

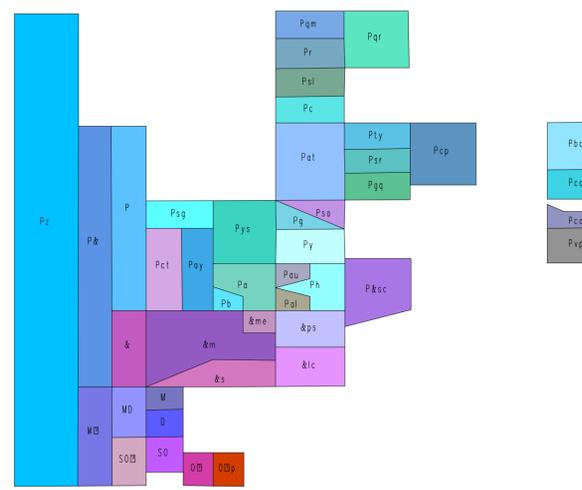
- QUATERNARY**
- ds - disturbed ground
 - Qa - Alluvium; upper and middle Quaternary
 - Ql - Landslide deposits and colluvium
 - Qe - Eolian deposits
 - Qc - Cypsiliferous eolian deposits
 - Qd - Glacial deposits; till and outwash; upper and middle Pleistocene
 - Qpl - Lacustrine and playa-lake deposits; includes associated alluvial and eolian deposits of major lake basins; upper Quaternary
 - Qp - Piedmont alluvial deposits; upper and middle Quaternary; includes deposits of higher gradient tributaries bordering major stream valleys, alluvial veneers of the piedmont slope, and alluvial fans
 - Qb - Basalt and andesite flows and locally vent deposits
 - Qr - Silicic volcanic rocks
 - Qv - Basaltic volcanics; tuff rings, cinders, and proximal lavas
 - Qbo - Basalt or basaltic andesite; middle and lower Pleistocene
 - Qvr - Valles Rhyolite; Jemez Mountains area only
 - Qbt - Bandelier Tuff; Jemez Mountains area only
 - Qaa - Older alluvial deposits of upland plains and piedmont areas, and caliche soils and eolian cover sediments of High Plains region; includes scattered lacustrine, playa, and alluvial deposits of the Tahoka, Double Tanks, Tule, Blanco, Blackwater Draw, and Galena Formations; the latter of which may be Pliocene at base; outcrops, however, are basically of Quaternary deposits; upper Quaternary to uppermost Pliocene(?)

