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

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Mapped, edited, and published by the Geological Survey

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Topography by photogrammetric methods from aerial photographs taken 1961. Field checked 1962. Revised from aerial photographs taken 1981. Field checked 1983. Map edited 1986

Projection: New Mexico coordinate system, east zone (transverse Mercator)
10,000-foot grid ticks based on New Mexico coordinate system, east zone and Colorado coordinate system, south zone
1000-meter Universal Transverse Mercator grid, zone 13
1927 North American Datum
To place on the predicted North American Datum 1983 move the projection lines 1 meter north and 48 meters east as shown by dashed corner ticks

Fine red dashed lines indicate selected fence lines

UTM GRID AND 1986 MAGNETIC NORTH DECLINATION AT CENTER OF MAP
DIAGRAM IS APPROXIMATE

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

QUADRANGLE LOCATION

ROAD CLASSIFICATION
Primary highway, hard surface
Light-duty road, hard or improved surface
Secondary highway, hard surface
Unimproved road

VERMEJO PARK, N. MEX.—COLO.
NE/4 ASH MOUNTAIN 15' QUADRANGLE
36105-H1-TF-024

1986

DMA 4957 I NE–SERIES V881

DESCRIPTION OF MAP UNITS

Qal **Alluvium (Holocene)**--Unconsolidated silt, sand, and gravel deposits in and adjacent to modern stream channels. Yellowish-gray, silty to gravelly, stratified, stream deposits in lowest parts of valleys.

Qfa **Fan alluvium (Holocene and upper Pleistocene)**--Fan-like accumulations of poorly sorted gravelly alluvium at mouths of gullies draining mountainous areas. Material composed chiefly of sandstone and shale mixed with rhyolite of Ash Mountain. Generally about 10ft (3 m) thick

Qaf **Alluvium and fan deposits (Holocene and upper Pleistocene)**--Locally includes debris-flow, talus, and slopewash deposits.

Qls **Landslide deposits (Holocene and upper Pleistocene)**-- Large slump and earthflow deposits; angular blocks of sandstone mixed with soil and debris of overlying rocks in a fine-grained matrix. Surface of landslides hummocky and littered with large blocks. Large landslide on north side of Vermejo Park consists of a large toreva block that rotated and slid down slope.

Qta **Terrace alluvium (Pleistocene)**--Terrace deposits along the Vermejo River: Yellowish-gray to grayish-orange stratified gravel composed chiefly of subangular to rounded pebbles, cobbles, and boulders of rhyolite from Ash Mountain mixed with local sandstone, and a wide variety of igneous and metamorphic rocks derived from the mountains to the west. Deposited in undifferentiated terraces along the Vermejo River 20 to 80 ft above river level

Qba **Barela Alluvium (lower middle Pleistocene)**--Yellowish-gray to grayish-orange stratified gravel composed chiefly of subangular to rounded pebbles, cobbles, and boulders of locally derived sandstone mixed with other older rock types. The Barela Alluvium locally found on two pediment levels; alluvium of each level 5-10 ft (1.5-3 m) thick. Alluvium lies on youngest of three pediments described by Pillmore and Scott (1976). Barela Alluvium is equivalent to Slocum Alluvium of Colorado Front Range (Pillmore and Scott, 1976; Scott, 1984, and Levings, 1951) and probably was deposited during interglacial time, about 120,000-130,000 yr ago.

Qbe **Beshoar Alluvium (lower middle Pleistocene)**--Grayish-orange and yellowish-gray, stratified, sandy gravel. Most clasts are locally derived sandstone mixed with rhyolite from Ash Mountain, quartzitic sandstone, and some older igneous and metamorphic rocks. Unit includes many boulders larger than 2 ft (0.5 m) in diameter. Alluvium is 10-15 ft (3-5 m) thick and locally forms two pediment levels that are mapped separately. The Beshoar Alluvium is equivalent to Verdos Alluvium of the Colorado Front Range (Pillmore and Scott, 1976; Scott, 1984, and Levings,1951) and probably was deposited during an interglacial time, starting about 600,000 yr ago and ending thousands of years later

Qbeh **Older (higher)** pediment; about 110-130 ft (33-39 m) above major streams

Qsm **San Miguel Creek alluvium (lower Pleistocene and Pliocene)**--Composed nearly entirely of monolithologic highly resistant gravels that cap pediment surfaces about 250-300 ft (75-90m) above modern streams. The gravel, termed the State Line Pediment (Pillmore, C.L., and Scott, G.R., 1976) comprises distinctive clasts of bluish-gray weathering andesite with phenocrysts of hornblende that overlie rounded to subrounded clasts of various Pre-Cambrian lithologies at the base of the deposit.

IGNEOUS ROCKS

Tla **Dikes and sills** of basic to intermediate composition (Tertiary). Includes lamprophyric rocks. Sills of fine to very fine grained greenish-gray andesite; distributed widely in the subsurface; intruded into coal beds, either completely destroying the beds or altering and coking the coal.

