subsurface (drillhole) data. Cross-sections should be used as an aid to understanding the general geologic framework of the map area, and not be the sole source of information for use in locating or designing wells, buildings, roads, or other man-made structures.

The map has not been reviewed according to New Mexico Bureau of Geology and Mineral Resources standards. The contents of the report and map should not be considered final and complete until reviewed and published by the New Mexico Bureau of Geology and Mineral Resources. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the State of New Mexico, or the U.S. Government.

MAP UNIT DESCRIPTIONS

Quaternary

Qal Alluvium—Deposits of sand, gravel and silt in main valley bottoms; predominantly Late Holocene in age where exposed. Maximum thickness of various alluvial deposits is uncertain but is at least 40 m. Well logs from sections 26 and 35, T 12 N, R 10 W (in western Lobo Canyon) indicate a total thickness of 20 to 40 meters of alluvium overlying Chinle Formation shale. Well logs from the NW¼, Section 20, T 11 N, R 9 W (in western Grants Canyon) indicate a total thickness of around 40 meters of alluvium overlying red clay and shale. Well logs from Section 6, T 10 N, R 9 W (Rio San Jose valley) indicate a total thickness of 50 to 60 meters of alluvium and interbedded basalt overlying red shale (Chinle Formation). Alluvium is typically fine-grained, silt and sand dominated deposits with pebble and cobble-gravel lenses and interbedded gravel beds (Figure 4). Clasts in gravel lenses from locally derived sources in Lobo and Grants canyon valley floor alluvium. Includes some low (<3m above modern valley floor) alluvial surfaces of possible middle Holocene age. Deposits are characterized by weakly-developed soils with 10YR-7.5YR color (reflecting varying parent material), none to Stage I carbonate morphology, and lack of Bt horizon development (Table 1). Locally includes thin eolian mantle <50 cm thick.

Qsw Colluvial, eolian, and alluvial deposits that have accumulated behind large landslide blocks forming distinctive benches.

Qt Alluvium underlying terrace surfaces—Deposits of sandy pebble to cobble size gravel underlying terrace surfaces located approximately 7 m above local base level in Lobo Canyon. Clasts are subangular to rounded rhyolite, obsidian, basalt, limestone, sandstone, andesite, chert, and minor granite. Typically forms fill terraces with deposit thickness greater than 7 m. Deposits are characterized by stage II carbonate, Bt horizon is typically absent (stripped?) (Table 1). Likely late Pleistocene in age and correlative with Qt3 in upper Lobo Canyon in Lobo Springs Quadrangle (Goff et al., 2008).

Qfy Young Alluvial fans—Typically fan-shaped deposits sand, silt, and clay with pebble-and cobble size gravel lenses deposited at the mouth of small drainages at the base of Grants Ridge and Horace Mesa; associated with present drainages and usually not incised more than a few meters; grades into alluvial deposits along main channels. Deposits are characterized by weakly-developed soils with 7.5YR – 2.5Y color (reflecting varying parent material), none to Stage I carbonate morphology, local gypsum accumulation, and lack of Bt horizon development (Figure 7; Table 1). Deposits are middle to late Holocene age; maximum exposed thickness about 5 m.

Qfo Older Alluvial fans—Dissected remnants of fan-shaped deposits of coarse to fine gravel and sand, silt, and clay graded to a base level 10 m or more above the modern valley floor; Middle(?) Pleistocene age. Forms a fan complex on the north side of East Grants Ridge. Characterized by well-developed soils with stage III carbonate morphology and Bt horizon development (Grimm, 1983). Approximate thickness about 5 to 10 m or more.

Qes2 Eolian deposits in Lobo and Grants Canyons—0.5 to 10 m or more thick deposit of well-sorted, subrounded, very fine- to fine-grained quartz lithic sand forming sand sheets in Lobo and Grants Canyons. Distinguished by lack of soil-profile development, although locally includes buried soils with Stage I-II carbonate morphology (Table 1). Color of deposits typically ranges from 5YR to 7.5YR, reflecting varying source areas for different eolian events; low-angle planer cross bedding locally preserved (Figure 5).

Qed Dune sand— well-sorted, subrounded, very fine- to fine-grained quartz lithic sand forming stabilized dunes in Lobo Canyon. Distinguished by lack of soil-profile development. Qed in Grants Canyon appears destabilized due to anthropogenic activities.

