GEOLOGIC MAP OF
NEW MEXICO,
1:500,000

NEW MEXICO BUREAU
OF MINES AND MINERAL
RESOURCES

Open File Report
No. 408

Orin J. Anderson and Glen E. Jones

1994
Index Map to principal sources of data for state geologic map
Principal Sources of Data

Number at left refers to numbered 1°x2° quadrangles shown in above index map.


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Explanation of Map Units

3/25/93
* 8/5/93
* 3/10/94
* 12/16/94

Qa - Alluvium; Upper and Middle Quaternary
Ql - Landslide deposits and colluvium
Qe - Eolian deposits
Qeg - Gypsiferous 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 vent deposits
Qr - Silicic volcanics
Qv - Basaltic volcanics; tuff rings, cinders, and lavas
Qbo - Basalt or basaltic andesite; Middle and Lower Pleistocene
Qvr - Valles Rhyolite; Jemez Mountains area only
Qbt - Bandelier Tuff; Jemez Mountains area only
Qoa - Older alluvial deposits of upland plains and piedmont areas, and calcic 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 Gatuna Formations, the latter of which may have a Pliocene aspect at base; outcrops, however, are basically of Quaternary deposits; Upper Quaternary to uppermost Pliocene(?)
QTa - Shallow basin fill, west-central area; includes Quemado Formation; Lower Quaternary to Upper Pliocene
QTp - Older piedmont alluvial deposits
QTb - Basaltic and andesitic volcanics interbedded with Pleistocene and Pliocene sedimentary units
QTc - Silicic flows and domes interbedded with Pleistocene and Pliocene sedimentary units
QTt - Travertine
QTg - Older piedmont and alluvial fan deposits; may in part have a Late Tertiary aspect
QTg - Gila Group. Includes Mimbres Formation and several unnamed units in southwestern basins; Middle Pleistocene to uppermost Oligocene
QTs - Santa Fe Group, undivided. Basin fill of Rio Grande rift region; Middle Pleistocene to uppermost Oligocene
QTr - Upper Santa Fe Group. Includes Camp Rice, Fort Hancock, Palomas, Sierra Ladrones, Ancha, Puye, and Alamosa Formations; Middle Pleistocene to uppermost Miocene
Tsu - Tertiary portion of Upper Santa Fe Group
Tus - Upper Tertiary sedimentary units; includes Bidahochi Formation, the Picuris Formation, and Las Feveras
Formation, and locally fanglomerates; Pliocene to Upper Miocene of Mora area

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; includes unit Qoa

Tlp - Los Pinos Formation of Lower Santa Fe Group (Miocene and Upper Oligocene); includes Carson Conglomerate (Dane and Bachman, 1965) in Tusas Mountains-San Luis Basin area

Tos - Mostly Oligocene and Upper Eocene sedimentary and volcanoclastic sedimentary rocks with local andesitic to intermediate volcanics; includes Espinaso, Spears, Bell Top, and Palm Park Formations

Thb - Hinsdale Basalt; northern Taos 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

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 - Chuska Sandstone; restricted to Chuska Mountains

Tv - Middle Tertiary volcanic rocks, undifferentiated

Tif - Middle Tertiary felsic shallow-intrusive rocks; phonolites and trachytes of northeastern N.M.

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, 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 Ranch Tuffs, the Turkey Springs Tuff, the tuff of Little Mineral Creek, the Amalia Tuff and others. Some contain volcaniclastic and reworked volcaniclastic rocks, and eolian sandstone; (24-29 Ma.)

Tlrp - Lower Oligocene silicic pyroclastic rocks (ash-flow tuffs); includes Hell's Mesa, Kneeling Nun, lower part of Bell Top Formation, Caballo Blanco, Datil Well, Rock House Canyon, Blue Canyon, Sugarlump and Tadpole Ridge Tuffs, the tuffs of the Organ cauldron, Treasure Mountain Tuff (now known as Chiquito Peak Tuff) Bluff Creek Tuff, Oak Creek Tuff, tuff Steins Mountain, tuff of Black Bill Canyon, Woodhaul Canyon, Gillespie and Box Canyon Tuffs and other volcanic and interbedded fluvial and pumiceous units; (31-36.5 Ma.)
Kms - Satan 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 Members; other members are Bartlett Barren, 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 Twowells Tongue of Dakota Sandstone; mapped only where Tres Hermanos Formation or the Atarque 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 chronostratigraphic equivalent of Juana Lopez Mbr of Mancos Shale; Turonian
Kth - Tres Hermanos Formation; (formerly designated as Lower Gallup Sandstone in the Zuni Basin); Turonian
Kma - Moreno Hill Formation and Atarque 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 (above Gallup Ss)
Kml - Mancos Shale, Lower part (below Gallup Ss)
Kdr - Dakota Sandstone and Rio Salado Tongue of the Mancos Shale. In northwest Socorro County locally includes overlying Tres Hermanos Formation
Kdm - Intertongued Dakota-Mancos sequence of west central New Mexico; includes the Whitewater Arroyo Tongue of Mancos Shale and the Twowells Tongue of the Dakota
Kd - Dakota Sandstone includes the main body - Oak Canyon, Cubero, and Paguate Tongues plus Clay Mesa Tongue of Mancos Shale; Cenomanian
Kcg - Greenhorn Formation and Carlile Shale, undivided
Kc - Carlile Shale; limited to northeastern area; Turonian-Coniacian
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 Ls.) 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
Kdg - 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 Sarten 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 Cornudas Mountains includes Campogrande, Cox and other Washita Group formations. At Cero 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
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; Callovian

Js - San Rafael Group; consists of Entrada Sandstone, Todilto and Summerville Formations, Bluff Sandstone, and locally Zuni Sandstone (or only Acoma Tongue of Zuni)

R - Triassic rocks, undivided; continental red beds

Rcr - Rock Point Formation of Chinle Group; Upper Triassic. May locally include Lukachukai Member of Wingate Sandstone

