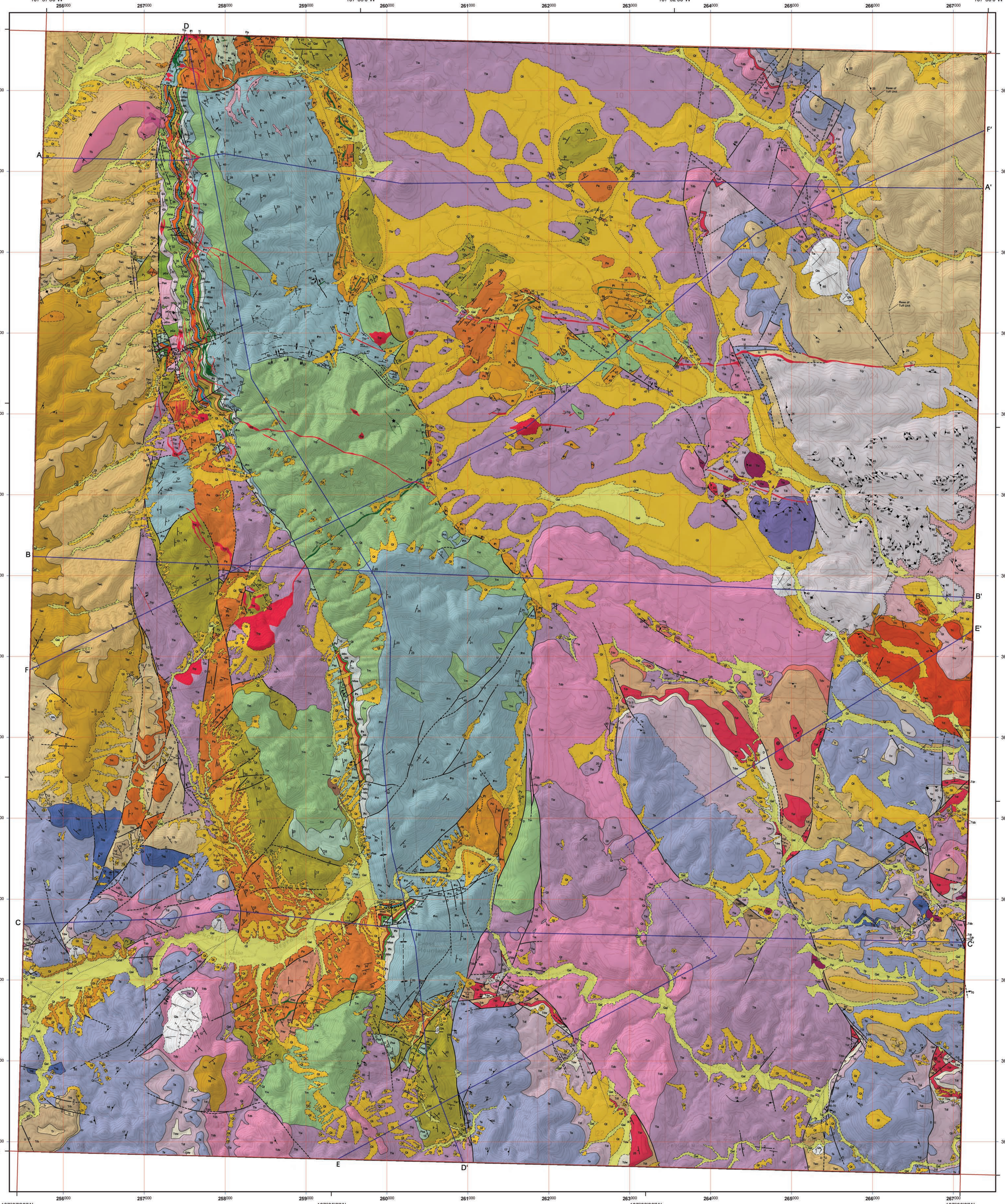
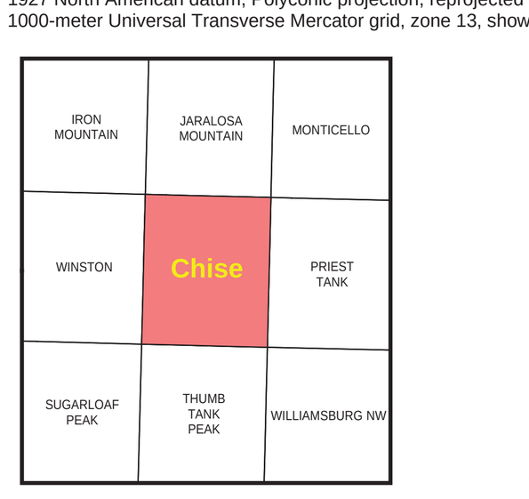
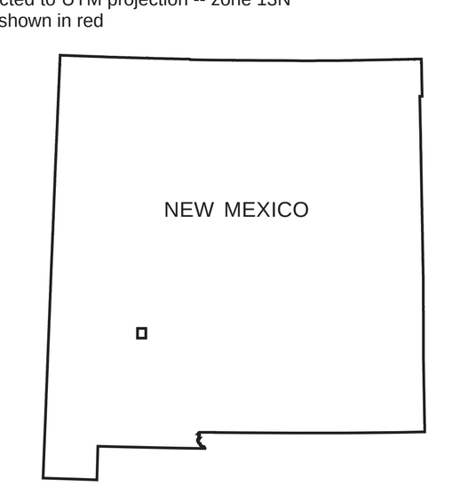
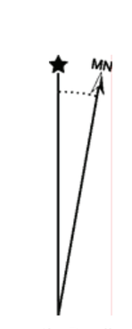