Qes1 Older Eolian deposits of Horace Mesa—0.2 to approximately 1 m thick deposit of silt and very fine sand forming sand sheet on Horace Mesa (Figure 6). Characterized by thin (<10 to 30 cm thick) late Holocene deposit overlying discontinuous, buried middle to late Pleistocene eolian deposit approximately 1 m thick. Surficial soil is weakly developed with 10YR color, none to Stage I- carbonate morphology, and lack of Bt horizon development. Buried soil is well developed, with Stage II+ to III carbonate morphology, Bt horizon with 5YR to 7.5YR color. Deposit locally includes scattered large basalt clasts - Qc derived from basalt at top of nearby scarp.

Qls Landslides—Poorly sorted debris that has moved chaotically down steep slopes; slumps or block slides (toreva blocks) partially to completely intact, that have moved down slope; slumps and block slides usually display some rotation relative to their failure plane; thickness varies considerably depending on the size and nature of the landslide.

Qlt Calcareous Tufa—Porous limestone with casts of grasses, reeds, and other plant matter, bedded on a 1 cm to > 10 cm scale with a 30-40 cm layer of plant casts near top (Figure 8). Weathered surface is pale yellow to light yellowish brown, fresh surface is light gray with yellowish brown bands of plant mats and dark gray manganese-stained layers. Distinctive egg shell weathering on exposed surfaces. Maximum thickness approximately 7 m.

Qc Colluvium, undivided—Very poorly sorted gravels and sands deposits on steep slopes. Mapped where colluvium obscures underlying geologic relationships. <1 to 4 m thick.

Qoa Older alluvium, undivided—High-level sands with rare pebbles of exotic(?) clasts. 'Exotic' clasts consist of white to pink quartzite and very dark gray chert; the former is found as xenoliths in nearby cinder deposits, however, and could be locally derived. The later has not been seen as xenoliths. No exposure of the soil developed in this alluvium has yet been found. Unit is 1-3 m thick.

Qbp Paxton Springs flow—Younger Quaternary basalt flow. Dark gray to black basalts largely uncovered by eolian material. Thin sections show olivine and rare pyroxene and plagioclase phenocrysts in a groundmass of plagioclase, pyroxene, and opaque oxides (Maxwell, 1986). Originated in the Zuni Mountains, 12 miles to the WSW. Cl-36 surface exposure age of 20.7 ± 2.2 ka (Dunbar and Phillips, 2004).

Qbc El Calderon flow—Older Quaternary basalt flows. Black basalts that are, significantly buried by eolian material. Thin sections show olivine phenocrysts in a groundmass of plagioclase, clinopyroxene, olivine, and opaque oxides, with rare glass (Maxwell, 1986). Includes the less extensive, older Grants flow of Cascadden et al. (1997). Originated from El Calderon, a peak 15 miles to the SSW. Exact age uncertain (see report), but constrained to upper Pleistocene, 50-130 ka.

Tertiary

Pliocene Volcanics

Ttb, Ttc, Ttcr Aphyric trachybasalt—Very dark gray, very sparsely (<<1%) porphyritic flows. Phenocrysts consist of fine olivine, plagioclase, and possibly pyroxene. Associated cinder deposits are Ttc and Ttcr, the former being light to dark brown and the later being distinctly deep red in color. Cinder deposits contain rare xenoliths of Mesozoic sandstone as well as white to pink quartzite. Appears to overlie Ttmb and Ttmpb, but the relationship is not clearly expressed in outcrop.

Ttsb Spotted trachybasalt—Very dark gray, very sparsely (<<1%) porphyritic, 'spotted' flows. 'Spotting' consists of conspicuous abundant white to very light gray spots 2-4 mm across. Phenocrysts, where present, consist of plagioclase and olivine. No associated cinder has been found .

Ttmb, Ttmc Older sparsely megacrystic trachybasalt—Very dark gray porphyritic flows with sparse megacrysts. Megacrysts consist dominantly of pyroxene but are rarely of plagioclase, and are 1-2 cm across. In addition, flows consist of 4-10% medium phenocrysts of pyroxene (2-5%, up to 4mm across, generally anhedral), plagioclase (<1 to 1%, up to 4mm across, generally anhedral), and sparse olivine (<1%, up to 1 mm across, anhedral and commonly replaced by iddingsite). Associated cinder deposits are mapped as Ttmc. Unit appears to overlie Ttmpb, but the relationship is not clearly expressed.

