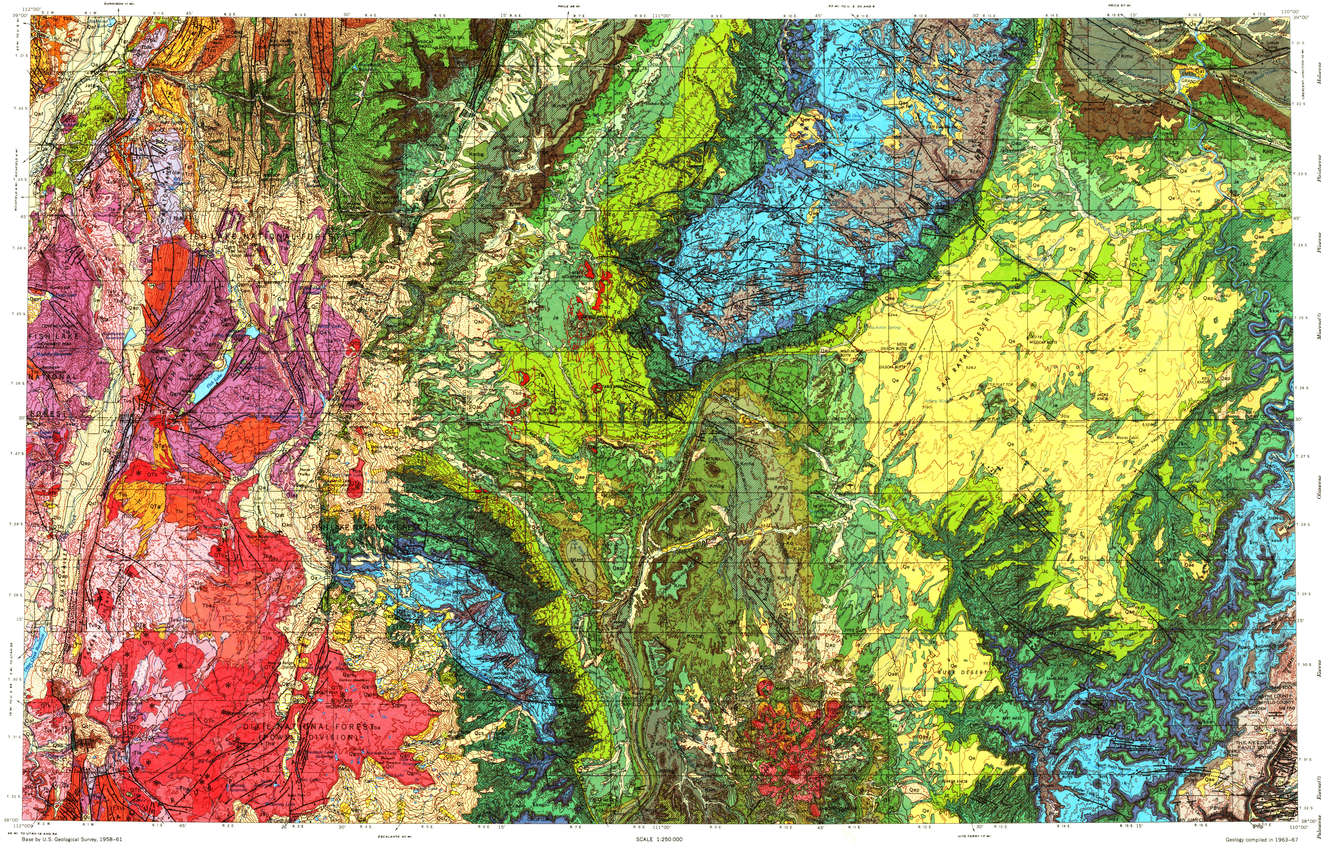
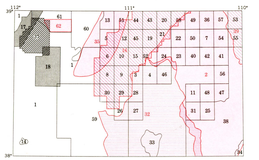