Rc - 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:

Rr - Redonda Formation

Rb - Bull Canyon Formation; Norian

Rt - Trujillo Formation; Norian

Rg - Garita Creek Formation; Carnian

Rs - Santa Rosa Formation; Carnian; includes Moenkopi Formation (Middle Triassic) at base in most areas

Rcu - Upper Chinle Group, Garita Creek through Redonda Formations, undivided

Rm - Moenkopi Formation; Middle Triassic

P - Paleozoic rocks undivided

Pz - 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 S-SE trending outcrop from Glorieta 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

Pgg - Grayburg and Queen Formations. Sandstone, gypsum, anhydrite, dolomite, and red mudstone; Guadalupian

Pcp - Capitan Formation; Upper Guadalupian age limestone (reef facies)

Pdm - Delaware Mountain Group; includes Brushy Canyon, Cherry Canyon and Bell Canyon Formations; Guadalupian

Pbc - Bell Canyon Formation; basin facies-sandstone, limestone, and shale; Guadalupian

Pcc - Cherry Canyon Formation; basin facies-sandstone, limestone, and shale

Pbr - Brushy Canyon Formation; basin facies-sandstone, limestone, and shale

Pgs - Goat Seep Limestone; limestone and dolomite (reef facies); Guadalupian

Psa - 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

Psg - San Andres Limestone and Glorieta Sandstone; Guadalupian and Leonardian
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pco</td>
<td>Cutoff Shale; in Brokeoff Mountains only</td>
</tr>
<tr>
<td>Pvp</td>
<td>Victorio Peak Limestone; in Brokeoff Mountains only</td>
</tr>
<tr>
<td>Py</td>
<td>Yeso Formation; sandstones, siltstones, anhydrite, gypsum, halite, and dolomite; Leonardian</td>
</tr>
<tr>
<td>Pa</td>
<td>Abo Formation; red beds, arkosic at base, finer and more mature above; Wolfcampian; may include</td>
</tr>
<tr>
<td></td>
<td>limestone beds of Pennsylvanian age (Virgilian) in Zuni Mountains</td>
</tr>
<tr>
<td>Pau</td>
<td>Upper part of Abo Formation; Wolfcampian</td>
</tr>
<tr>
<td>Pal</td>
<td>Lower part of Abo Formation; Wolfcampian, an in part Virgilian?</td>
</tr>
<tr>
<td>Pys</td>
<td>Yeso, Glorieta and San Andres Formations, undivided</td>
</tr>
<tr>
<td>Pay</td>
<td>Yeso and Abo Formations, undivided</td>
</tr>
<tr>
<td>Pct</td>
<td>Cutler Formation; used in northern areas and Chama embayment only</td>
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<tr>
<td>Ph</td>
<td>Hueco Formation; limestone unit restricted to south central area; Pendejo Tongue divides Abo Fm</td>
</tr>
<tr>
<td></td>
<td>into upper and lower parts; Wolfcampian</td>
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<tr>
<td>Pb</td>
<td>Bursum Formation; shale, arkose, and limestone; earliest Permian</td>
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<tr>
<td>PP</td>
<td>Undivided Permian and Pennsylvanian rocks; includes Horquilla Limestone, Earp Formation, Epitaph</td>
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<tr>
<td></td>
<td>and Scherrer Formations, and Concha Limestone</td>
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<tr>
<td>PPsc</td>
<td>Sangre de Cristo Formation, in Sangre de Cristo Mountains</td>
</tr>
<tr>
<td>P</td>
<td>Pennsylvanian rocks, undivided; in Sangre de Cristo Mountains may include Sandia Formation, Mader</td>
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<td></td>
<td>a Limestone, La Pasada, Alamitos, and Flechado Formations: elsewhere may include Bar-B, Nakaye,</td>
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<tr>
<td></td>
<td>Red House, Oswald, and Syrena Formations</td>
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<tr>
<td>Pm</td>
<td>Madera Formation (Limestone, or Group); in Manzano Mountains includes Los Moyos Limestone and</td>
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<td></td>
<td>Wild Cow Formation; in Lucero Mesa includes Gray Mesa, Atrasdo, and Red Tanks Members; in</td>
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<td></td>
<td>Sacramento Mountains includes Beeman and Holder Formations; may include strata lumped as</td>
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<tr>
<td></td>
<td>Magdalena Group in a few areas</td>
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<tr>
<td>Pme</td>
<td>Exotic blocks of Madera Limestone; present only in the Chloride area of Sierra County</td>
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<tr>
<td>Ps</td>
<td>Sandia Formation; predominately clastic unit (commonly arkosic) with minor black shales, and</td>
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<tr>
<td></td>
<td>limestone in lower part; locally includes Osha Canyon Formation in Nacimiento Mountains</td>
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<tr>
<td>Pps</td>
<td>Panther Seep Formation; Organ, Franklin, and San Andres Mountains</td>
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<tr>
<td>Plc</td>
<td>Lead Camp Formation; San Andres and Organ Mountains</td>
</tr>
<tr>
<td>M</td>
<td>Mississippian rocks undivided; Arroyo Penasco Group in Sangre de Cristo Mountains, Sierra</td>
</tr>
<tr>
<td></td>
<td>Nacimiento, San Pedro Mountain, and Sandia Mountains; Lake Valley Limestone in south-central New</td>
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<tr>
<td></td>
<td>Mexico</td>
</tr>
<tr>
<td>Mk</td>
<td>Kelly Limestone; Socorro and Sierra Counties</td>
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<tr>
<td>MD</td>
<td>Mississippian and Devonian rocks undivided; includes the Lake Valley Limestone, Caballero, Las</td>
</tr>
<tr>
<td></td>
<td>Cruces, Rancheria, and Helms Formations and Escabrosa Group of Mississippian age; the Onate, Sly</td>
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<tr>
<td></td>
<td>Gap, Contadero Formations, and Percha Shale of south-central New Mexico, and Canutillo Formation</td>
</tr>
<tr>
<td></td>
<td>of Northern Franklin Mountains and Bishops Cap area, all of Devonian age</td>
</tr>
<tr>
<td>MC</td>
<td>Cambrian through Mississippian rocks undivided; includes Bliss Sandstone (Cambrian and Ordovician), El Paso Formation and Montoya Group (or Fm), (Ordovician); locally rocks of Devonian age, and the Lake Valley Limestone (Mississippian)</td>
</tr>
<tr>
<td>D</td>
<td>Percha Shale; southern Caballo Mountains. Also includes the Onate and Sly Gap Formations</td>
</tr>
<tr>
<td>SO</td>
<td>Silurian and Ordovician rocks undivided</td>
</tr>
<tr>
<td>SOC</td>
<td>Silurian through Cambrian rocks undivided</td>
</tr>
<tr>
<td>OC</td>
<td>Ordovician and Cambrian rocks undivided; includes Bliss Sandstone, El Paso Formation, and Montoya</td>
</tr>
<tr>
<td></td>
<td>Formation (or Group)</td>
</tr>
<tr>
<td>OCP</td>
<td>Ordovician-Cambrian plutonic rocks of Florida Mountains</td>
</tr>
</tbody>
</table>
Turf- Upper Oligocene silicic (or felsic) flows and masses and associated pyroclastic rocks; includes Taylor Creek, Fanney, 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
Tli - 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
Tla - Lower Tertiary, (Lower Oligocene and Eocene) andesite and basaltic andesite flows, and associated volcanioclastic units. Includes Rubio Peak Formation, and andesite of Dry Leggett Canyon
Tps - Paleogene sedimentary units; includes Baca, Galisteo, 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
Toa - Ojo Alamo Formation; Paleocene, San Juan Basin
Tpc - Poison Canyon Formation; Paleocene, in Raton Basin
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
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 Sarten, Mancos in Silver City area; Cenomanian - Maastrichtian for most part, although Beartooth is pre-Cenomanian
Kmc - McRae Formation; Engle basin - Cutter sag area; Maastrichtian
Kvt - Vermejo Formation and Trinidad Sandstone; Maastrichtian
Kkf - Kirtland and Fruitland Formations; coal-bearing, coal primarily in the Fruitland; Campanian to Maastrichtian
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 Satan Tongue of Mancos Shale; Santonian - Campanian
Middle Proterozoic rocks, undifferentiated