Ttmb2 Younger sparsely megacrystic trachybasalt—Very dark gray porphyritic flows with sparse megacrysts locally found above the scoriaceous top of Ttmb. Similar in appearance to Ttmb, save for rarer and possibly smaller megacrysts, it is distinguished from Ttmb by the presence of a broad scoriaceous zone found toward the top of the main Ttmb cliff, separating the younger and older flows. Overlies Ttmb.

Ttmpb Sparsely megacrystic, sparely phenocrystic trachybasalt—Very dark gray sparsely porphyritic flows with very sparse megacrysts. Megacrysts are dominantly of pyroxene by with rare plagioclase, both of which are 1 to 1.5 cm across. Medium phenocrysts constitute generally <1%, but locally up to 5%, of the flows, and are also dominantly pyroxene but locally include plagioclase; each is up to 3 mm across and anhedral.

Ttma Abundantly megacrystic trachyandesite—Very dark gray megacryst-rich flows. Megacrysts are dominantly plagioclase, with rare pyroxene, that are up to 1 cm across and constitute 5-10% of the flows. Unit may be a local plagioclase-rich zone of unit Ttmpb, or may be a separate flow underlying Ttmpb.

Ttba, Ttbac Sparsely megacrystic, porphyritic basaltic trachyandesite—Medium to very dark gray porphyritic flows with sparse megacrysts. Macroscopic phenocrysts are dominantly plagioclase (5-15%, up to 6 mm across, subhedral to euhedral, white to clear), followed by pyroxene (<1-10%, up to 8 mm across, anhedral to subhedral, generally black but variably degraded to reddish and orangish minerals). Sparse (<<1 to <1%) megacrysts of pyroxene are up to 1.5 cm across and anhedral. Associated cinder is mapped as Ttbac. On the east side of East Grants Ridge, basalt bands thin rapidly from the north and south edges of the Ridge toward the center, suggesting the basalt onlapped a topographically high Tgro ridge or dome. On the west side of the Ridge, the basalt cliffs drop in elevation along a north-striking monocline-like trend, possibly draping over a paleoslope. A thick mass of basalt surrounded by cinder above the perlite mine at 0248140mE, 3899360mN (NAD27, Zone 13S) may be an intrusive plug (Thaden et al., 1967) or a lava pond at the center of the cinder cone that solidified in place (Crumpler, 2003). The shallow valley in the cinder cone to the north of the mass of basalt may be the location that the basaltic magma breached the cone and flooded northward and westward to cap the Grants Ridge mesas (Crumpler, 2003). Overlies Ttci, Ttbb, Tgro, Tgrt and a variety of Mesozoic rocks. Up to about 100 m thick by the perlite mine, up to 30 m thick outside the source cone.

Ttcu Trachybasaltic cinder, undivided—Cinder deposits with no clear equivalent basalt. Light to dark brown to reddish brown, vesicular trachybasaltic cinder.

Ttci Inset trachybasaltic cinder—Cinder deposits clearly inset upon Mesozoic strata at the west end of East Grants Ridge. Light brown to reddish brown to dark red blocks of moderately to strongly vesicular, aphyric basaltic scoria with a cement of sparry calcite. Generally poorly exposed, and surrounded mainly by colluvium. Overlies or intrudes Mesozoic strata, underlies Ttba. At least 30 m thick.

Ttbb Trachybasaltic breccia—Dark gray to dark brownish gray flow breccia with local, discontinuous, aphyric flow core, forming a distinct bed inset upon Mesozoic strata on the West end of East Grants Ridge. Basalt blocks and flow core bear sparse, indistinct phenocrysts that are likely small plagioclase, and amorphous clots of orangish brown Fe-oxide that may be degraded pyroxene. Weathered surfaces bear common, vague to distinct, light gray spotting, with spots typically 1 cm across. Bed trends from moderately west-dipping at west end, to subhorizontal, to moderately east-dipping at east end, with the east end clearly inset upon Mesozoic strata. Intercalates with Ttci, underlies Ttba. 5-10 m thick.