Base map from U.S. Geological Survey 1965, from photographs taken 1964, field checked in 1965.
1927 North American datum, Polyconic projection, reprojected to UTM projection -- zone 13N
1000-meter Universal Transverse Mercator grid, zone 13, shown in red





QUADRANGLE LOCATION



Magnetic Declination
May, 2006
9º 57' East
At Map Center

1:24,000

1 0.5 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0.5 0 1 KILOMETER

CONTOUR INTERVAL XX FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

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

New Mexico Bureau of Geology and Mineral Resources
Open-file Map Series
OFGM 115

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, (Dr. Peter A. Scholle, *Director and State Geologist*, Dr. J. Michael Timmons, *Geologic Mapping Program Manager*).

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This and other STATEMAP quadrangles are (or soon will be) available for free download in both PDF and ArcGIS formats at:

http://geoinfo.nmt.edu/publications/maps/geologic/ofgm/home.html

Geologic map of the Chise quadrangle, Sierra County, New Mexico.

May 2006

by
Richard H. Jahns, Kent McMillan, and James D. O'Brient.

ACKNOWLEDGEMENTS

This map is the result of field work in the Chise Quadrangle between 1975 and 1979 as part of a Ph.D. thesis under the supervision of R.H. Jahns, (McMillan, 1979). Mapping in the Cuchillo Negro Range was begun in 1942 by Jahns, and continued intermittently thereafter until completion of the Chise Quadrangle in 1979. Field work was supported by the New Mexico Bureau of Mines and Mineral Resources and Jahns. We were assisted in the field at various times by John P. Anderson, Jr., John A. Baltierra, and Dorothy L. Fisher. Other support was provided by New Mexico residents Roland and Jeannette Johnson, and Rob and Mernie Cox. Professor C.E. Chapin provided the age date of the Cuchillo Mountain monzonite intrusive before its publication. Compilation of the map and computer graphics was supported by McMillan and Quaternary Science Applications.

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.

Explination of Map Units

Af Artificial Fill

QUATERNARY

Qal Stream-Laid Alluvium
Younger, medium to coarse-grained alluvial fan debris and thin deposits along present stream courses.

Qt Talus and Stream-Terrace Alluvium
Older, mainly coarse-grained fan and terrace deposits; talus deposits of various ages.

Qaol Older Alluvium
Locally thick accumulations of coarse-grained alluvium in Cuchillo Creek and Margarita Canyon.

Qls Landslide Deposits (Quaternary)
Mainly in domains of loose alluvial deposits and altered pyroclastic rocks, includes some talus.