Base by U.S. Geological Survey, 1958-61

Geology compiled in 1963-67

SCALE 1:250 000

CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOUR INTERVALS
DATUM IS MEAN SEA LEVEL
1970 MAGNETIC DECLINATION FOR THIS SHEET WAS FROM 15°30' EASTERLY FOR THE CENTER OF THE WEST EDGE TO 15°00' EASTERLY FOR THE CENTER OF THE EAST EDGE



INDEX SHOWING SOURCES OF GEOLOGIC DATA

Older geologic maps, most of which are on photometric bases, are indicated in red. Geologic from these maps modified and adjusted to modern topographic bases by the authors where more recent geologic maps on modern topographic bases are not available.

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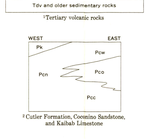

INDEX MAP SHOWING AREA OF SALINA QUADRANGLE AND OTHER PUBLISHED QUADRANGLES

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Geology
GEOLOGY, STRUCTURE, AND URANIUM DEPOSITS OF THE SALINA QUADRANGLE, UTAH

Compiled by
Paul L. Williams and Robert J. Hackman
1971

EXPLANATION

QUATERNARY

Holocene

Qa, Qaf, Qe, Qae, Qec — Alluvium and eolian deposits
Qa, alluvial deposits; chiefly gravel, sand, and silt of Holocene age on flood plains and terraces.
Qaf, alluvial fan gravels; mostly poorly sorted deposits of sand and gravel where side streams emerge onto flat valley floors.
Qe, eolian deposits; includes loess and well-sorted sand in barchan dunes on the San Rafael Desert.
Qae, alluvium and eolian deposits undifferentiated; mostly windblown silt and sand in small alluvial fans, benches, and in broad valleys; reworked in part by running water.
Qaec, alluvium and colluvial deposits undifferentiated.

Qsg, Qsf — Gravels
Qsg, pediment gravels; generally thin blanket deposits of coarse gravel on pediments, terraces, benches in and adjacent to mountainous areas.
Qsf, terrace gravels, deposits of sand and gravel on benches along major streams.

Qc, Qcs, Qcl — Colluvial deposits
Qc, undifferentiated; includes talus, slope wash, and landslide deposits.
Qcs, slope wash; generally fine-grained material derived from erosion of well-consolidated and eroded bedrock and landslide deposits of pre-Lake age.
Qcs, slope wash; generally fine-grained poorly sorted debris.
Qcl, talus; coarse angular block rubble.

Qls, Qls, Qls — Landslide debris
Qsl, landslide deposits; undifferentiated, all of Lake age, consist of unsorted rock debris.
Qsl$_{ls}$ of Pleistocene age.
Qsl$_{ls}$ of Bull Lake age.

Qgm, Qgm, Qgm, Qgm — Glacial deposits
Qgm, glacial outwash; sand and gravel, generally well bedded and well rounded.
Qgm, glacial till; unsorted westward-flow deposits occurring in moraines; undifferentiated as to age.
Qgm$_{pl}$ of late Pinedale age.
Qgm$_{pl}$ of early Pinedale age.
Qgm$_{bl}$ of Bull Lake age.

Ql — Lake deposits
Includes fine-grained lake beds and boulder pavements flooring lakes at higher elevations.

Pleistocene

QTg — Gravels[1]
Unconsolidated to partly consolidated gravel with minor sand beds. In part formed by damming behind basalt flows.

Pliocene

Qb — Basalt
Olivine basalt[1]
Gray to black thin flows of olivine basalt. Phenocrysts are olivine, pigeonite, and bytownite in a fine-grained groundmass of plagioclase, pyroxene, olivine, and magnetite-ilmenite. 0 to 100 feet thick.
✱, basalt volcanoes; cinder cones surrounding necks of diabase.

Miocene(?)

Tvs — Volcanic sediments[1]
Conglomerate, sandstone, and siltstone consisting dominantly of volcanic material. Generally well bedded. 0 to 200 feet thick. Partly equivalent to the Sevier River Formation.