Middle Proterozoic; mafic dikes, diabase, metadiabase, metadiorite mainly of Burro Mountains; age not well constrained

Middle Proterozoic sedimentary rocks of the Sacramento Mountains

Middle Proterozoic plutonic rocks (younger than 1600 Ma.)

Middle and Lower Proterozoic plutonic rocks, undivided

Lower Proterozoic rocks, undivided

Lower Proterozoic metasedimentary rocks, circa 1650-1700 Ma. Essentially equivalent to Hondo Group; locally includes high-grade quartzite-pelitic schist of unknown age

Lower Proterozoic metamorphic rocks, dominantly felsic volcanic, volcaniclastic and plutonic rocks, circa 1650-1700+ Ma; includes Vadito Group. Also locally includes high-grade felsic gneisses of unknown age

Lower Proterozoic plutonic rocks generally older than 1600 Ma.

Lower Proterozoic metamorphic rocks, dominantly mafic, age 1720-1760 Ma.

Lower Proterozoic metamorphic rocks, undivided
Instructions for installing the Geologic Map of New Mexico

1) make a directory on your C drive called NM
   
   cd \n
   mkdir nm

2) change to the nm directory
   
   cd nm

3) restore the data from the disks
   
   msbackup
   
   choose restore

4) make a backup copy of your config8.sym
   
   cd \sys8 (or your gsmmap directory)
   
   copy config8.sym config8.bak

5) copy the config8.sym to the sys8 directory
   
   copy c:\nm\config8.sym config8.sym

Instructions for loading plotter pens

pen 1  fine black
pen 2  fine red
pen 3  wide black
pen 4  fine blue
<table>
<thead>
<tr>
<th>Known contacts</th>
<th>Approximate contacts</th>
<th>Covered contacts</th>
</tr>
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<tbody>
<tr>
<td>Known fault</td>
<td>Approximate fault</td>
<td>Covered fault</td>
</tr>
<tr>
<td>Ti dikes</td>
<td>Tui dikes</td>
<td>Tli dikes</td>
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<td>Tuim dikes</td>
<td>TKi dikes</td>
<td>Yi dikes</td>
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<td>Xi dikes</td>
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</tr>
</tbody>
</table>

Change in level of detail or terminology

Mine dump

Precambrian Shear Zone

Vent
Explanation of Map Units

3/25/93
* 8/5/93
* 3/10/94
* 12/16/94

Qa - Alluvium; Upper and Middle Quaternary
Ql - Landslide deposits and colluvium
Qe - Eolian deposits
Qeg - Gypsiferous 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 vent deposits
Qr - Silicic volcanics
Qv - Basaltic volcanics; tuff rings, cinders, and lavas
Qbo - Basalt or basaltic andesite; Middle and Lower Pleistocene
Qvr - Valles Rhyolite; Jemez Mountains area only
Qbt - Bandelier Tuff; Jemez Mountains area only
Qoa - Older alluvial deposits of upland plains and piedmont areas, and calcic 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 Gatuna Formations, the latter of which may have a Pliocene aspect at base; outcrops, however, are basically of Quaternary deposits; Upper Quaternary to uppermost Pliocene(?)
QTa - Shallow basin fill, west-central area; includes Quemado Formation; Lower Quaternary to Upper Pliocene
QTp - Older piedmont alluvial deposits
QTB - Basaltic and andesitic volcanics interbedded with Pleistocene and Pliocene sedimentary units
QTr - Silicic flows and domes interbedded with Pleistocene and Pliocene sedimentary units
QTT - Travertine
QTP - Older piedmont and alluvial fan deposits; may in part have a Late Tertiary aspect
QTG - Gila Group. Includes Mimbres Formation and several unnamed units in southwestern basins; Middle Pleistocene to uppermost Pliocene
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 Ladrones, Ancha, Puye, and Alamosa Formations; Middle Pleistocene to uppermost Miocene
Ts - Tertiary portion of Upper Santa Fe Group
Tus - Upper Tertiary sedimentary units; includes Bidahochi Formation, the Picuris Formation, and Las Feveras
Formation, and locally fanglomerates; Pliocene to Upper Miocene of Mora area