Unconfomity

TERTIARY

Olivine Basalt Sequence (4.8 my; Seager, and others, 1984)

Tb Olivine Basalt
Mesa-capping remnants of flows; Porphyritic aphanitic, dark gray, dense to vesicular, flow layered, weathers medium gray to reddish brown; small to large phenocrysts of lustrous brown olivine in a groundmass of plagioclase, olivine, pyroxene and glass.

Tbx Mesa-capping remnants of flows; local vent complexes of altered breccia and tuff.

Tbi Dikes and small plugs.

Tp Pediment Deposits
Ridge and mesa-capping remnants of lag-gravel and cobble cover on one-extensive aggraded surface.

Twc Winston and Cuchillo Beds
Valley-fill conglomerate, probably equivalent to Palomas and Santa Fe beds.

Unconfomity

Tax Upper Andesite Sequence (18.3 Ma (?); Seager, and others, 1984)
Thin to thick flows, commonly with basal agglomerate; vent complexes of breccia, agglomerate and tuff; dikes and small plugs.

Pyroxene Andesite
Fine-grained to aphanitic, medium to dark gray and locally yellowish brown to brick red, dense to finely vesicular and scoriaceous; weathers dull gray and brownish gray, locally purplish gray to reddish brown; forms slopes with platy to blocky rubble, numerous rib-like ledges with rough surfaces, and several high prominent cliffs. Typically pilotaxitic with sparse to rare small phenocrysts of placioclase, pyroxene, biotite and hornblende; widespread dustings of ores; vesicles open or partly filled by calcite, zeolites, silica and chlorite.

Trp Rhyolite Porphyry
Porphyritic rhyolite dikes and plugs; includes minor younger felsite and fine-grained granitic dikes and plugs in the area of Table Top Mountain.

Tr Rhyolite-Trachyte Sequence
Sheets of tuff and tuff breccia, in places intertongued with tuffaceous conglomerate; local flows and small to moderately large flow domes, scattered dikes, small plugs and vent accumulations.

Trt Trachyte
Medium to coarsely porphyritic, light gray and buff, flow-layered and in general non-vesicular; weathers tan to brownish-gray; forms smooth to bouldery outcrop slopes. Phenocrysts of alkali feldspar, sparse biotite, and rare pyroxene in a trachytic groundmass of sanidine, ore and glass.

Trc Conglomerate
Tuffaceous, pebbly, light-gray to brownish gray, thin to medium bedded, well cemented; abundant rounded to subangular clasts of rhyolite, trachyte, andesite, quartz and alkali feldspar in a detrital rhyolite matrix; forms low, rounded outcrops and pebbly slopes.

Trr Rhyolite
Coarsely porphyritic, light gray and pinkish gray, distinctly flow-layered and locally somewhat vesicular; weathers reddish gray to maroon and reddish brown; forms rough slopes and bold irregular cliffs; in places associated with crudely layered to massive crystal tuff that is similar in composition. Phenocrysts, chiefly large crystals and crystal fragments of quartz, alkali feldspar, and biotite, set in a flow-layered to brecciated aphanitic matrix; locally abundant small miarolitic aggregates of quartz and alkali feldspar.

Trv Vitric-Crystal Tuff
Fine-grained, light-gray and pinkish gray to white, loose to well consolidated but not welded, thin to very thick bedded; commonly traversed by sub-parallel cross-fractures; interlayered with tuff breccia; weathers dull gray to tan; forms smooth slopes and few prominent outcrops. Crystals and crystal fragment of sanidine, quartz, biotite and glass in a devitrified matrix; rare small fragments of rhyolite and trachyte; scattered cavities lined with euhedral crystals of quartz and alkali feldspar.

Trb Tuff Breccia
Fine to coarse grained, light gray and buff to purplish rown, moderately compact to densely welded, medium to thick bedded; weathers tan to reddish brown; forms rubbly knobs and slopes, ledgy slopes and bold, vertically jointed cliffs. Crystals and crystal fragments of quartz, sanidine and biotite in a finely layered and deformed matrix of devitrified glass; flattened clasts of pumice in some beds, small to very large clasts of rhyolite in others; abundant blocks of andesite in vent accumulations; some beds with numerous small cavities filled by intergrown quartz and alkali feldspar.