Ttpb Porphyritic trachybasalt—Very dark gray porphyritic basalt with distinct greenish alteration. Phenocrysts are dominantly of pyroxene (5-10%, 0.1 to 1.3 cm across, subhedral to euhedral), with lesser plagioclase (1-3%, up to 0.5 cm across, subhedral), and both phenocryst types are variably degraded. Greenish alteration consists of an abundant greenish brown to greenish gray stain seen on weathered and fresh faces. Ttpb is only very locally exposed inset upon Mesozoic strata at the west end of East Grants Ridge, and is possibly intrusive. At least 1 m thick.

Tgro Rhyolite of Grants Ridge—White to medium gray to brown, sparsely porphyritic lavas and local breccias. Phenocrysts consist of potassium feldspar, plagioclase, and very rare quartz. Massive to strongly flow-foliated, with bands of coarse vesicles and local lithophysae following foliation trends. Vesicles are uncommonly rimmed in fine crystals. Some areas, particularly along the north flank, are rich in nodules of obsidian. A strongly flow-foliated vitrophyre is common to the base of the dome at least along the north flank, with steep southward dips to the foliation suggesting the rhyolite is somewhat inset upon the underlying tuff. Small exposures of pumiceous clastic rocks suggest that minor tephra beds intercalate with the rhyolite lavas. Overlain by Ttba and Ttbac, underlain by Tgrt. Dated by the K-Ar method at 3.34 ± 0.16 Ma from an unknown location (Lipman and Mehnert, 1979). At least 180 m thick.

Tgrt Grants Ridge Tuff—White to light gray to pale red ignimbrite, fallout, flow, surge, and breccia deposits with local alluvial reworking, particularly at the top. Highly variable, but typically consists of a coarse, lithic-rich basal zone, and fine-grained, pumice-rich upper zone, and capped by alluvial gravels. Lithics are of rhyolite, granite, gneiss, chert, sandstone, limestone, and basanite (Goff et al., 2008). Keating and Valentine (1998) identified two eruptive sequences of ignimbrites overlain by fallout and surge beds. Alluvial beds consist of moderately to poorly sorted pebbles and sparse cobbles of angular to subangular aphyric gray rhyolite and/or subrounded to rounded obsidian with sparse granite and quartz-rich sandstone gravels. Alluvial beds are commonly thinly cross-bedded, and occur in thin to medium (10 cm to 1 m thick), locally channel-shaped beds. Goff et al. (2008) dated obsidian clasts from upper tuff beds beneath Mesa La Jara by the 40Ar/39Ar method at 3.26 ± 0.04 Ma. Thickness trends suggest the source lay beneath the rhyolite of Grants Ridge. At least 150 m thick.

Pliocene Sediments

Tvss Sandstones interbedded with trachybasalts—Light gray sandstones and basalt-bearing pebbly sandstones. Only locally preserved between basalt flows. Thinly bedded with poorly sorted sands and rare fine subrounded pebbles of trachybasalt. Very poorly exposed.

Tvsb Basaltic-rich volcaniclastic gravels—Gray to tan alluvial deposits of subrounded to rounded trachybasaltic pebbles and cobbles. Interbeds with trachybasalt flows to the east on the Lobo Springs quadrangle (Goff et al., 2008).

Tvsd Coarse basalt-dominated debris flow deposits—Very poorly sorted pebbles to local boulders of angular to subrounded basalts of various textures. Deposits are massive and clast-supported with only minor matrix material between clasts. Only locally exposed at the very NW corner of Horace Mesa, where it underlies Ttmpb with a very irregular upper contact; basal contact is not exposed.

Cretaceous

Crevasse Canyon Formation

Kcg Gibson Coal Member—Interbedded black and brown siltstone, thin to medium bedded tan to greenish gray sandstone, and black coal. Sandstones are well to moderately sorted, very fine to medium grained, with angular to subround quartz. Composition is 90% quartz, 10% lithics with less than 1% clay matrix (litharenite). Sandstone beds are cross-bedded with a range from trough cross-beds to large-scale, low-amplitude planar cross-beds. Locally, ripple marks are preserved. Elliptical to spherical siderite to goethite concretions are common as is petrified wood. Coal beds are generally <0.5 m thick. Lower contact is gradational with underlying Dalton Sandstone, top is overlain by Tba of Horace Mesa. Maximum exposed thickness is approximately 350 m.