- TERTIARY (continued)**
- Tnr - Silicic to intermediate volcanic rocks; mainly quartz latite and rhyolite Neogene; may locally include flows interbedded with Santa Fe Group
 - Tnv - Neogene volcanic rocks; primarily in Jemez Mountains
 - Tc - Chusko Sandstone; restricted to Chusko Mountains
 - Tv - Middle Tertiary volcanic rocks, undifferentiated
 - Ttf - Middle Tertiary felsic shallow-intrusive rocks; phonolites and trachytes of northeastern N.M.; includes the rhyolite of Ash Mountain
 - Tuv - Volcanic and some volcanoclastic rocks, undifferentiated; lower Miocene and Upper Oligocene (younger than 29 Ma)
 - Tlv - Lower Oligocene and Eocene volcanic rocks, undifferentiated; dominantly intermediate composition, with interbedded volcanoclastic rocks; (31-44 Ma)
 - Tuau - Lower Miocene and uppermost Oligocene basaltic andesites (22-26 Ma). Includes Bearwallow Mountain Andesite and basaltic andesite of Mangas Mountain
 - Tual - Upper Oligocene andesites and basaltic andesites (26-29 Ma); includes La Jara Peak Basaltic Andesite, Uvas Basalt, the basaltic andesite of Poverty Creek, and Squirrel Springs Andesite, the Razorback, Bear Springs Canyon, Salt Creek, Gila Flat, and Middle Mountain Formations, and the Alum Mountain Group; locally includes more silicic flows
 - Turp - Upper Oligocene rhyolitic pyroclastic rocks (ash-flow tuffs); includes Davis Canyon Tuff, South Crosby Peak Formation, La Jencia, Vick's Peak, Lemitar, South Canyon, Bloodgood Canyon, Shelley Peak Tuffs, Tuff of Horseshoe Canyon, Park Tuff, Rhyolite Canyon Tuff, Apache Springs Tuff, Diamond Creek, Jordan Canyon, Garcia Camp Tuffs, the Turkey Springs Tuff, the Tuff of Little Mineral Creek, the Amalia Tuff, and others. Some contain volcanoclastic and reworked volcanoclastic rocks, and eolian sandstone; (24-29 Ma)
 - Tlrv - Lower Oligocene silicic pyroclastic rocks (ash-flow tuffs); includes Hell's Mesa, Kneeling Nun, lower part of Bell Top Formation, Caballo Blanco, Datil Well, Leyba Well, Rock House Canyon, Blue Canyon, Sugarlump and Tadpole Ridge Tuffs, the tuffs of the Organ cauldron, Treasure Mountain Tuff (now known as Chiguito Peak Tuff), Bluff Creek Tuff, Oak Creek Tuff, tuff of Steins Mountain, tuff of Black Hill Canyon, tuff of Farr Ranch, Woodhull Canyon, Gillespie and Box Canyon Tuffs, Cooney Tuff, and other volcanic and interbedded fluvial and pumiceous units; (31-36.5 Ma)
 - Turf - Upper Oligocene silicic (or felsic) flows and masses and associated pyroclastic rocks; includes Taylor Creek, Tanney, and Rocky Canyon Rhyolites
 - Tlrf - Lower Oligocene silicic (or felsic) flows, domes, and associated pyroclastic rocks and intrusions; includes Mimbres Peak Formation
 - Ti - Tertiary intrusive rocks; undifferentiated
 - Tui - Miocene to Oligocene silicic to intermediate intrusive rocks; dikes, stocks, plugs, and diatremes
 - Tuim - Upper and Middle Tertiary mafic intrusive rocks
 - Tii - Quartz monzonites (Eocene) in the Silver City and Los Pinos Range, intermediate intrusives of the Cooke's Range (Oligocene), and other intermediate to felsic dikes and plugs of Oligocene and Eocene age
 - Tio - Lower Tertiary, (Lower Oligocene and Eocene) andesite and basaltic andesite flows, and associated volcanoclastic units. Includes Rubio Peak Formation, and andesite of Dry Legett Canyon
 - Tps - Paleogene sedimentary units; includes Baca, Goliseto, El Rito, Blanco Basin, Love Ranch, Lobo, Sanders Canyon, Skunk Ranch, Timberlake, and Cub Mountain Formations
 - Tsj - San Jose Formation; Eocene, San Juan Basin
 - Tn - Nacimiento Formation; Paleocene, San Juan Basin
 - Taa - Ojo Alamo Formation; Paleocene, San Juan Basin
 - Tpc - Poison Canyon Formation; Paleocene, Raton Basin

- TRIASSIC**
- * - Triassic rocks, undivided; continental red beds
 - *rp - Rock Point Formation of Chinle Group; Upper Triassic. May locally include Lukachukai Member of Wingate Sandstone
 - *c - Chinle Group; Upper Triassic; includes Moenkopi Formation (Middle Triassic) at base in many areas; in eastern part of state the following five formations are mapped:
 - *r - Redonda Formation
 - *b - Bull Canyon Formation; Norian
 - *t - Trujillo Formation; Norian
 - *g - Gorito Creek Formation; Carnian
 - *s - Santa Rosa Formation; Carnian; includes Moenkopi Formation (Middle Triassic) at base in most areas
 - *cu - Upper Chinle Group, Gorito Creek through Redonda Formations, undivided
 - *m - Moenkopi Formation; Middle Triassic