Tbb — Tuff of Osiris, latite, and basaltic andesite flows undifferentiated

Tlo — Latite[1]
Flows and ash-flow tuffs of latite composition.
Tlo, tuff of Osiris; gray, purplish-gray, and red-brown densely welded vitreo-crystal ash-flow tuff. Phenocrysts make up about 25 percent of the rock; 15 percent sanidine, 5 percent sensitive, and 5 percent biotite. Weathers to huge rounded boulders. 0 to 200 feet thick; great local variations exist, the tuff being absent in places. Equivalent to the upper part of the Dry Hollow Formation.
Tl, dark-gray and purplish, in part banded, aphanitic to crystal-poor latite flows and densely welded ash-flow tuffs. Phenocrysts are sanidine and (or) sensitite. 0 to 300 feet thick. In part intercalated with basaltic andesite flows (Tba). Largely equivalent to the Isom Formation.

Tba — Basaltic andesite[1]
Dark-gray, brown, and red, in part vesicular, generally massive flows and flow breccias. Characteristic phenocrysts are of dark-green augite and conspicuous equal labradorite crystals as large as 1 inch. 0 to about 700 feet thick. Equivalent to the lower part of the Dry Hollow Formation.

Tlb — Latite and basaltic andesite flows undifferentiated

Tvb — Andesite breccias[1]
Gray, pink, and pale-green coarsely bedded to massive wooflow breccias, with clasts of pebble to boulder size in which dark-green hornblende phenocrysts are conspicuous. Interbedded with tuffaceous sandstone, siltstone and conglomerate, and minor flows and flow-breccias of gray andesite; near the base, a thin lacitic crystal ash-flow tuff is equivalent to part of the Oligocene Needle Range Formation. North of Burrville, the breccias are younger and are related in origin to the basaltic andesite flows (Tba). 0 to 2,500 feet thick or more. Thickens southward to 4 feet near Lee. The breccias are equivalent in part to the Bullion Canyon Volcanics.

Oligocene

INTRUSIVE IGNEOUS ROCKS
Age uncertain

Tis — Irregular bodies of diorite porphyry intruded into shattered sedimentary rocks in the Henry Mountains

Tdp, Tdi, Tdd — Diorite porphyry
Consists of oligoclase, hornblende, and magnetite in a fine-grained groundmass of quartz, orthoclase, and albite-oligoclase. Occurs in the Henry Mountains.
Tdps, sheets
Tdp, laccoliths, hypssoliths, and sills
Tdd, dikes

Td — Diabase
Dikes, 5 to 15 feet thick, consisting chiefly of augite, biotite, labradorite, anorthoclase, olivine, thomsonite, basaltic hornblende, and analcite

Tsd — Syenite and diabase
Composite sills of syenite and diabase; generally less than 100 feet thick. The diabase is similar to that in the associated dikes but has a groundmass of anorthoclase, labradorite, basaltic hornblende, analcite, and thomsonite.

Eocene

Tcc — Dipping Vat Formation of McCookey (1960)[1]
White sandy bedded tuffaceous sandstone; minor interbedded white clay and silty limestone. Forms a prominent cliff. About 300 feet thick.

Tbr — Bald Knoll Formation of Gilliland (1951)
Pale-orange, white, and reddish-orange, in part bentonitic, lacustrine shale; thin beds of silty limestone and micaceous sandstone. About 1,000 feet thick.

Tch — Crazy Hollow Formation of Spieker (1949)
Red and orange sandstone, siltstone, and shale; light-gray sandstone; salt-and-pepper and lacustrine local brown thick lenses of conglomeratic sandstone; entirely fluvial. About 1,000 feet thick.

Tgr — Green River Formation
Upper part consists of white to light-gray, in part fine-grained partly oolitic limestone, locally much replaced by silica; minor gray-green and brown shale; 400 to 750 feet thick. Lower part consists of grayish-green shale with shale silicified limestone beds, and a thin basal sandstone; 100 to 120 feet thick. Of lacustrine origin.