Kcda Dalton Sandstone Member—Forms stepped cliff with lower yellow-orange cliff, intervening short slope and upper white cliff. Lower sandstone has thin beds with abundant pelecypod casts and molds and is carbonate cemented. This sandstone is well sorted, very fine grained with angular quartz grains. Composition is 95% quartz, 5% lithics with less than 1% clay matrix (sublitharenite). Upper sandstone is weakly cemented and is well sorted, fine grained with angular to subround quartz grains. Composition is 90% quartz, 10% feldspar and <1% lithics. Upper and lower contacts are gradational and maximum exposed thickness is <25 m.

Kcmm Mulatto Tongue, Mancos Shale—Distinctive mustard yellow shale that coarsens upwards into laminated siltstone. Siltstone is bioturbated and locally can contain pelecypod shells. Upper and lower contacts are gradational. Up to 240' thick.

Kcs Stray Sandstone Member—Forms stepped cliff with two prominent red-orange cliffs separated with a short slope. Sandstones are medium bedded with planar cross-beds and are white to yellowish gray on fresh surfaces. Well to moderately sorted, very fine to medium grained with angular quartz grains. Composition is 99% quartz, 1 % lithics with <1% clay matrix (quartz arenite). Topmost 1 m of sandstone is a pebble to cobble conglomerate with clasts of quartzite, chert and quartz. Upper and lower contacts are gradational and maximum exposed thickness is <40 m.

Kcdi Dilco Coal Member—Interbedded black to brown siltstone, thin to medium bedded tan to olive green sandstone and black coal. Sandstones are well to moderately sorted, very fine to fine grained with angular quartz grains. Composition is 90% quartz, 10% lithics (including up to 5% muscovite) with up to 5% potassium feldspar altered to clay as a matrix. Sandstones are cross-bedded to ripple laminated. Elliptical to spherical siderite to goethite concretions are present throughout the unit. Upper and lower contacts are gradational and maximum exposed thickness is <150 m.

Gallup Sandstone

Kgm Main Body—Yellowish gray to white, medium to thick bedded sandstone. Moderately sorted, fine to very fine grained with angular to subrounded quartz grains. 95% quartz, 5% lithics (including muscovite mica) as well as plant debris. Contains up to 30% clay matrix from altered feldspar (quartz wacke). Often, beds are bioturbated with ~1.0 cm diameter cylindrical, vertically oriented burrows. Carbonaceous shale locally intercalated with sandstone. Faint, very low angle trough cross beds occur in sets less than 0.25 m thick, with paleocurrent azimuth of 010°. Beds primarily planar-tabular or laminated. Lower contact gradational with Mancos Shale unit and maximum exposed thickness with <25 m.

Kgu Upper Tongue—White, medium bedded sandstone locally capped by well-cemented, fractured, brown-weathered, planar cross-bedded sandstone. Brown sandstone is carbonate sandstone, underlying white sandstone is not. Sandstones are well-sorted, fine grained with angular quartz grains. Composition 95% quartz and 5% lithics with 15 to 25% clay matrix (quartz wacke). White sandstone has no muscovite, overlying brown sandstone has trace amounts of both muscovite and biotite. Trough crossbeds occurs in sets less than 0.5 m thick with paleocurrent azimuths of 025°. Cross beds are somewhat steeper than in lower tongue. Local internal scour surfaces present, as well as hematitic concretions and stained surfaces. Upper and lower contacts with Mancos Shale are gradational and maximum exposed thickness is <30 m.

Kgl Lower Tongue—White, medium bedded sandstone capped with brown-weathered sandstone as in Kgu. Sandstone well to moderately sorted, fine to very fine grained with angular quartz grains. Composition is 95% quartz and 5% lithics with 10 to 15% clay matrix (quartz arenite). White sandstone contains no mica, but overlying brown sandstone contains traces of muscovite. Cross bed sets are 0.5 m thick, are low angle trough cross beds and have paleocurrent azimuths of 150°. Top of unit locally conglomeratic with sandstone clasts and rare shark teeth. Upper and lower contacts with Mancos Shale are gradational and maximum exposed thickness is <15 m.

Jurassic

Jm Morrison Formation, undivided—Interbedded sandstone and shale. Includes Jackpile Member, Brushy Basin Member, Salt Wash Member, Recapture Member and Bluff Sandstone (Lucas and Zeigler, 2003). Combined thickness is on the order of 200 m.