**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, Popotas, 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 Qoa)

**Tlp** - Los Pinos Formation of Lower Santa Fe Group (Miocene and Upper Oligocene); includes Carson Conglomerate (Dane and Bachman, 1965) in Tusas Mountains-San Luis Basin area

**Tos** - Mostly Oligocene and Upper Eocene sedimentary and volcanoclastic sedimentary rocks with local andesitic to intermediate volcanics; includes Espinaso, Spears, Bell Top, and Palm Park Formations

**Thb** - Hinsdale Basalt; northern Taos 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

**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** - Chuska Sandstone; restricted to Chuska Mountains

**Tv** - Middle Tertiary volcanic rocks, undifferentiated

**Tif** - Middle Tertiary felsic shallow-intrusive rocks; phonolites and trachytes of northeastern N.M.

**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, 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 Ranch 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.)

**Tlrip** - Lower Oligocene silicic pyroclastic rocks (ash-flow tuffs); includes Hell’s Mesa, Kneeling Nun, lower part of Bell Top Formation, Caballo Blanco, Datil Well, Rock House Canyon, Blue Canyon, Sugarlump and Tadpole Ridge Tuffs, the tuffs of the Organ cauldron, Treasure Mountain Tuff (now known as Chiquito Peak Tuff) Bluff Creek Tuff, Oak Creek Tuff, tuff Steins Mountain, tuff of Black Bill Canyon, Woodhaulf Canyon, Gillespie and Box Canyon Tuffs and other volcanic and interbedded fluvial and pumiceous units; (31-36.5 Ma.)
Kms - Satan 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 Members; other members are Bartlett Barren, 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 Twowells Tongue of Dakota Sandstone; mapped only where Tres Hermanos Formation or the Atarque 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 Mbr of Mancos Shale; Turonian
Kth - Tres Hermanos Formation; (formerly designated as Lower Gallup Sandstone in the Zuni Basin); Turonian
Kma - Moreno Hill Formation and Atarque 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 (above Gallup Ss)
Kml - Mancos Shale, Lower part (below Gallup Ss)
Kdr - Dakota Sandstone and Rio Salado Tongue of the Mancos Shale. In northwest Socorro County locally includes overlying Tres Hermanos Formation
Kdm - Intertongued Dakota-Mancos sequence of west central New Mexico; includes the Whitewater Arroyo Tongue of Mancos Shale and the Twowells Tongue of the Dakota
Kd - Dakota Sandstone includes the main body - Oak Canyon, Cubero, and Paguate Tongues plus Clay Mesa Tongue of Mancos Shale; Cenomanian
Kcg - Greenhorn Formation and Carlile Shale, undivided
Ko - Carlile Shale; limited to northeastern area; Turonian-Coniacian
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 Ls.) 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
Kdg - 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 Sarten 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 Cornudas Mountains includes Campogrande, Cox and other Washita Group formations. At Cero 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
J - Jurassic rocks, Middle and Upper, undivided
Im - Morrison Formation; Upper Jurassic nonmarine rocks, present only in northern one-third of state
Jmsu- Morrison Formation and upper San Rafael Group
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jz</td>
<td>Zuni Sandstone; consists of undivided equivalents of the Summerville Formation and Bluff Sandstone; restricted to Zuni Basin area.</td>
</tr>
<tr>
<td>Jze</td>
<td>Zuni and Entrada Sandstones, undivided.</td>
</tr>
<tr>
<td>Je</td>
<td>Entrada Sandstone, Middle Jurassic; Callovian.</td>
</tr>
<tr>
<td>JsR</td>
<td>San Rafael Group; consists of Entrada Sandstone, Todilto and Summerville Formations, Bluff Sandstone, and locally Zuni Sandstone (or only Acoma Tongue of Zuni).</td>
</tr>
<tr>
<td>R</td>
<td>Triassic rocks, undivided; continental red beds.</td>
</tr>
<tr>
<td>RCR</td>
<td>Rock Point Formation of Chinle Group; Upper Triassic. May locally include Lukachukai Member of Wingate Sandstone.</td>
</tr>
<tr>
<td>RC</td>
<td>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:</td>
</tr>
<tr>
<td>R</td>
<td>Redonda Formation</td>
</tr>
<tr>
<td>Rb</td>
<td>Bull Canyon Formation; Norian</td>
</tr>
<tr>
<td>Rt</td>
<td>Trujillo Formation; Norian</td>
</tr>
<tr>
<td>Rg</td>
<td>Garita Creek Formation; Carnian</td>
</tr>
<tr>
<td>Rs</td>
<td>Santa Rosa Formation; Carnian; includes Moenkopi Formation (Middle Triassic) at base in most areas.</td>
</tr>
<tr>
<td>RCU</td>
<td>Upper Chinle Group, Garita Creek through Redonda Formations, undivided.</td>
</tr>