SEDIMENTARY ROCK FORMATIONS

Tpc **Poison Canyon Formation (Paleocene)**--Sandstone with interbeds of sand claystone; caps flat-topped ridges. Sandstone is conglomeratic in upper part, containing pebbles of quartzite, chert, gneiss, feldspar, and quartz; medium grained to granule in lower part; light gray to yellowish gray, weathering grayish orange, dusky yellow, and grayish yellow with stains of red, pink, and brown; arkosic; numerous plant impressions in lower part; massive, forms prominent ledges. Sandy claystone is medium gray to grayish yellow, weathering to grayish-orange or dark-yellowish-orange soil; micaceous; sand grains mostly medium to coarse; forms slopes between and intertongues with sandstone beds. Contact with underlying Raton Formation is generally indefinite and gradational through a transition zone as thick as 100 ft that consists of very fine to medium grained sandstone with seams and stringers of arkosic granules; sandstone generally in discontinuous beds that intertongue and are interbedded with poorly bedded dusky-yellow-weathering micaceous sandy claystone and mudstone; transition zone also contains thin discontinuous carbonaceous seams and zones and numerous plant impressions. Where lithologies are not significantly different, the contact is mapped above the highest coal or carbonaceous zone and beneath the lowest persistent bed of arkosic granule sandstone. In the adjoining area to the north, Wood and others (1957) included some of the upper coal beds in the Poison Canyon Formation and s howed the contact about 75-100 ft lower than shown on this map. In the western part of the quadrangle, rocks of the Raton Formation intertongue regionally with coarser grained rocks of Poison Canyon lithology.

TKpr **Poison Canyon and Raton Formations, undivided (Paleocene and Upper Cretaceous)**--

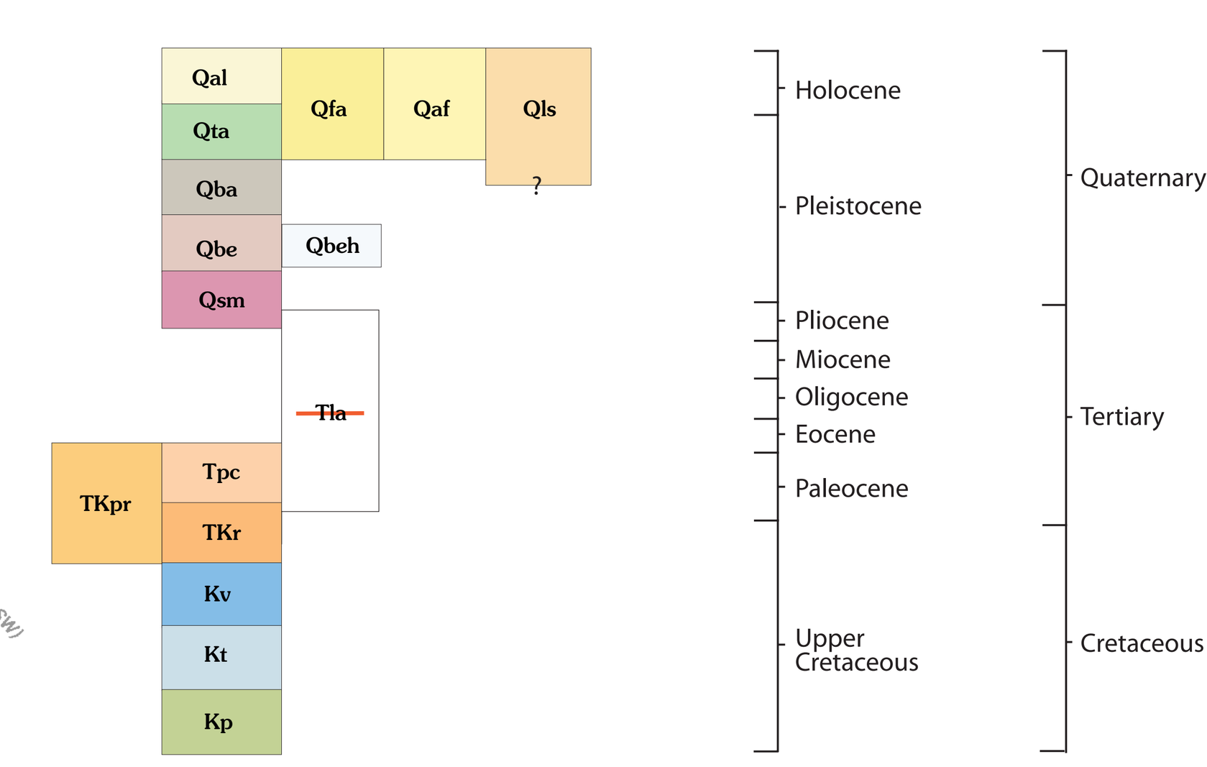
TKr **Raton Formation (Paleocene and Upper Cretaceous)**--Sandstone, interbeded with siltstone, claystone and mudstone, and beds of carbonaceous shale and coal; exposures generally poor to fair, individual beds difficult to trace; upper part of Raton Formation intertongues with the Poison Canyon Formation to the west. Sandstone is very fine to medium grained, light gray to yellowish gray, weathering grayish yellow to grayish orange; locally calcareous and carbonaceous; contains numerous plant impressions; some cross-bedding; generally forms ledges. Siltstone is light gray to medium gray; cross laminated; contains streaks of carbonaceous shale, coaly material, and plant fossils. Claystone and mudstone are medium gray to brownish gray; silty and sandy; contain scattered plant impressions and carbonaceous plant fragments; structureless. Carbonaceous shale is mostly associated with coal or occurs as discontinuous seams and lenses in other clastic rocks; contains abundant plant fossils. Contains numerous coal beds in the upper part; coal beds are single beds or composite zones comprised of coal and partings of carbonaceous shale, claystone, and bony or impure coal. Lower part of formation is mostly fine- to medium-grained sandstone which coarsens downward to conglomeratic sandstone in lower 30-50 ft (10-15 m), consisting of pebbles and cobbles of quartz, chert, quartzite, and feldspar with smaller fragments of siltstone and some coal; forms a rugged nearly vertical cliff at Vermejo Park and along the basin margin in the northwest corner of the map