Js Summerville Formation—White, red-brown and light brown fine to very fine muddy sandstone interbedded with brown mudstone and siltstone. Up to 40 m thick (Thaden et al., 1967).

Jt Todilto Formation—Pale gray to pale yellow micrite. Thick bedded and coarsely crystalline in upper part, crinkly bedded in middle part and laminated at base. Up to 12 m thick (Thaden et al., 1967).

Je Entrada Sandstone—Yellow fine to medium grained quartz arenite with large scale eolian crossbeds. Up to 40 m thick.

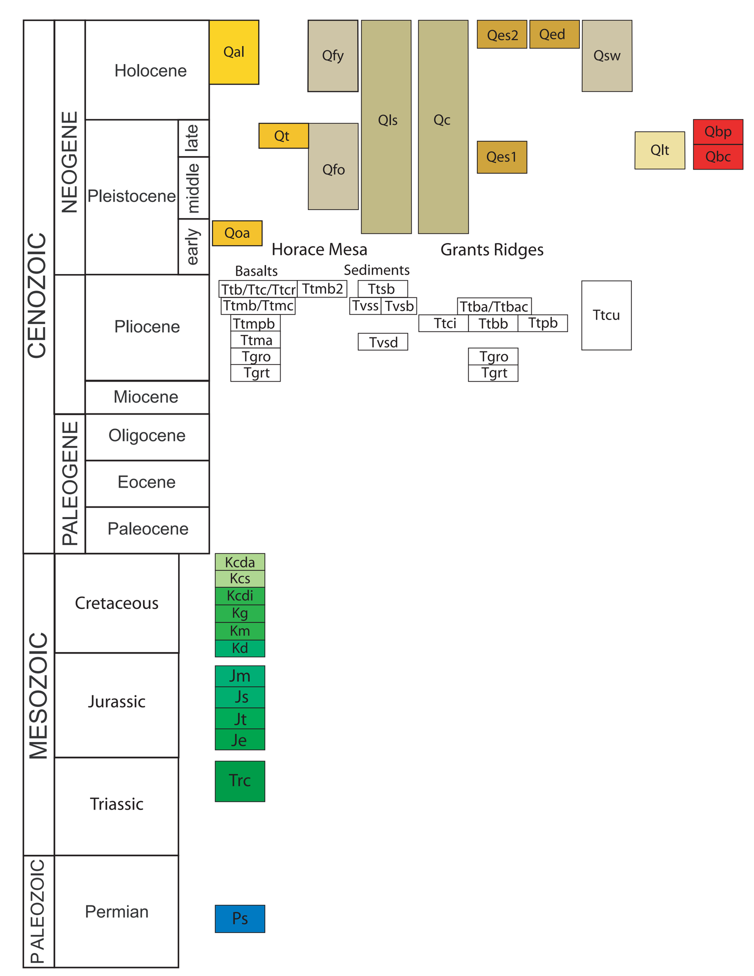
Triassic

TRc Chinle Group undivided – Red and purple mudstones, siltstones and fine to medium grained sandstones. Mudstones and siltstones commonly included pale green reduction spots up to 2 cm in diameter and small lenses of calcrete granules to pebbles. Sandstones are grayish purple lithic wackes with grains of mudstone, chert, micrite and quartz that are moderately sorted and subround. Sedimentary structures include crossbeds, crosslaminations and localized soft sediment deformation and bioturbation. Sandstones also may include small lenses of clast-supported rip-up clast conglomerate with clasts that are purple-brown mudstone and siltstone. Exposures of Chinle Group strata occur only as dislocated blocks within landslide deposits, such that thickness is unknown.

Permian

Ps San Andres Formation – Pale gray to buff dolomitized limestone that occurs only in the southwest corner of the map. Tabular to wavy, thinly bedded, and includes abundant and large pieces of gray and white banded chert. No fossils observed. Probably correlative with the Bonney Canyon Member of the San Andres Formation to the south due to presence of distinctive banded chert. Maximum exposed thickness is <10 m.

CORRELATION DIAGRAM



Central and West Grants Ridges, looking west for the west edge of East Grants Ridge. Central and West Grants ridges are the two mesas along the center of the photo. Hummocky terrain to the left and right sides of the mesas belongs to a landslide complex. Sporadic yellow and red outcrops are Mesozoic sediments. Houses along the left edge of the photo are located in the town of Grants.

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