<tr>
<td>RM</td>
<td>Moenkopi Formation; Middle Triassic.</td>
</tr>
<tr>
<td>Pz</td>
<td>Paleozoic rocks undivided.</td>
</tr>
<tr>
<td>P</td>
<td>Permian rocks undivided.</td>
</tr>
<tr>
<td>PQR</td>
<td>Quartermaster and Rustler Formations; Upper Permian.</td>
</tr>
<tr>
<td>PQM</td>
<td>Quartermaster Formation; red sandstone and siltstone; Upper Permian.</td>
</tr>
<tr>
<td>PR</td>
<td>Rustler Formation; siltstone, gypsum, sandstone, and dolomite; Upper Permian.</td>
</tr>
<tr>
<td>PSL</td>
<td>Salado Formation; evaporite sequence; Upper Permian.</td>
</tr>
<tr>
<td>PC</td>
<td>Castile Formation; dominantly anhydrite sequence; Upper Permian.</td>
</tr>
<tr>
<td>PAT</td>
<td>Artesia Group; shelf facies forming broad S-SE trending outcrop from Glorieta to Artesia area; includes Grayburg, Queen, Seven Rivers, Yates, and Tansill Formations; Guadalupian. May locally include Moenkopi Formation (Triassic) at top.</td>
</tr>
<tr>
<td>PTY</td>
<td>Yates and Tansill Formations. Sandstone, siltstone, limestone, dolomite, and anhydrite; Guadalupian.</td>
</tr>
<tr>
<td>PSR</td>
<td>Seven Rivers Formation; gypsum, anhydrite, salt, dolomite, and siltstone; Guadalupian.</td>
</tr>
<tr>
<td>PGQ</td>
<td>Grayburg and Queen Formations. Sandstone, gypsum, anhydrite, dolomite, and red mudstone; Guadalupian.</td>
</tr>
<tr>
<td>PCP</td>
<td>Capitan Formation; Upper Guadalupian age limestone (reef facies).</td>
</tr>
<tr>
<td>PDM</td>
<td>Delaware Mountain Group; includes Brushy Canyon, Cherry Canyon and Bell Canyon Formations; Guadalupian.</td>
</tr>
<tr>
<td>PBC</td>
<td>Bell Canyon Formation; basin facies-sandstone, limestone, and shale; Guadalupian.</td>
</tr>
<tr>
<td>PCC</td>
<td>Cherry Canyon Formation; basin facies-sandstone, limestone, and shale.</td>
</tr>
<tr>
<td>PBR</td>
<td>Brushy Canyon Formation; basin facies-sandstone, limestone, and shale.</td>
</tr>
<tr>
<td>PGS</td>
<td>Goat Seep Limestone; limestone and dolomite (reef facies); Guadalupian.</td>
</tr>
<tr>
<td>PSA</td>
<td>San Andres Formation; limestone and dolomite with minor shale; Guadalupian in south, in part Leonardian to north.</td>
</tr>
<tr>
<td>PG</td>
<td>Glorieta Sandstone; texturally and mineralogically mature, high-silica quartz sandstone.</td>
</tr>
<tr>
<td>PSG</td>
<td>San Andres Limestone and Glorieta Sandstone; Guadalupian and Leonardian.</td>
</tr>
</tbody>
</table>
PC0 - Cutoff Shale; in Brokeoff Mountains only
Pvp - Victorio Peak Limestone; in Brokeoff Mountains only
Py - 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
Pau - Upper part of Abo Formation; Wolfcampian
Pal - Lower part of Abo Formation; Wolfcampian, an in part Virgilian?
Pys - Yeso, Glorieta and San Andres Formations, undivided
Pay - Yeso and Abo 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 Abo Fm into upper and lower parts; Wolfcampian
Pb - Bursum Formation; shale, arkose, and limestone; earliest Permian
PP - Undivided Permian and Pennsylvanian rocks; includes Horquilla Limestone, Earp Formation, Epitaph and Scherrer Formations, and Concha Limestone
PPSc- Sangre de Cristo Formation, in Sangre de Cristo Mountains
P - 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, Oswaldo, and Syrena Formations
Pm - Madera Formation (Limestone, or Group); in Manzano Mountains includes Los Moyos Limestone and Wild Cow Formation; in Lucero Mesa includes Gray Mesa, Atrasdo, and Red Tanks Members; in Sacramento Mountains includes Beeman and Holder Formations; may include strata lumped as Magdalena Group in a few areas
Pme - Exotic blocks of Madera Limestone; present only in the Chloride area of Sierra County
Ps - Sandia Formation; predominately clastic unit (commonly arkosic) with minor black shales, and limestone in lower part; locally includes Osha Canyon Formation in Nacimiento Mountains
Pps - Panther Seep Formation; Organ, Franklin, and San Andres Mountains
Plc - 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
Mk - Kelly Limestone; Socorro and Sierra Counties
MD - Mississippian and Devonian rocks undivided; includes the Lake Valley Limestone, Caballero, Las Cruces, Rancheria, and Helms Formations and Escabrosa Group of Mississippian age; the Onate, Sly Gap, Contadero Formations, and Percha Shale of south-central New Mexico, and Canutillo Formation of Northern Franklin Mountains and Bishops Cap area, all of Devonian age
MC - Cambrian through Mississippian rocks undivided; includes Bliss Sandstone (Cambrian and Ordovician), El Paso Formation and Montoya Group (or Fm), (Ordovician); locally rocks of Devonian age, and the Lake Valley Limestone (Mississippian)
D - Percha Shale; southern Caballo Mountains. Also includes the Onate and Sly Gap Formations