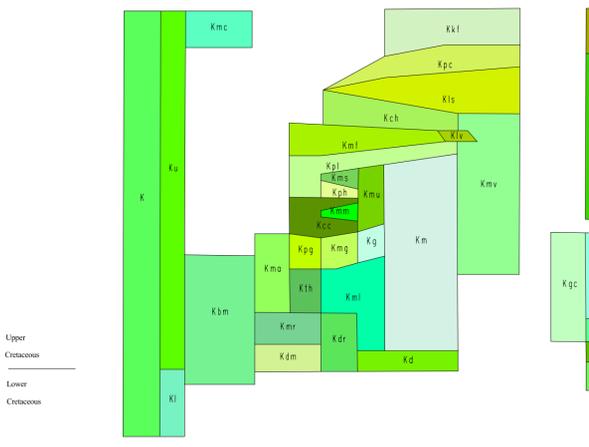
- QUATERNARY and TERTIARY**
- QTP - Older piedmont alluvial deposits and shallow basin fill; includes Quemado Formation and in northeast, high level piedmont gravels
 - Qtb - Basaltic and andesite volcanics interbedded with Pleistocene and Pliocene sedimentary units
 - Qtl - Traverline
 - QTg - Gila Group. Includes Mimbres Formation and several informal units in southwestern basins; Middle Pleistocene to uppermost Oligocene
 - Qtsf - Santa Fe Group, undivided. Basin fill of Rio Grande rift region; middle Pleistocene to uppermost Oligocene
 - Qts - Upper Santa Fe Group. Includes Camp Rice, Fort Hancock, Palomas, Sierra Ladrone, Ancha, Puye, and Alamosa Formations; middle Pleistocene to uppermost Miocene

- TERTIARY**
- Tus - Upper Tertiary sedimentary units; includes Bidahochi Formation, the Picuris Formation, and Los Fevers Formation, and locally fanglomerates; Pliocene to upper Miocene
 - Tfl - Fence Lake Formation; conglomerate and conglomeratic sandstone, coarse fluvial volcanoclastic sediments, minor eolian facies, and pedogenic carbonates of the southern Colorado Plateau region; Miocene
 - Tsf - Lower and Middle Santa Fe Group. Includes Hayner Ranch, Rincon Valley, Popotosa, Cochiti, Tesuque, Chamita, Abiquiu, and other Formations; Miocene and uppermost Oligocene
 - To - Ogallala Formation, alluvial and eolian deposits, and petrocalcic soils of the southern High Plains; Lower Pliocene to middle Miocene (locally includes unit Qaa)
 - Tlp - Los Pinos Formation of Lower Santa Fe Group (Miocene and upper Oligocene); includes Carson Conglomerate (Dane and Bachman, 1965)
 - Tos - Cenomanian - Moestrichtian for most part, although Beartooth is pre-Cenomanian - Moestrichtian; prominent cliff-forming marine sandstone
 - Thb - Hindale Basalt; northern Toas and eastern Rio Arriba Counties; basalt flows interbedded with Los Pinos Formation
 - Tnb - Basalt and andesite flows; Neogene. Includes flows interbedded with Santa Fe and Gila Groups
 - Tpb - Basalt and andesite flows; Pliocene
 - Tmb - Basalt and andesite flows; Miocene



- TERTIARY and CRETACEOUS**
- TKr - Raton Formation; in Raton Basin; unit contains conformable K/T boundary
 - TKpr - Poison Canyon and Raton Formations; undivided
 - TKa - Animas Formation; in northeast San Juan Basin
 - TKav - Andesitic volcanics
 - TKi - Paleogene and Upper Cretaceous intrusive rocks; includes Hanover, Fierro, Tyrone, and Lordsburg granodiorite-quartz monzonite porphyries