Kv **Vermejo Formation (Upper Cretaceous)**--Sandstone, siltstone, silty carbonaceous shale, and coal; generally poorly exposed on tree-covered slopes beneath cliffs of the Raton conglomerate; contains numerous thick coal beds and abundant plant fossils. Sandstone is very fine to medium grained, with some coarse grains, mostly quartz, chert, and feldspar; light gray to light medium gray, weathering light gray to yellowish gray and dark yellowish brown; irregularly calcareous; locally carbonaceous; massive to thin bedded; bedding locally highly contorted, containing incorporated angular fragments of siltstone and mudstone; interbeds of siltstone, carbonaceous shale and siltstone, and impure coal that are mostly non-resistant; sandstone locally forms discontinuous ledges. Siltstone is medium to dark gray; bedding highly contorted; laminae and seams of carbonaceous material. Thin lenticular beds of silty carbonaceous shale, fossiliferous; may grade laterally into coal. Coal commonly appears dirty, granular, and nonbanded in outcrop. Prominent coal beds are the Raton coal bed that occurs near the base of the formation generally on or just above the Trinidad Sandstone and the Vermejo coal bed that occurs near the top of the formation.

Kt **Trinidad Sandstone (Upper Cretaceous)**--Sandstone; forms a prominent persistent cliff at the base of the Vermejo Formation around the flanks of Vermejo Park and along the basin margin in the northwest corner of the map ;fine to fine grained; light gray to yellowish gray, weathering light gray to dusky yellow with stains of grayish orange and brown; mostly quartz grains with some chert and magnetite; calcareous; thick bedded and massive in the upper and middle parts, thin bedded in the lower part. Contains sparse thin seams of carbonaceous siltstone, faint crossbeds; brown-weathering nodular silty calcite and limonite concretions common; top locally stained medium gray to grayish-brown; top few feet thin bedded; abundant Ophiomorpha especially in roadcuts at west exit from Vermejo Park and at east exit, upper few feet of formation characterized by abundant Diplocraterion (Pillmore, C.L. and Maberry, J.O., 1976). Thickness of unit 80-100 ft (25-33 m)

Kp **Pierre Shale (Upper Cretaceous)**--Shale, exposures usually fair to poor, susceptible to landslides on steep slopes; slightly silty to very silty; medium dark gray to brownish gray, weathering medium gray to medium light gray; calcareous, layers and beds of limy siltstone common; contains yellowish-gray oblate mostly barren septarian concretions as large as 3 ft in diameter; contains some yellowish- to reddish-brown siderite concretions; becomes progressively sandier toward the top, grades upward into Trinidad Sandstone through a transition zone about 20-50 ft thick; sandstone layers contain Ophiomorpha; other fossils collected at Vermejo Park include Placenticeras sp., Ostrea sp., Inoceramus sp., Acmaea occidentalis (Meek and Hayden), Hoploscaphites sp., Cryptorhytis flexicostata (Meek and Hayden), Inoceramus vanuxemi Meek and Hayden, and Lucina sp. (W.A. Cobban, written commun., 1967) Thickness measured in the subsurface about 3000 ft (915 M)

CORRELATION OF MAP UNITS



EXPLANATION

Contact -- Approximately located; dotted where concealed beneath landslides

Fault -- Approximately located; dotted where concealed

Coal Bed -- Approximately located; dashed where inferred

Structure contours -- Drawn on top of Trinidad Sandstone

Transition zone -- Zone of intertonguing of Poison Canyon and Raton Formations (diagrammatic)--undivided to the west; divided to the east of the zone.

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GEOLOGIC MAP OF VERMEJO PARK QUADRANGLE, COLFAX COUNTY, NEW MEXICO, AND LAS ANIMAS COUNTY, COLORADO

By

Charles L. Pillmore

2003