SO - Silurian and Ordovician rocks undivided
SOC - Silurian through Cambrian rocks undivided
OC - Ordovician and Cambrian rocks undivided; includes Bliss Sandstone, El Paso Formation, and Montoya Formation (or Group)
OCp - Ordovician-Cambrian plutonic rocks of Florida Mountains
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turf</td>
<td>Upper Oligocene silicic (or felsic) flows and masses and associated pyroclastic rocks; includes Taylor Creek, Fanney, and Rocky Canyon Rhyolites</td>
</tr>
<tr>
<td>Tlrf</td>
<td>Lower Oligocene silicic (or felsic) flows, domes, and associated pyroclastic rocks and intrusions; includes Mimbres Peak Formation</td>
</tr>
<tr>
<td>Ti</td>
<td>Tertiary intrusive rocks; undifferentiated</td>
</tr>
<tr>
<td>Tui</td>
<td>Miocene to Oligocene silicic to intermediate intrusive rocks; dikes, stocks, plugs, and diatremes</td>
</tr>
<tr>
<td>Tuim</td>
<td>Upper and Middle Tertiary mafic intrusive rocks</td>
</tr>
<tr>
<td>Tli</td>
<td>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</td>
</tr>
<tr>
<td>Tla</td>
<td>Lower Tertiary, (Lower Oligocene and Eocene) andesite and basaltic andesite flows, and associated volcaniclastic units. Includes Rubio Peak Formation, and andesite of Dry Leggett Canyon</td>
</tr>
<tr>
<td>Tps</td>
<td>Paleogene sedimentary units; includes Baca, Galisteo, El Rito, Blanco Basin, Love Ranch, Lobo, Sanders Canyon, Skunk Ranch, Timberlake, and Cub Mountain Formations</td>
</tr>
<tr>
<td>Tsj</td>
<td>San Jose Formation; Eocene, San Juan Basin</td>
</tr>
<tr>
<td>Tn</td>
<td>Nacimiento Formation; Paleocene, San Juan Basin</td>
</tr>
<tr>
<td>Toa</td>
<td>Ojo Alamo Formation; Paleocene, San Juan Basin</td>
</tr>
<tr>
<td>Tpc</td>
<td>Poison Canyon Formation; Paleocene, in Raton Basin</td>
</tr>
<tr>
<td>TKr</td>
<td>Raton Formation; in Raton Basin; unit contains conformable K/T boundary</td>
</tr>
<tr>
<td>TKpr</td>
<td>Poison Canyon and Raton Formations; undivided</td>
</tr>
<tr>
<td>TKa</td>
<td>Animas Formation; in northeast San Juan Basin</td>
</tr>
<tr>
<td>TKav</td>
<td>Andesitic volcanics</td>
</tr>
<tr>
<td>TKi</td>
<td>Paleogene and Upper Cretaceous intrusive rocks; includes Hanover, Fierro, Tyrone, and Lordsburg granodiorite-quartz monzonite porphyries</td>
</tr>
<tr>
<td>K</td>
<td>Cretaceous rocks, undivided;</td>
</tr>
<tr>
<td>Ki</td>
<td>Uppermost Cretaceous intrusive rocks; restricted to Copper Flats area in Sierra County</td>
</tr>
<tr>
<td>Ka</td>
<td>Uppermost Cretaceous andesite flows; restricted to southwestern area.</td>
</tr>
<tr>
<td>Ku</td>
<td>Upper Cretaceous, undivided. Includes Virden Formation in northern Hidalgo County, Ringbone Formation in Hidalgo and Luna and Grant Counties, and locally Beartooth and Sarten, Mancos in Silver City area; Campanian - Maastrichtian for most part, although Beartooth is pre-Cenomanian</td>
</tr>
<tr>
<td>Kmc</td>
<td>McRae Formation; Engle basin - Cutter sag area; Maastrichtian</td>
</tr>
<tr>
<td>Kvt</td>
<td>Vermejo Formation and Trinidad Sandstone; Maastrichtian</td>
</tr>
<tr>
<td>Kkf</td>
<td>Kirtland and Fruitland Formations; coal-bearing, coal primarily in the Fruitland; Campanian to Maastrichtian</td>
</tr>
<tr>
<td>Kpc</td>
<td>Pictured Cliffs Sandstone; prominent cliff-forming marine sandstone</td>
</tr>
<tr>
<td>Kls</td>
<td>Lewis Shale; marine shale and mudstone</td>
</tr>
<tr>
<td>Kpn</td>
<td>Pierre Shale and Niobrara Formation</td>
</tr>
<tr>
<td>Knf</td>
<td>Fort Hays Limestone Member of Niobrara Formation</td>
</tr>
<tr>
<td>Kmv</td>
<td>Mesaverde Group includes the Gallup Sandstone, Crevasse Canyon Formation, Point Lookout Sandstone, Menefee Formation, and Cliff House Sandstone</td>
</tr>
<tr>
<td>Kch</td>
<td>Cliff House Sandstone; transgressive marine sandstone; Campanian</td>
</tr>
<tr>
<td>Klv</td>
<td>La Ventana Tongue of the Cliff House Sandstone</td>
</tr>
<tr>
<td>Kmf</td>
<td>Menefee Formation; mudstone, shale, and sandstone; coal-bearing</td>
</tr>
<tr>
<td>Kpl</td>
<td>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 Satan Tongue of Mancos Shale; Santonian - Campanian</td>
</tr>
</tbody>
</table>
Y - Middle Proterozoic rocks, undifferentiated
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, circa 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, volcaniclastic and plutonic rocks, circa 1650-1700+ Ma; includes Vadito Group. Also locally includes high-grade felsic gneisses of unknown age
Xp - Lower Proterozoic plutonic rocks generally older than 1600 Ma.
Xmo - Lower Proterozoic metamorphic rocks, dominantly mafic, age 1720-1760 Ma.
Xmu - Lower Proterozoic metamorphic rocks, undivided
Instructions for installing the Geologic Map of New Mexico