Ta Lower Andesite Sequence
Thin to thick flows, generally with basal aggomerate; sheets and lenses of tuff, tuff breccia, and conglomerate.

Tax Vent complexes of breccia, tuff breccia and tuff.

Tai Dikes, sills and small plugs.

Pyroxene Andesite
Fine-grained to aphanitic, medium bluish gray to dark bluish or greenish gray, dense and uniform to finely porphyritic, in part amygdaloidal; weathers dull gray, brownish gray, maroon and reddish brown; forms smooth to rubbly slopes, irregular ledges, and prominent dark cliffs and buttresses. Typically a felted aggregate of plagioclase laths with interstitial pyroxene, ores and rare biotite, with or withour larger subhedral to euhedral crystals of plagioclase and pyroxene; amygdaloidal fillings of calcite, silica, epidote, zeolites and chlorite.

Tuff and Tuff Breccia
Fine to coarse grained, reddish yellow to dark reddish brown, thin to medium bedded, moderately compact but not welded; forms smooth to rubbly slopes and scattered low ledges.

Vent Breccia
Coarse and rubbly, greenish gray to reddish brown closely packed blocks of andesite in a matrix of highly altered pyroclastic material; forms rubbly slopes and no projecting outcrops.

Conglomerate
Tuffaceous, pebbly to blocky, gray and buff to light reddish brown, thick to medium bedded; abundant angular to sub-rounded clasts of andesite in a detrital andesite matrix; forms low ledges and rubbly slopes.

Dacite-Rhyolite Sequence
Sheets and local vent accumulations of tuff and tuff breccia.

Tdl Lavender Member
Vitric-crystal tuff and tuff breccia, medium to coarse grainned, light gray and lavender to pinkish gray and buff; medium to very thick bedded; locally welded and dense, especially in lower part; weathers yellowish to purplish brown; forms low to high cliffs and buttresses. Crystals of quartz, sanidine, plagioclase, and biotite in a partly compacted matrix of devitrified glass and fragments of pumice.

Tdw White Member
Vitric-lithic-crystal tuff, fine grained, light gray to white, thin to medium bedded, soft and porous; irregularly platy near base; coarsens near top; weathers dull-gray and forms few outcrops. Fragments of plagioclase, biotite, sparse quartz and sanidine, and pumice, dacite, and latite in a matrix of devitrified glass.

Tdr Red Member
Vitric-crystal tuff and tuff breccia, fine to medium grained, brick-red to brownish red, porous to compact; moderately to densely welded in some areas; forms rubbly slopes and low cliffs. Distinctive flattened fragments of pumice, commonly an inch of more long, with fragments of plagioclase, sparse biotite and sanidine, and rare quartz in a compacted groundmass of devitirified glass dusted with hematite.

Tdt Tan Member
Vitric-lithic-crystal tuff, fine to medium grained, white and pinkish-gray to tan and light reddish brown, thin to medium bedded; generally porous and punky, but in places densely welded; weathers medium brown and forms local rounded outcrops. Fragments of plagioclase, biotite, pumice, welded tuff, and dacite in a devitrified glassy matrix. **Tdtb Tuff Breccia** representing local vent accumulations.

Tdv Variegated Member
Vitric-lithic-crystal tuff, fine-grained, yellowish and pinkish gray to brown and brownish red, thin to medium bedded; generally porous and punky, but in places welded or well cememnted; forms local ledges and rounded outcrops. Fragments of plagioclase, biotite, pumice, welded tuff, dacite, and latite in devitrified glassy matrix.

Tdb Basal Welded Member
Tuff breccia, fine to coarse grained, pale lavender and pinkish gray to purplish and reddish brown, thin to very thick bedded; in general densely welded, but locally less welded or compacted near top; uppermost part locally rich in small geodes; weathers buff to purplish and dark reddish brown; forms numerous ledges, knobs and bold, irregular cliffs. Groundmass of devitrified glass crowded with fragments of latite, andesite, and latitic tuff; abundant flattened clasts of devitrified pumice; rare fragments of plagioclase, quartz and bitote.