- PALEOZOIC**
- Pz - Paleozoic rocks, undivided
 - P - Permian rocks, undivided
 - Pqr - Quartermaster and Rustler Formations; Upper Permian
 - Pqm - Quartermaster Formation; red sandstone and siltstone; Upper Permian
 - Pr - Rustler Formation; siltstone, gypsum, sandstone, and dolomite; Upper Permian
 - Ps - Salado Formation; evaporite sequence; Upper Permian
 - Pc - Castile Formation; dominantly anhydrite sequence; Upper Permian
 - Pat - Artesia Group; shelf facies forming broad south-southeast trending outcrop from Florida to Artesia area; includes Grayburg, Queen, Seven Rivers, Yates, and Tansill Formations; Guadalupian. May locally include Moenkopi Formation (Triassic) at top
 - Pty - Yates and Tansill Formations; sandstone, siltstone, limestone, dolomite, and anhydrite; Guadalupian
 - Psr - Seven Rivers Formation; gypsum, anhydrite, salt, dolomite, and siltstone; Guadalupian
 - Pqa - Grayburg and Queen Formations; sandstone, gypsum, anhydrite, dolomite, and red mudstone; Guadalupian
 - Pcp - Capitan Formation; Upper Guadalupian age limestone (reef facies)
 - Pbc - Bell Canyon Formation; basin facies-sandstone, limestone, and shale; Guadalupian
 - Pcc - Cherry Canyon Formation; basin facies-sandstone, limestone, and shale
 - Pso - San Andres Formation; limestone and dolomite with minor shale; Guadalupian in south, in part Leonardian to north
 - Pg - Glorieta Sandstone; texturally and mineralogically mature, high-silica quartz sandstone
 - Pag - San Andres Limestone and Glorieta Sandstone; Guadalupian and Leonardian
 - Pco - Culiff Shale; in Breakoff Mountains only
 - Pyo - Victoria Peak Limestone; in Breakoff Mountains only
 - Pyp - Yeso Formation; sandstones, siltstones, anhydrite, gypsum, halite, and dolomite; Leonardian
 - Pa - Abo Formation; red beds, arkosic at base, finer and more mature above; Wolfcampian; may include limestone beds of Pennsylvanian age (Virgilian) in Zuni Mountains. In Robledo Mountains the Abo may be considered a member of the Hueco Formation
 - Pau - Upper part of Abo Formation; Wolfcampian
 - Pal - Lower part of Abo Formation; Wolfcampian, and in part Virgilian ?
 - Pys - Yeso, Glorieta and San Andres Formations, undivided
 - Pcy - Abo and Yeso Formations, undivided
 - Pct - Cutler Formation; used in northern areas and Chama embayment only
 - Ph - Hueco Formation; limestone unit restricted to south-central area; Pendejo Tongue divides into upper and lower parts; Wolfcampian
 - Pb - Bursum Formation; shale, arkose, and limestone; earliest Permian
 - P& - Permian and Pennsylvanian rocks, undivided; includes Horquilla Limestone, Earp Formation, Epitaph and Scherrer Formations, and Concho Limestone
 - P&sc - Sangre de Cristo Formation, in Sangre de Cristo Mountains
 - & - Pennsylvanian rocks, undivided; in Sangre de Cristo Mountains may include Sandia Formation, Madera Limestone, La Pasada, Alamitos, and Flechado Formations; elsewhere may include Bar-B, Nakaye, Red House, Oswald, and Syrena Formations
 - &m - Madera Formation (Limestone, or Group); in Manzano Mountains includes Los Mayos Limestone and Wild Cow Formation; in Lucero Mesa includes Gray Mesa, Atrasado, and Red Tanks Members; in Sacramento Mountains includes Beeman and Holder Formations; may include strata lumped as Magdalena Group in a few areas
 - &me - Madera Limestone, exotic blocks; present only in the Chloride area of Sierra County
 - &s - Sandia Formation; predominately clastic unit (commonly arkosic) with minor limestone; in Nacimiento Mountains
 - &ps - Panther Seep Formation; Organ, Franklin, and San Andres Mountains
 - &lc - Lead Camp Formation; San Andres and Organ Mountains
 - M - Mississippian rocks, undivided; Arroyo Penasco Group in Sangre de Cristo Mountains, Sierra Nacimiento, San Pedro Mountain, and Sandia Mountains; Lake Valley Limestone in south-central New Mexico
 - MD - Mississippian and Devonian rocks, undivided; includes the Lake Valley Limestone, Caballero, Las Cruces, Rancheria, and Helms Formations and Escabrosa Group; Mississippian; the Onate, Sly Gap, Contadora Formations, and Percha Shale of south-central New Mexico, and Canutillo Formation of Northern Franklin Mountains and Bishops Cap area; Devonian
 - MB - Mississippian through Cambrian rocks, undivided; includes Lake Valley Limestone; Devonian; Devonian rocks, undivided; El Paso Formation and Montoya Group (or Formation); Ordovician; and Bliss Sandstone, Cambrian and Ordovician
 - D - Percha Shale; southern Caballo Mountains; includes the Onate and Sly Gap Formations
 - SD - Silurian and Ordovician rocks, undivided
 - SO - Silurian through Cambrian rocks, undivided
 - OB - Ordovician and Cambrian rocks, undivided; includes Bliss Sandstone, El Paso Formation, and Montoya Formation (or Group)
 - OBp - Ordovician-Cambrian plutonic rocks of Florida Mountains



