

INTRODUCTION

Surficial geology conceals the origin, distribution, and significance of deposits and soils at or near the earth's surface. Completely bare bedrock forms probably less than 5 percent of New Mexico's land surface; consequently surficial materials form by far the largest and most-used part of the ground around us. Several aspects of surficial geology that contribute significantly to an understanding of our environment are water-yielding properties of the ground; its susceptibility to flooding and erosion; its susceptibility to such hazards as landslides, avalanches, and earthquakes; ease of excavation; suitability for foundations and road building; agricultural potential, including suitability for irrigation or pasturage; and mineral resources potential.

Surficial materials commonly are poorly consolidated, consisting partly of bedrock weathered in situ (residuum), but mostly of sediments derived by erosion and transported by water, wind, ice, or gravity (not wasting) to a site of temporary deposition before being further eroded and transported downslope.

Four major categories of surficial materials are distinguished on the map by color: residual materials, transitional deposits, transported deposits, and miscellaneous types of ground.

RESIDUAL MATERIALS

Materials generally formed in place, including: residuum, formed in situ by weathering of a parent formation; caliche; travertine and related spring deposits; shallow sandstone baked by coal beds burning in situ (clinker); karst and related deposits in sinks; and the following, which are not distinguished on the map: organic deposits; desert pavement; cave deposits; and desert varnish.

RESIDUUM

In New Mexico, residuum tends to be thin, generally less than 2 ft thick -- rarely as much as 5 ft. Texture depends upon composition of parent rock, and ranges from clay to coarse sand; texture may be bouldery in granitic areas. Areas shown as residuum include small outcrops of parent rocks and some alluvial or eolian deposits either mistaken for residuum or too small to show on the map. These materials are predominantly of late Pleistocene (Wisconsinan) or Holocene age. Ground is hummocky with slopes less than 10 percent; scattered small outcrops of resistant beds form small ledges.

rl LOAMY RESIDUUM -- Texture variable -- mixed clay, silt, and sand. Thickness 1 to 5 ft. Parent formations fine grained, shallow, and identified by subscripts. Where clayey, this residuum generally contains appreciable amounts of swelling clay and is highly susceptible to sodium exchange, especially over the Chinle Formation (subscript Tc), Cretaceous shale (subscript Ksh), and Tertiary clayey volcanic formations. Slopes locally 10 percent and subject to washing. Although the unit is distinctive, the indicated boundaries are approximate.

rg STONY RESIDUUM -- Stony residuum, with accompanying sand and silt. Thickness mostly less than 3 ft. Texture variable depending on parent material, indicated by subscript. Boundaries gradational with cl and lg.

l/b STONY LOAM OVER BASALT -- Lithology highly variable; locally abundant clay and silt, probably loesslike; stones basaltic, mostly rough scoriae or angular blocks and flakes. Includes alluvium along small washes; numerous basalt mounds and low scarps along some washes and at edges of flows; thickness generally less than 3 ft. Surface smooth; slopes usually less than 5 percent except at sides of washes, bases of volcanic cones (including spatter cones), and edges of flows. Not subject to severe erosion. Boundaries indicated are fairly well defined despite variable lithology; boundaries with alluvium are approximate.

rs SANDY OR SANDY LOAM RESIDUUM -- The shallow sandy or sandy silt substrates are distinguished by subscripts (e.g., rskd, sandy residuum over Dakota Sandstone). Thickness commonly 1 ft. Subject to wind erosion where vegetation is sparse; minimal washing. A distinctive unit with adequate boundaries, except in the San Juan Basin and along the Canadian River.

l/gyp GYPSIFEROUS AND SANDY RESIDUUM ALONG PECOS RIVER VALLEY -- Parent material Artesia (Pa) and related formations. Rarely over 2 ft thick. Numerous small outcrops of gypsum thinly mantled by loose sand with or without small pebbles. A distinctive unit; boundaries are approximate.

rlt RESIDUUM ON LIMESTONE -- Widespread on east slope of Sacramento Mountains, Chupadera Mesa, and flanks of Zuni Mountains; less extensive on Cretaceous limestone beds south of Raton. Stony and blocky, generally well cemented with calcium carbonate, little subject to erosion. Slopes average steeper than most residuum. Thickness generally less than 2 ft, rarely as much as 5 ft. A distinctive unit; boundaries indicated are adequate.

CALICHE

cb CALICHE -- Partly indurated zone of calcium carbonate accumulation formed in upper layers of surficial deposits, 2 to 10 ft thick; commonly overlain by windblown sand. Much caliche shown on the map consists of rough, stobby surface layers underlain by calcium carbonate nodules that grade downward to fibers and veins. Especially well developed in Basin and Range and Great Plains parts of the state. Thick caliches (locally >20 ft) associated with undissected High Plains surfaces of the Great Plains commonly comprise an upper sequence of several carbonate-cemented zones intercalated with reddish loamy paleosol horizons over a basal caprock zone developed on Ogallala (Tn) sediments. Forms on various types of parent formations, indicated by subscripts. The extensive caliche along Rio Salado northwest of Socorro is partly a travertine deposit. Where buried by sand, the caliche is identified by subscript (e.g., A distinctive unit; boundaries are well defined where the caliche forms a block and approximate where exposed in deflation hollows. Where thick and well indurated, caliche is quarried for road metal and other aggregate, subject to minimal erosion.

SPRING DEPOSITS

sp TRAVERTINE AND RELATED DEPOSITS -- Most deposits shown have been formed at springs discharging water hotter than 100°F (34°C). Travertine mounds and benches to 50 ft high. Deposits at east base of Mesa Lucero may not have been created by hot springs.

CLINKER

cl SLAGGY COAL ASH AND VERIFIED SHALE AND SANDSTONE MASSES CAUSED BY BURNING COAL BEDS -- Incompletely shown -- coal may ignite spontaneously, by lightning or ground fire. Depending on oxygen availability, the coal may burn tens of feet back into the ground. Common in coal-bearing formations of San Juan Basin and Raton district. Used for road metal.

KARST DEPRESSION DEPOSITS

ka KARST-RELATED DEPOSITS -- Underground solution of limestone and gypsum produces caverns or smaller subsurface voids, and causes roof-rock collapse, forming closed karst depressions (sinkholes) at the surface, mantled with blocks of the roof rock. Widespread in San Andres Formation (subscript Pa) north of the Sacramento Mountains and on Chupadera Mesa. Sinks commonly 50 ft deep and 500 to 1,000 ft wide. Similar deposits composed of slumped gravel and alluvium along the Pecos River valley are attributed to solution of underlying gypsum or other salts. Slumped beds dip 1 to 5 degrees into the depression; may be overlain by undisturbed gravels. Thickness to 300 ft. Although these are distinctive features, extent and boundaries, largely derived from the 1/250,000 quadrangle maps, are approximate.