Tl Latite
Dikes and small sills.

Tm Monzonite Porphyry (48.8 my; Chapin, personal communication)
Dikes, sills, small stocks and laccoliths.

Tlm Leucomonzonite
Small stocks and sills.

Tla Latite-Andesite Sequence Undifferentiated
Sheets and lenses of tuff and tuff breccia, thin to moderately thick flows; local vent complexes of tuff, tuff breccia, and flow rocks; lacustrine accumulations of volcaniclastic sediment; dikes and small plugs.

Latite and Trachyandesite
Porphyritic aphanitic and aphanitic, greenish gray to maroon and dark purplish gray, propylitically altered; typically in moderately thick to thick flow units; forms bouldery outcrops and bold cliffs. Phenocrysts mainly albitized plagioclase and hornblende altered to epidote and chlorite; rare biotite and pyroxene; quartz and alkali felspar restricted to groundmass.

Tuff Breccia
Medium to extremely coarse grained, dull lavender and greenish gray to purplish gray and dark maroon, massive and dense, propylitically altered; forms rounded hills with rubbly to bouldery slopes. Fine-grained groundmass of altered pyroclastic materials typically crowded with sub-andgular to rounded fragments of latite and trachyandesite; clasts of Permian sedimentary rocks locally abundant near base of sequence

Tuff
Fine grained and crystal poor, greenish and pinkish gray to purplish brown, thin to thick bedded, in general altered; compact but apparently not welded; typically intertongued with tuff breccia; forms few extensive outcrops.

Water Laid Tuff
Tuffaceous mudstone, siltstone and sandstone, greenish gray and olive drab to medium brown, thin bedded, locally fossiliferous; represents lacustrine deposition of reworked volcanic debris, possibly with addition of air fall tuff; forms few extensive outcrops.

Unconfomity

MESOZOIC

Kd Dakota Formation equivalent (?) (Upper Cretaceous)
Interbedded orthoquartzite, shale, limestone, and locally abundant conglomerate with siliceous or calcareous cement and closely packed pebbles of chert, jasper, quartz, limestone, and sandstone (probably all or in part equivalent to Dakota Formation); locally underlain by brown calcareous shale, bluish gray limestone, and gray silty sandstone; overlain by reddish-brown shale.

Unconfomity

PALEOZOIC

Manzano Group (Permian)

Psa San Andres Formation
Limestone, fine-grained, medium to dark gray, thin to medium bedded, fossiliferous, generally fetid when struck; subordinate interbeds of silty limestone, yellowish to reddish siltstone, and reddish fine-grained sanstone; forms many ledgy outcrops.

Py Yeso Formation
Sandstone and siltstone, varigated in shades of yellowish, greenish and reddish to reddish brown, thin to medium bedded; abundant medium to dark gray, medium to thick bedded limestone in middle and upper parts; rare thin beds of gypsiferous siltstone; thickest limestone beds commonly form low, rib-like cliffs.

Pa Abo Formation
Siltstone, mudstone and sandstone, red, maroon, and yellowish to reddish brown, thin to medium bedded, generally calcareous; thin beds and lenses of greenish gray limestone and reddish brown limestone-pebble conglomerate near base; lowermost part fossiliferous and may be equivalent to Bursum Formation.

Unconfomity (?)

Magdalena Group (Pennsylvanian)

IPt Transition Beds
Siltstone, mudstone, and sandstone, greenish to pinkish gray and yellowish to reddish brown or maroon, generally calcareous; numerous thin interbeds of fossiliferous gray to pinkish or greenish nodular silty limestone; thin to thick bedded, fine to medium grained gray limestone abundant in upper and middle parts; many thin to thick beds and lenses of conglomerate with silty to sandy fossiliferous matrix and abundant pebbles of limestone, siltstone and chert; uppermost part may be equivalent to Bursum Formation.

IPm Madera Formation
Limestone, fine to medium grained, light to medium gray, thin to very thick bedded, commonly cherty, locallly nodular, sparsely to abundantly fossiliferous; numerous shaly partings and rare layers of calcareous siltstone; thin to thick beds of vitreous orthoquartzite near base; thickest limestone beds form prominent gray cliffs, weathering brownish where chert is abundant.