1) make a directory on your C drive called NM
   \cd \nm

2) change to the nm directory
   \cd \nm

3) restore the data from the disks
   msbackup
       choose restore

4) make a backup copy of your config8.sym
   \cd \sys8 ( or your gsmap directory)
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Qvr - Valles Rhyolite; Jemez Mountains area only
Qbt - Bandelier Tuff; Jemez Mountains area only
Qoa - Older alluvial deposits of upland plains and piedmont areas, and calcic 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 Gatuna Formations, the latter of which may have a Pliocene aspect at base; outcrops, however, are basically of Quaternary deposits; Upper Quaternary to uppermost Pliocene(?)

QTa - Shallow basin fill, west-central area; includes Quemado Formation; Lower Quaternary to Upper Pliocene
QTp - Older piedmont alluvial deposits
QTB - Basaltic and andesitic volcanics interbedded with Pleistocene and Pliocene sedimentary units
QTr - Silicic flows and domes interbedded with Pleistocene and Pliocene sedimentary units
QTt - Travertine
QTP - Older piedmont and alluvial fan deposits; may in part have a Late Tertiary aspect
QTG - Gila Group. Includes Mimbres Formation and several unnamed units in southwestern basins; Middle Pleistocene to uppermost Miocene
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 Ladrones, Ancha, Puye, and Alamosa Formations; Middle Pleistocene to uppermost Miocene
Tsu - Tertiary portion of Upper Santa Fe Group
Tus - Upper Tertiary sedimentary units; includes Bidahochi Formation, the Picuris Formation, and Las Feveras
Formation, and locally fanglomerates; Pliocene to Upper Miocene of Mora area

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 - Ogalalla Formation, alluvial and eolian deposits, and petrocalcic soils of the southern High Plains; Lower Pliocene to Middle Miocene (locally includes unit Qoa)

Tlp - Los Pinos Formation of Lower Santa Fe Group (Miocene and Upper Oligocene); includes Carson Conglomerate (Dane and Bachman, 1965) in Tusas Mountains-San Luis Basin area

Tos - Mostly Oligocene and Upper Eocene sedimentary and volcanioclastic sedimentary rocks with local andesitic to intermediate volcanics; includes Espinaso, Spears, Bell Top, and Palm Park Formations

Thb - Hinsdale Basalt; northern Taos 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

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 - Chuska Sandstone; restricted to Chuska Mountains

Tv - Middle Tertiary volcanic rocks, undifferentiated

Tif - Middle Tertiary felsic shallow-intrusive rocks; phonolites and trachytes of northeastern N.M.

Tuv - Volcanic and some volcanioclastic rocks, undifferentiated; Lower Miocene and Upper Oligocene (younger than 29 Ma)

Tlv - Lower Oligocene and Eocene volcanic rocks, undifferentiated; dominantly intermediate composition, with interbedded volcanioclastic 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, 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 Ranch Tuffs, the Turkey Springs Tuff, the tuff of Little Mineral Creek, the Amalia Tuff and others. Some contain volcanioclastic and reworked volcanioclastic rocks, and eolian sandstone; (24-29 Ma.)

Tlrp- Lower Oligocene silicic pyroclastic rocks (ash-flow tuffs); includes Hell’s Mesa, Kneeling Nun, lower part of Bell Top Formation, Caballo Blanco, Datil Well, Rock House Canyon, Blue Canyon, Sugarlump and Tadpole Ridge Tuffs, the tuffs of the Organ cauldron, Treasure Mountain Tuff (now known as Chiquito Peak Tuff) Bluff Creek Tuff, Oak Creek Tuff, tuff Steins Mountain, tuff of Black Bill Canyon, Woodhaul Canyon, Gillespie and Box Canyon Tuffs and other volcanic and interbedded fluvial and pumiceous units; (31-36.5 Ma.)
Kms - Satan 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 Members; other members are Bartlett Barren, 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 Twowells Tongue of Dakota Sandstone; mapped only where Tres Hermanos Formation or the Atarque 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 chronostatigraphic equivalent of Juana Lopez Mbr of Mancos Shale; Turonian
Kth - Tres Hermanos Formation; (formerly designated as Lower Gallup Sandstone in the Zuni Basin); Turonian
Kma - Moreno Hill Formation and Atarque 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 (above Gallup Ss)
Kml - Mancos Shale, Lower part (below Gallup Ss)
Kdr - Dakota Sandstone and Rio Salado Tongue of the Mancos Shale. In northwest Socorro County locally includes overlying Tres Hermanos Formation
Kdm - Intertongued Dakota-Mancos sequence of west central New Mexico; includes the Whitewater Arroyo Tongue of Mancos Shale and the Twowells Tongue of the Dakota
Kd - Dakota Sandstone includes the main body - Oak Canyon, Cubero, and Pajuate Tongues plus Clay Mesa Tongue of Mancos Shale; Cenomanian
Kcg - Greenhorn Formation and Carlile Shale, undivided
Kc - Carlile Shale; limited to northeastern area; Turonian-Coniacian
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 Ls.) 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
Kdg - 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 Sarten 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 Cornudas Mountains includes Campogrande, Cox and other Washita Group formations. At Cero 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
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; Callovian

**Js** - San Rafael Group; consists of Entrada Sandstone, Todilto and Summerville Formations, Bluff Sandstone, and locally Zuni Sandstone (or only Acoma Tongue of Zuni)

**R** - Triassic rocks, undivided; continental red beds

**Rcr** - Rock Point Formation of Chinle Group; Upper Triassic. May locally include Lukachukai Member of Wingate Sandstone

**Rc** - 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:

- **Rcr** - Redonda Formation
- **Rb** - Bull Canyon Formation; Norian
- **Rt** - Trujillo Formation; Norian
- **Rg** - Garita Creek Formation; Carnian
- **Rs** - Santa Rosa Formation; Carnian; includes Moenkopi Formation (Middle Triassic) at base in most areas

**Rcu** - Upper Chinle Group, Garita Creek through Redonda Formations, undivided

**Trm** - Moenkopi Formation; Middle Triassic

**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

**Psl** - Salado Formation; evaporite sequence; Upper Permian

**Pc** - Castile Formation; dominantly anhydrite sequence; Upper Permian

**Pat** - Artesia Group; shelf facies forming broad S-SE trending outcrop from Glorieta 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