Tco — Colton Formation
Reddish-brown, gray, and purplish shale; gray and red siltstone; yellow sandstone; minor bentonite and limestone. Probably of lacustrine origin. 120 feet thick.

Tf — Flagstaff Limestone
White cherty dense lacustrine limestone with minor interbedded gray and greenish-gray shale. Near its western limit, consists of red calcareous shale and limestone with a basal conglomerate. Characteristically 0 to 300 feet thick. In Antimony Canyon, rocks mapped as the Flagstaff are about 1,200 feet thick, and include gray, green, and buff shale, boulder conglomerate, white, gray, and buff sandstone, and red sandstone and sandy shale; these rocks may be in part equivalent to units older and (or) younger than the Flagstaff.

Tcf — Colton and Flagstaff Formations undivided

Tsc — Sandstone, siltstone, and conglomerate
May include rocks as old as the Flagstaff Limestone and as young as the top of Osiris; in part interbedded with basaltic andesite.

Paleocene

TKn — North Horn Formation
Pale-red, reddish-brown, purple, gray, and green coarsely interbedded shale and mudstone with minor intercalated buff and gray sandstone, limestone, and conglomerate. Contains numerous beds of coal. Contains numerous remains of Paleocene and upper part and lower part of Late Cretaceous age in the type part. About 1,200 feet thick.

Kpc — Price River Formation and Castlegate Sandstone
Price River Formation, light-gray, medium-grained to massive fine- to coarse-grained partly conglomeratic fluvial sandstone, with rare thin beds of carbonaceous shale. About 300 feet thick.
Castlegate Sandstone; massive cliff-forming sandstone. 150 feet thick.

UNCONFORMITY

Upper Cretaceous

Kmv — Mesaverde Formation
Pale-yellow thick-bedded sandstone and thin interbedded dark-gray shale west of the Henry Mountains. Of marginal marine origin. More than 300 feet thick.

Kbs — Blackhawk Formation and Star Point Sandstone
Blackhawk Formation, buff, gray, and white massive to thick-bedded fine- to coarse-grained sandstone and thin interbedded dark-gray and green carbonaceous shale. Contains thick, mineable coal beds in the lower part. 0 to 1,000 feet thick.
Star Point Sandstone, light-gray, buff, and white massive to thick-bedded fine- to medium-grained sandstone of beach and near-shore origin with interbedded dark-gray flaggy shale of marine origin that are tongues of the upper part of the Mancos Shale. 350 feet thick.

Mesaverde Group

Kim — Indianola Group
Gray to buff fluvial and marine sandstone and conglomerate; gray shale with thin beds of limestone, bentonite, and sandstone; fossiliferous. Forms small hogbacks west of the Henry Mountains. Of Cretaceous age. In the map area, consists of three formations, in descending order: Funk Valley Formation, buff, brown, and white thick-bedded to massive marine sandstone and interbedded shale, 600 feet thick; Blue Gate Shale Member, dark-gray to black carbonaceous shale with thin layers of bentonite, gray limestone, and fine-grained sandstone, 450 feet thick; Ferron Sandstone Member, brown, buff, and gray fine- to coarse-grained marine and nonmarine sandstone with interbedded shale and conglomerate, 1,300 feet thick.