- CRETACEOUS**
- K - Cretaceous rocks, undivided
 - Ki - Uppermost Cretaceous intrusive rocks; restricted to Copper Flats area in Sierra County
 - Ka - Uppermost Cretaceous andesite flows; restricted to southwestern area
 - Ku - Upper Cretaceous, undivided. Includes Virden Formation in northern Hidalgo County, Ringbone Formation in Hidalgo and Luna and Grant Counties, and locally Beartooth and Sartan, Mancos in Silver City area; Cenomanian - Moestrichtian for most part, although Beartooth is pre-Cenomanian - Moestrichtian; Engle basin - Cutler sag area; Moestrichtian
 - Kmc - McRae Formation; transgressive marine sandstone; Moestrichtian
 - Kkf - Kirilind and Fruiland Formations; coal-bearing, coal primarily in the Fruiland, Campanion to Moestrichtian
 - Kpc - Pictured Cliffs Sandstone; prominent cliff-forming marine sandstone
 - Kls - Lewis Shale; marine shale and mudstone
 - Kpn - Pierre Shale and Niobrara Formation
 - Knf - Fort Hays Limestone Member of Niobrara Formation
 - Kmv - Mesaverde Group includes the Gallup Sandstone, Crevasse Canyon Formation, Point Lookout Sandstone, Menefee Formation, and Cliff House Sandstone
 - Kch - Cliff House Sandstone; transgressive marine sandstone; Campanian
 - Klv - La Ventana Tongue of the Cliff House Sandstone
 - Kmf - Menefee Formation; mudstone, shale, and sandstone; coal-bearing
 - Kpl - Point Lookout Sandstone; regressive marine sandstone in McKinley and Sandoval Counties. The lower, Hosta Tongue, of Point Lookout is transgressive and is separated from main body by the Salton Tongue of Mancos Shale; Santonian - Campanian
 - Kms - Salton Tongue of Mancos Shale
 - Kph - Hosta Tongue of Point Lookout Sandstone; transgressive marine sandstone
 - Kmm - Mulatto Tongue of Mancos Shale
 - Kcc - Crevasse Canyon Formation; coal-bearing units are Dilco and Gibson Coal Members; other members are Bartlett Barron, Dalton Sandstone, and Borrego Pass Sandstone (or Lentil)
 - Kg - Gallup Sandstone; generally regressive marine sandstone; Turonian
 - Kmg - Gallup Sandstone and underlying D-Cross Tongue of the Mancos Shale; Turonian
 - Kmr - Rio Salado Tongue of the Mancos Shale. Overlies Iwovells Tongue of Dakota Sandstone; mapped only where Tres Hermanos Formation or the Atrague Sandstone is present; mapped as Kdr in parts of Socorro County; Turonian