**Pgq** - Grayburg and Queen Formations. Sandstone, gypsum, anhydrite, dolomite, and red mudstone; Guadalupian

**Pcp** - Capitan Formation; Upper Guadalupian age limestone (reef facies)

**Pdm** - Delaware Mountain Group; includes Brushy Canyon, Cherry Canyon and Bell Canyon Formations; Guadalupian

**Pbc** - Bell Canyon Formation; basin facies-sandstone, limestone, and shale; Guadalupian

**Pcc** - Cherry Canyon Formation; basin facies-sandstone, limestone, and shale

**Phbc** - Brushy Canyon Formation; basin facies-sandstone, limestone, and shale

**Pgs** - Goat Seep Limestone; limestone and dolomite (reef facies); Guadalupian

**Psa** - 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

**Psg** - San Andres Limestone and Glorieta Sandstone; Guadalupian and Leonardian
PCo - Cutoff Shale; in Brokeoff Mountains only
Pvp - Victorio Peak Limestone; in Brokeoff Mountains only
Py - 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
Pau - Upper part of Abo Formation; Wolfcampian
Pal - Lower part of Abo Formation; Wolfcampian, an in part Virgilian?
Pys - Yeso, Glorieta and San Andres Formations, undivided
Pay - Yeso and Abo 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 Abo Fm into upper and lower parts; Wolfcampian
Pb - Bursum Formation; shale, arkose, and limestone; earliest Permian
PP - Undivided Permian and Pennsylvanian rocks; includes Horquilla Limestone, Earp Formation, Epitaph and Scherrer Formations, and Concha Limestone
PPsc - Sangre de Cristo Formation, in Sangre de Cristo Mountains
P - 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, Oswaldo, and Syrena Formations
Pm - Madera Formation (Limestone, or Group); in Manzano Mountains includes Los Moyos Limestone and Wild Cow Formation; in Lucero Mesa includes Gray Mesa, Atrasdo, and Red Tanks Members; in Sacramento Mountains includes Beeman and Holder Formations; may include strata lumped as Magdalena Group in a few areas
Pme - Exotic blocks of Madera Limestone; present only in the Chloride area of Sierra County
Ps - Sandia Formation; predominately clastic unit (commonly arkosic) with minor black shales, and limestone in lower part; locally includes Osha Canyon Formation in Nacimiento Mountains
Pps - Panther Seep Formation; Organ, Franklin, and San Andres Mountains
Ple - 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
Mk - Kelly Limestone; Socorro and Sierra Counties
MD - Mississippian and Devonian rocks undivided; includes the Lake Valley Limestone, Caballero, Las Cruces, Rancheria, and Helms Formations and Escabrosa Group of Mississippian age; the Onate, Sly Gap, Contadero Formations, and Percha Shale of south-central New Mexico, and Canutillo Formation of Northern Franklin Mountains and Bishops Cap area, all of Devonian age
MC - Cambrian through Mississippian rocks undivided; includes Bliss Sandstone (Cambrian and Ordovician), El Paso Formation and Montoya Group (or Fm), (Ordovician); locally rocks of Devonian age, and the Lake Valley Limestone (Mississippian)
D - Percha Shale; southern Caballo Mountains. Also includes the Onate and Sly Gap Formations
SO - Silurian and Ordovician rocks undivided
SOc - Silurian through Cambrian rocks undivided
OC - Ordovician and Cambrian rocks undivided; includes Bliss Sandstone, El Paso Formation, and Montoya Formation (or Group)
OCp - Ordovician-Cambrian plutonic rocks of Florida Mountains
Turf - Upper Oligocene silicic (or felsic) flows and masses and associated pyroclastic rocks; includes Taylor Creek, Panney, and Rocky Canyon Rhyolites

Tlr - 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

Tli - Upper and Middle Tertiary mafic intrusive rocks

Tla - 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

Tla - Lower Tertiary, (Lower Oligocene and Eocene) andesite and basaltic andesite flows, and associated volcaniclastic units. Includes Rubio Peak Formation, and andesite of Dry Leggett Canyon

Tps - Paleogene sedimentary units; includes Baca, Galisteo, 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

Toa - Ojo Alamo Formation; Paleocene, San Juan Basin

Tpc - Poison Canyon Formation; Paleocene, in Raton Basin

TKr - Raton Formation; in Raton Basin; unit contains conformable K/T boundary

TKKr - Poison Canyon and Raton Formations; undivided

TKa - Animas Formation; in northeast San Juan Basin

TKay - Andesitic volcanics

TKi - Paleogene and Upper Cretaceous intrusive rocks; includes Hanover, Fierro, Tyrone, and Lordsburg granodiorite-quartz monzonite porphyries

K - Cretaceous rocks, undivided;

Kl - 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 Sarten, Mancos in Silver City area; Campanian - Maastrichtian for most part, although Beartooth is pre-Cenomanian

Kmc - McRae Formation; Engle basin - Cutter sag area; Maastrichtian

Kvt - Vermejo Formation and Trinidad Sandstone; Maastrichtian

Kkf - Kirtland and Fruitland Formations; coal-bearing, coal primarily in the Fruitland; Campanian to Maastrichtian

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 Satan Tongue of Mancos Shale; Santonian - Campanian
Middle Proterozoic rocks, undifferentiated
Middle Proterozoic; mafic dikes, diabase, metadiabase, metamorphite mainly of Burro Mountains; age not well constrained
Middle Proterozoic sedimentary rocks of the Sacramento Mountains
Middle Proterozoic plutonic rocks (younger than 1600 Ma.)
Middle and Lower Proterozoic plutonic rocks, undivided
Lower Proterozoic rocks, undivided
Lower Proterozoic metasedimentary rocks, circa 1650-1700 Ma. Essentially equivalent to Hondo Group; locally includes high-grade quartzite-pelitic schist of unknown age
Lower Proterozoic metamorphic rocks, dominantly felsic volcanic, volcaniclastic and plutonic rocks, circa 1650-1700+ Ma; includes Vadito Group. Also locally includes high-grade felsic gneisses of unknown age
Lower Proterozoic plutonic rocks generally older than 1600 Ma.
Lower Proterozoic metamorphic rocks, dominantly mafic, age 1720-1760 Ma.
Lower Proterozoic metamorphic rocks, undivided