IPs Sandia Formation
Siltstone and silty sandstone, greenish gray to reddish brown, calcareous, slabby and platy to papery where weathered, interbedded with limestone, fine grained, light to medium gray, medium to thick bedded, commonly cherty; some medium to thick bedded, light gray to brownish orthoquartzite in middle and upper parts; pebble to large-block conglomerate and breccia, with fragments of chert and coarse grained limestone at base; forms some ledgy outcrops.

Mk Kelly Limestone (Mississippian)
Limestone and coquina, medium to very coarse grained, light bluish gray to very light gray, thick bedded to massive, locally rich in light colored chert; forms broad "whaleback" outcrops and rounded cliffs.

Lake Valley Formation (Mississippian)

Mltn:

Mlt Tierra Blanca Member
Limestone medium to coarse grained, light to medium bluish gray, platy to thick bedded, locally fossiliferous, with sparse to abundant lenses of pinkish to light gray; some beds of coquina near top; scattered silty partings; forms some ledgy outcrops.

Mln Nunn Member
Limestone, marl and coquina, fine to medium grained, pinkish and yellowish to light gray, very thin bedded to platy, richly fossiliferous; sparse pods of gray chert near base, and locally abundant thin layers of pinkish to light gray chert in upper part; rarely well exposed.

Mlaa:

Mla Alamogordo Member
Limestone, fine to medium grained, medium to dark gray, medium to thick bedded, locally fossiliferous; layers and bulbous lenses of chert with distinctive light and dark gray concentric layering; forms rib-like ocutcrops and locally prominent cliffs.

Mlaa Andrecito Member
Limestone and marl, fine to medium grained, light to medium bluish gray, very thin to medium bedded and locally nodular, richly fossiliferous; includes numerous silty partings and thick layers of delicately bedded calcareous silt; rarely well exposed.

Unconfomity

Dp Percha Shale (Devonian)
Siltstone, medium to dark gray, homogeneous, in part calcareous; thin layer of phosphatic nodules at base; much fractured and discolored with iron oxides; weathers to thin greenish gray chips and forms few extensive outcrops.

Unconfomity

Included in Dp where not shown

Do Oñate Formation (Devonian)
Siltstone, medium to dark gray, calcareous, interbedded with medium gray, silty, nodular to flaggy dolomite and limestone; weathers to greenish gray chips and yellowish to light brownish gray plates and disks.

Unconfomity

Not shown; included in Omc

Fusselman Dolomite (Silurian)
Dolomite, fine to medium grained, medium to thickly bedded, locally cherty; forms ledges and low cliffs.

Unconfomity

Montoya Dolomite (Ordovician)

Omc Cutter Member
Dolomite, finely crystalline to sublithographic, very light gray to greenish gray, thin to moderately thick bedded and locally irregularly bedded, in part cherty; scattered silty layers and partings; generally weathers to smooth, light colored surfaces, but forms brownish crusty surfaces where cherty.

Oma Aleman Member
Dolomite and limestone, fine-grained, light to medium gray, thin to moderately thick bedded, with many undulatory silty partings; abundant banded gray chert in sub-paralled thin layers and thicker globular lenses; forms bold outcrops and low cliffs with ribbed faces.

Omu Upham Dolomite
Dolomite and limestone, fine to moderately coarse grained, very light to medium gray and bluish gray, medium to very thick bedded; banded chert: sparse to moderately abundant in upper part; sandy dolomite in lowest part; locally forms rounded cliffs with surfaces that are rough in detail.

Omcc Cable Canyon Sandstone
Orthoquartzite, vitreous, fine to coarse grained and pebbly, and sandstone with siliceous or calcareous cement and numerous granules of quartz, chert, dolomite; light gray to yellowish and brownish bray; hard and resistant but forms low, blocky outcrops rather than conspicuous cliffs.