Mancos Shale

Kmf, Kmb, Kmf, Kmb, Kmf, Kmb, Kmf, Kmb — Mancos Shale
Dark-gray to black soft, fissile fossiliferous marine shale with thin beds of bentonite and limestone, and interbedded white fine-grained sandstone. Total thickness 2,200 to 2,500 feet; thickens from east to west.
Kmu, upper part undifferentiated; in northeastern part of area.
Kmk, Mancos Shale; dark-gray to black carbonaceous and sandy shale, interbedded with pale-yellow sandstone and shale sandstone. 600 to 800 feet thick.
Kma, Ferron Sandstone Member; massive to thick-bedded lenticular sandstone and minor interbedded carbonaceous shale and impure coal. 0 to 300 feet thick; thins from east to west.
Kmbg, Blue Gate Shale Member; dark-gray to black carbonaceous marine shale with thin beds of bentonite, gray limestone, and fine-grained sandstone.
Kmfa, Ferron Sandstone Member; pale-yellow thin- to thick-bedded lenticular sandstone and interbedded carbonaceous shale and coal. 50 to 750 feet thick; thickens from east to west.
Kmt, Tununk Shale Member; dark-gray to black carbonaceous shale interbedded with thin beds of pale-yellow sandstone. 250 to 450 feet thick; thickens from east to west.

Kmtd — Tununk Shale Member of Mancos Shale and Dakota Sandstone

Kd — Dakota Sandstone
Light-yellow and yellowish-brown friable to quartzitic coarse-grained cross-bedded fluvial sandstone, conglomeratic sandstone, and conglomerate, with minor interbedded carbonaceous shale and impure coal. Plant impressions are common. 0 to 125 feet thick; commonly occurs as discontinuous lenses.

Middle Pennsylvanian

Kcc — Cedar Mountain and Morrison Formations

Kbch — Cedar Mountain Formation and Brushy Basin Member of Morrison Formation

UNCONFORMITY

Lower Cretaceous

Cedar Mountain Formation
Shale member; light-gray, grayish-green, and purple lacustrine shale and mudstone, with minor sandstone lenses and limestone beds. Chert and limestone nodules, and siliceous detrital pebbles and cobbles, possibly gastroliths, are abundant in the lower 50 feet. Equivalent to the Burro Canyon Formation of southwestern Colorado. 0 to 60 feet thick.
Buckhorn Conglomerate Member; dark-reddish-brown to purplish-gray thick-bedded to massive cobble conglomerate with subordinate fine-grained sandstone. Pebbles average slightly more than 1 inch in diameter and are mostly black chert, with minor chiefly of limestone, sandstone, and shale, and sparse pebbles of igneous rock. Maximum thickness is 100 feet in the north-central part of the area; thins southward to 0 feet.

Jmb, Jmwb, Jmbr — Morrison Formation
Variegated fluvial and lacustrine mudstone, siltstone, and sandstone; local thin limestone beds. 0 to 300 feet thick.
Jmb, Brushy Basin Shale Member; light-red, purple, and grayish-green bentonitic lacustrine mudstone; minor limestone lenses and concretions; minor white, gray, and buff crossbedded sandstone lenses; minor but distinctive conglomerate lenses containing multicolored chert pebbles. 0 to 300 feet thick; increasing from east to northeast.
Jmwb, Westwater Canyon Member; light-gray, tan, and white fluvial, thickly crossbedded fine- to coarse-grained lenticular sandstone containing scattered pebbles and thin conglomerate beds; contains interbeds of variegated sandy mudstone. Northeast of the Henry Mountains as much as 50 feet of massive gypsum occurs at the base. 0 to 200 feet thick; increasing from west to southeast.

UNCONFORMITY

Upper Jurassic

Jsc — Summerville and Curtis Formations

Jsc — Summerville Formation
Reddish-brown even-bedded, thin-bedded siltstone, sandstone, and mudstone; minor gypsum on this beds and veinlets; probably of tidal flat origin. 100 to 300 feet thick

Jcu — Curtis Formation
Greenish-gray and brown fine- to coarse-grained thin- to thick-bedded glauconitic marine sandstone and siltstone with minor green-gray to red shale and local thin lenses of conglomerate. 0 to 120 feet thick

UNCONFORMITY

Middle Jurassic

Jsr — San Rafael Group

Jse — Summerville and Entrada Formations

Je — Entrada Sandstone
Reddish-brown thin- to thick-bedded silty fine-grained sandstone of littoral origin, with light-reddish-brown to tan massive crossbedded sandstone beds dominant in the eastern part of the area. 300 to 500 feet thick, increasing irregularly from east to west

Jc — Carmel Formation
Yellow to light-brown fine-grained silty friable sandstone; green and red siltstone and shale; thin-bedded limestone; and massive beds of gypsum. 0 to thick beds of coarsely crystalline gypsum. Of marine origin. Limestone and gypsum content increases from east to west, so does total thickness from about 50 to about 300 feet.