- Kpg - Pescado Tongue of the Mancos Shale and Gallup Sandstone; in Zuni Basin only. Pescado is chrono-stratigraphic equivalent of Juana Lopez Member of Mancos Shale; Turonian
- Kth - Tres Hermanos Formation; formerly designated as Lower Gallup Sandstone in the Zuni Basin; Turonian
- kma - Moreno Hill Formation and Atrague Sandstone; in Salt Lake coal field and extreme southern Zuni basin; Turonian
- km - Mancos Shale; divided into Upper and Lower parts by Gallup Sandstone
- kmu - Mancos Shale, Upper part
- kml - Mancos Shale, Lower part
- Kdr - Dakota Sandstone and Rio Salado Tongue of the Mancos Shale. In northwest Socorro County locally includes overlying Tres Hermanos Formation
- Kgc - Greenhorn Formation and Carlile Shale, undivided; locally includes Graneros Shale
- Kc - Carlile Shale; limited to northeastern area; Turonian-Cenomanian
- Kgg - Graneros Shale and Greenhorn Formation; limited to northeastern area; lower Turonian and Cenomanian
- Kgh - Greenhorn Formation; limited to northeastern area. The upper member (Bridge Creek Limestone), can be traced into western area where it is commonly shown as a bed-rank unit in Mancos Shale on detailed maps
- Kgr - Graneros Shale; limited to northeastern area; Cenomanian
- Kdm - Intertongued Dakota-Mancos sequence of west-central New Mexico; includes the Whitewater Arroyo Tongue of Mancos Shale and the Iwovells Tongue of the Dakota Sandstone; includes Oak Canyon, Cubero, and Pagueate Tongues plus Clay Mesa
- Kd - Dakota Group of east-central and northeast New Mexico; in ascending order, Mesa Rica Sandstone, Pajarito Shale, and Romeroville Sandstone; includes the underlying Tucumcari Shale in Tucumcari area and Glencairn Formation in Union County. Encompasses both Upper and Lower Cretaceous rocks
- Kbm - Mancos Formation and Beartooth Quartzite (and Sartan Sandstone); Mancos includes what was formerly referred to as Colorado Shale which in turn may include equivalents of Tres Hermanos Formation
- Kl - Lower Cretaceous, undivided; in northern Lea and Roosevelt Counties includes equivalents of Tucumcari Shale. In Coronado Mountains includes Campaogrande, Cox and other Washita Group formations. At Cerro de Cristo Rey includes several Fredericksburg and Washita Group formations, and the Boquillas Formation; Cenomanian. In the southwest includes Hell-to-Finish, U-Bar, and Mojado Formations which are equivalent to Bisbee Group of Arizona

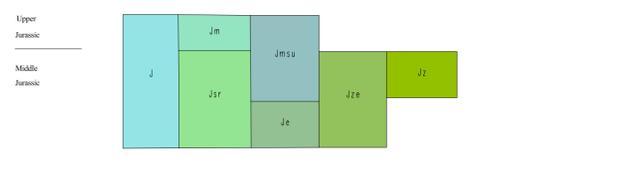
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GEOLOGIC MAP of NEW MEXICO

compiled by **O.J. Anderson, G.E. Jones, and G.N. Green**
 USGS Open-File Report OF-97-52

Digital data base by **G.N. Green and G.E. Jones**

New Mexico Bureau of Mines and Mineral Resources
 U.S. Geological Survey, Department of the Interior



- JURASSIC**
- J - Jurassic rocks, Middle and Upper, undivided
 - Jm - Morrison Formation; Upper Jurassic nonmarine rocks present only in northern one-third of state
 - Jmsu - Morrison Formation and upper San Rafael Group
 - Jz - Zuni Sandstone; consists of undivided equivalents of the Summerville Formation and Bluff Sandstone; restricted to Zuni Basin area
 - Jze - Zuni and Entrada Sandstones, undivided
 - Je - Entrada Sandstone, Middle Jurassic; Collovian
 - Jsr - San Rafael Group; consists of Entrada Sandstone, Todilto and Summerville Formations, Bluff Sandstone, and locally Zuni Sandstone (or only Acoma Tongue of Zuni)

- PRECAMBRIAN**
- Zi - Upper Proterozoic; mafic dikes
 - Yi - Middle Proterozoic; mafic dikes, diabase, metadiabase, metadiorite mainly of Burro Mountains; age not well constrained
 - Ys - Middle Proterozoic sedimentary rocks of the Sacramento Mountains
 - Yp - Middle Proterozoic plutonic rocks (younger than 1600 Ma)
 - Yxp - Middle and Lower Proterozoic plutonic rocks, undivided
 - X - Lower Proterozoic rocks, undivided
 - Xms - Lower Proterozoic metasedimentary rocks (1650-1700 Ma). Essentially equivalent to Hondo Group; locally includes high-grade quartzite-pelitic schist of unknown age
 - Xm - Lower Proterozoic metamorphic rocks, dominantly felsic volcanic, volcanoclastic and plutonic rocks (1650-1700+ Ma); includes Vadillo Group; locally includes high-grade felsic gneisses of unknown age
 - Xp - Lower Proterozoic plutonic rocks (older than 1600 Ma)
 - Xmo - Lower Proterozoic metamorphic rocks, dominantly mafic (1720-1760 Ma)
 - Xmu - Lower Proterozoic metamorphic rocks, undivided