Unconfomity

Oe El Paso Limestone (Ordovician)

Bat Cave Member
Limestone and dolomite, fine-grained, light to medium gray and pinkish gray, thin to medium bedded and in part irregularly bedded, locally cherty; sandy and silty partings in upper part; locally stromatolitic, detrital, and irregularly bedded; thickest beds form low, rib-like cliffs.

Sierrito Limestone
Limestone and dolomite, fine to very fine grained, light to medium gray, thin to medium bedded with abundant closely spaced, crenulated laminations of light gray chert; glauconitic and locally silty near base; forms some low cliffs with gray to light brownish faces that appear banded.

Ꞓb Bliss Sandstone (Cambrian and Ordovician)
Upper part interbedded greenish gray to dark reddish brown sandstone, siltstone, and silty limestone and dolomite and dolomite, with many glauconite-rich layers; lower part interbedded light gray vitreous orthoquartzite, greenish gray to dark brownish gray felspathic sandstone and silty sanstone, and medium to dark reddish brown sandstone with layers of oolitic hematite; thick beds of orthoquartzite with thin lenses of quartz pebble conglomerate at base; upper part of section forms dark colored slopes with some ledges, lower part light to dark colored cliffs.

Unconfomity

PRECAMBRIAN

Metamorphosed Volcanic Rocks

pꞒm Metarhyolite
Finely crystalline, in gerneral porphyritic with sparse to abundant small phenocrysts of quartz and alkali felsdpar, pinkish to creamy-gray with inconspicuous greenish-gray speckling; distinctly layered to essentially massive; forms bold cliffs and extensive rubbly outcrops.

pCa Amphibolite
Medium - to coarse-grained, distinctly foliated, medium to dark greenish gray; numerous epidote-rich layers and small amygdaloidal pods; local lenses and layers of breccia (agglomerate?); small masses of metadiabase; in places cut by dense dark-greenish gray metadiabase, forms dark colored slopes.

pCu Undifferentiated (Geologic Cross Sections)

Contacts

Well-Located
Approximately Located or Inferred
Concealed
Gradational
Inter-unit Bedding Form Lines
Interfingered

Faults

Well-Located with Dip of Fault Plane
U = Upthrown Side
D = Downthrown Side
Inferred
Concealed

Folds

Anticline
Syncline (Overturned)
Syncline

Symbols

Strike and Dip of Bedding
Vertical Bedding
Horizontal Bedding
Overturned Bedding
Strike and Dip of Foliation
Vertical Foliation
Horizontal Foliation
Bearing and Plunge of Lineation
Direction of Landslide Movement
Landslide Scarp
Radiometrically Dated Sample Location
Cross-Section Line
Jog in Section
Jasperoid replacement; mainly of carbonate units
Generalized dip of bedding or foliation projected on section