Jafg, Jafc — Arapien Shale
Jafg, Twist Gulch Member; red siltstone and light-red to gray sandstone; bluish-gray shale, near top, 175 feet of olive-green shale with thin sandstone and grit layers. Of marine origin. 1,300 feet or more thick. Equivalent to the Summerville, Curtis, and Entrada Formations.
Jafc, Twelvemile Canyon Member; brick-red silty locally crossbedded sandstone; gray to olive-green shale with thin beds of gypsiferous shale; bluish-gray calcareous shale with fossiliferous limestone beds; gray shale and thin-bedded limestone; thin to thick lenticular beds of gypsum. Of marine origin. At least 3,000 feet thick. Equivalent to the Carmel Formation.

UNCONFORMITY

Upper Triassic(?)

Glen Canyon Group

Jn — Navajo Sandstone
Light-orange, buff, and light-yellow thickly crossbedded fine-grained calcareous cliff-forming sandstone; in the lower part of gray sandy limestone. 450 to 1,100 feet thick; increasing from east to west

Ykw — Kayenta Formation and Wingate Sandstone
Kayenta Formation; irregularly interbedded fluvial red, reddish-brown, buff, gray, and lavender shale, siltstone, and fine- to coarse-grained sandstone, in part conglomeratic, with minor beds of limestone and shale-pellet conglomerate. Forms slopes below the cliffs of Wingate Sandstone. 0 to 400 feet thick.
Wingate Sandstone; reddish-brown, buff and grayish-orange fine-grained thickly crossbedded calcareous eolian sandstone. Forms vertical cliffs with dark-brown desert varnish on weathered surfaces. 270 to 400 feet thick, increasing from west to east

UNCONFORMITY

Upper Triassic

Ys — Kayenta Formation

Yc — Chinle Formation
Consists of seven members, or lithologic equivalents of members, the rocks of which are mostly of fluvial and lacustrine origin. In descending order, they are:
Church Rock(?) Member; light-red, purplish, and brown siltstone and fine-grained sandstone, containing a persistent ledge of white to gray, black-pebble quartzite conglomerate. 0 to 100 feet.
Owl Rock Member; light-red to reddish-brown massive mudstone and siltstone, with minor beds and lenses of sandstone and limestone.
Petrified Forest Member; light-reddish-brown and reddish-orange siltstone and sandstone, with a persistent bed of sandstone and conglomeratic sandstone. 0 to 100 feet.
Moss Back Member; yellowish-gray fine- to medium-grained lenticular conglomeratic sandstone, with minor sandstone seams and pellets, limestone pellet conglomerate, and coaly material.
Monitor Butte Member; greenish-gray and reddish-brown bentonitic mudstone and minor sandstone. 0 to 100 feet.
Shinarump Member; light-gray to yellow medium- to coarse-grained sandstone and conglomeratic sandstone, with minor mudstone lenses and plant remains.
Temple Mountain Member; mottled purple, red, brown, and white massive mudstone and siltstone, minor coarse quartz grains, lenses of jasper and greenish carbonaceous mudstone.
Distribution of members is as follows: San Rafael Swell area, Church Rock(?), Moss Back, Monitor Butte, and Temple Mountain Members. Orange Cliffs area, Church Rock(?), Owl Rock, Moss Back, and Monitor Butte Members. Circle Cliffs area, Church Rock(?), Owl Rock, Monitor Butte, and Shinarump Members. Total thickness of Chinle Formation 215 to 550 feet, increasing from northeast to southwest

UNCONFORMITY

Lower and Middle(?) Triassic

Ym — Moenkopi Formation
Upper part; reddish-brown even-bedded fissile mudstone and siltstone, and fine-grained ripple-marked sandstone, with thin layers of gypsum and anhydrite. In exposures in the northeastern part of the San Rafael Swell, the unit is bleached greenish gray, in petroliferous, and contains pelecypod fossils. 200 to 775 feet thick
Middle part; light-reddish-brown to light-brown and-gray and tan thin- to medium-bedded silty dolomite and limestone, with minor amounts of siltstone and mudstone; locally petroliferous. 12 to 200 feet thick; absent in the canyon of the Green River.
Lower part; light-reddish-brown, yellow, and green even-bedded siltstone and mudstone, with minor sandstone and veinlets, with chert pebble conglomerate at the base. 30 to 140 feet thick
Of marine origin. Total thickness of the Moenkopi 200 to 1,000 feet or more, increasing from east to west

UNCONFORMITY

Permian

Pkc — Kaibab Limestone and Coconino Sandstone

Pk — Kaibab Limestone[1]
Light-gray to brown massive cliffy marine limestone, in part oolitic, white calcareous siltstone; thin beds of crossbedded fine-grained sandstone; minor some dolomite. 0 to 100 feet thick in the San Rafael Swell, thickening to 350 feet in the Capitol Reef area.

Pcn — Coconino Sandstone[1]
Light-gray to buff friable to hard fine-grained thickly crossbedded eolian sandstone; minor siltstone and sandstone; local thin ferruginous siderite limestone in the lower 10 feet. 700 to 1,200 feet thick; increasing southward

Pcw, Pcc — Cutler Formation[1]
Pcwo, White Rim Sandstone Member and Organ Rock Tongue undivided. The White Rim Sandstone Member is fine-grained to coarse-grained pale-yellow to gray, well-sorted to fine-grained eolian sandstone, 0 to 250 feet thick; the Organ Rock Tongue is a tongue of reddish-brown siltstone and thin-bedded fine-grained sandstone, 0 to 500 feet thick.
Pcc, Cutler Member; brown, reddish-brown, gray, red, and yellow fine- to coarse-grained thickly crossbedded fine-grained sandstone, with minor beds of red sandy shale and gray clayey limestone. 750 feet thick

Pcw, Pcc — Cutler Formation[1]

Pcr — Rico Formation
Reddish-brown and greenish-gray fine- to coarse-grained crossbedded sandstone, with minor beds of gray limestone and gray and red fossiliferous marine limestone; red and purple shale and siltstone. 400 feet thick at the east edge of the area, thinning westward to 0 feet

Ph — Hermosa Formation
Ph, upper member; gray thin- to thick-bedded dense to coarsely crystalline cherty fossiliferous marine limestone, interbedded with dark-gray and brown massive to thin-bedded fine-grained sandstone, minor gray and red shale. 200 to 1,200 feet thick, increasing eastward.
Phh, Honaker Trail Member; gray limestone, dark-gray shale, and gray sandstone. Of marine origin. Crinoids are common, only as molds and plugs. 0 to 2,500 feet thick; determined from drilled wells; thickness decreases from east to west

Pennsylvanian

Carboniferous

Contact

Fault
Dashed where approximately located; dotted where concealed. Bar and ball on downthrown side

Strike and dip of beds

Vertical beds

Horizontal beds

Approximate strike, and direction of dip of beds and volcanic flow tops
Determined from aerial photographs

Limit of deposition of a formation, here the Curtis Formation

Collapse structures
Small vertical pipe-like bodies of breccia, bounded by circular faults, in the San Rafael Swell. Contain altered and brecciated rocks of the Moenkopi, Chinle and Wingate Formations. In the Temple Mountain area, the rocks in the collapse structures are uranium bearing

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