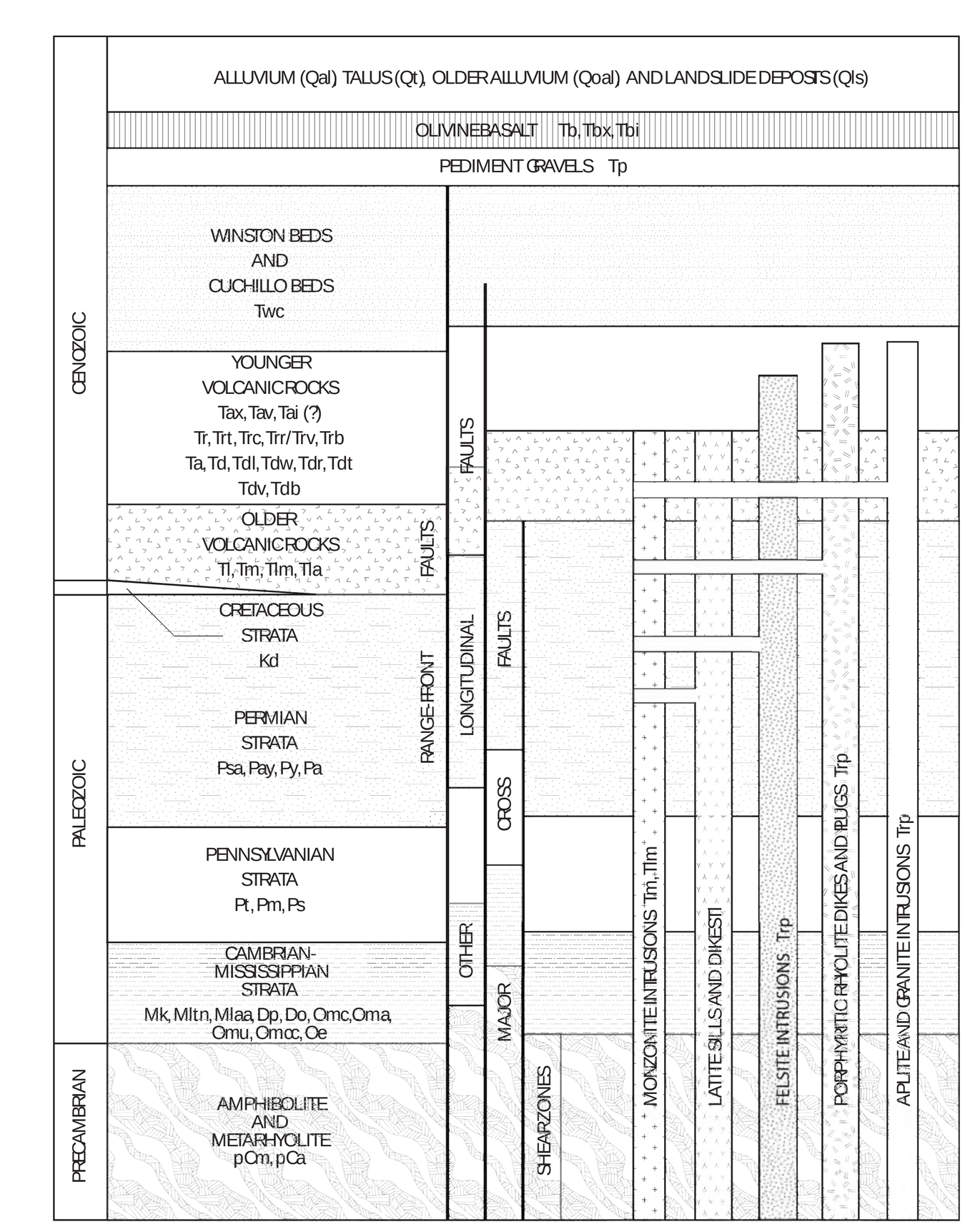

Diagram illustrating age and field relationships of principal faults and intrusive masses with respect to the stratigraphic section in the Sierra Cuchillo and flanking areas. Vertical proportions reflect differences in thicknesses of most stratigraphic units but are not to scale (Jahns, et al., 1978, Figure 2).

NOTE

The geology as shown in the map and cross sections and data from this explanation are preliminary and subject to revision. The map compilation has been checked and does not reflect natural or cultural changes in the area since 1979.

Maximum estimated thicknesses of Cenozoic volcanic units west and east of the Sierra Cuchillo

Unit		West Side Chise	East Side HOK	East Side Willow Springs
Olivine Basalt Sequence	Tb	100	NP	NP
Upper Andesite Sequence	Tax	300	NP	NP
Rhyolite-Trachyte Sequence	Tr	700	100	1350+
Lower Andesite Sequence	Ta	550	350	250
Dacite-Rhyolite Sequence		(400)	(830)	(630+)
Lavender Member	Tdl	100	200	200
White Member	Tdw	100	50	NP
Red Member	Tdr	NE	30	30
Tan Member	Tdt	NE	30	30
Variegated Member	Tdv	NE	100	NP
Basal Welded Member	Tdb	200	400+	400+
Latite-Andesite Sequence	Tla	800+	800+	800+

* Thicknesses of units that are incompletely exposed or are in part faulted out are indicated with plus marks; total thicknesses of formations for which thicknesses of individual members are also listed are enclosed by parentheses.
NE: Unit not exposed in area

Maximum Observed Thicknesses of Pre-Cenozoic Sedimentary Units in Southern, Central, and Northern Parts of the Sierra Cuchillo (Jahns, and others, 1978)

[illegible]

REFERENCES

[illegible]