UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

BULLETIN 1137
PLATE 1 (SOUTH HALF)

Geology by D. A. Phoenix assisted by D. W. Peterson, 1956

Base from U. S. Geological Survey topographic quadrangles

GEOLOGIC MAP AND SECTIONS OF THE LEES FERRY AREA, COCONINO COUNTY, ARIZONA (SOUTH HALF)

SCALE 1:24 000

1 ½ 0 1 MILE

CONTOUR INTERVALS 40 AND 80 FEET
DATUM IS MEAN SEA LEVEL

Quaternary deposits not shown

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EXPLANATION

Qs — Wind deposits
Light-tan windblown sand and silt derived mostly from the San Rafael or Glen Canyon group

Qa$_1$, Qa$_2$ — Fluvial deposits
Qa$_1$, *in canyons; stream-washed sand and gravel derived mostly from distant sources.*
Qa$_2$, *on plateaus; sand and silt transported from place to place by seasonal runoff locally stabilized by plants derived from local sources*

Qt — Talus deposits
Broken blocks and angular fragments of rock at base of cliffs; forms cones

Qls — Landslide deposits
Jumbled blocks and fragments of sandstone cemented more or less by clay-rich silty sand, "toreva-blocks" of the Glen Canyon group, all mostly covering mudstone of the Chinle formation

Qa$_3$ — Alluvial fan deposits
Sand and partly rounded fragments of Triassic and Jurassic rocks in fan-shaped deposits; bouldery near source, sand partly windblown near toe

Terrace gravel
Stream-washed sand and gravel on terraces bordering streams and on plateaus locally

Pleistocene(?) and Recent — QUATERNARY

UNCONFORMITY

Kd — Dakota sandstone
Pink to pale-brown crossbedded sandstone and conglomerate overlain by yellow-green to light-brown ripple-marked siltstone; coal-bearing

Upper Cretaceous — CRETACEOUS

UNCONFORMITY

Je — Entrada sandstone
Pale-gray massive crossbedded medium- to fine-grained sandstone

Jc, Jcj — Carmel formation
Red-brown to gray-green mudstone; red sandstone interstratified with siltstone; slump-deformed red-brown siltstone and pale-brown sandstone.
Jcj, Judd Hollow tongue, at base; dark-brown sandstone and siltstone. Identifiable only where Carmel formation intertongues with Navajo sandstone

Upper Jurassic; Middle and Upper Jurassic, San Rafael group — JURASSIC

Jmt, Jn — Navajo sandstone
Gray to red-brown massive crossbedded coarse- to fine-grained sandstone with lenses of dark-brown chert locally.
Jmt, *Thousand Pockets tongue, at top; pale-yellow massive medium- to fine-grained sandstone. Identifiable only where Navajo sandstone intertongues with Carmel formation*

Jk — Kayenta formation
Pale-red-brown massive even-bedded medium- to fine-grained sandstone

Trms, Trmd — Moenave formation
Trms, *Springdale sandstone member; darkly stained broadly lenticular massive strata of medium- to fine-grained sandstone.*
Trmd, *Dinosaur Canyon sandstone member, red-orange thin- to thick-bedded fine-grained sandstone and siltstone*

Glen Canyon group — JURASSIC(?) and TRIASSIC(?)

UNCONFORMITY

Trcu, Trcss, Trcs — Chinle formation
Trcu, *Owl Rock and Petrified Forest members undifferentiated; Owl Rock is interbedded cherty limestone, limestone conglomerate, sandstone and mudstone; underlies Petrified Forest that is variegated bentonitic clay and mudstone.*
Trcss, *sandstone and shale member; light-colored arkosic sandstone separated by mudstone.*
Trcs, *Shinarump member; pale-brown crossbedded conglomerate sandstone*

Upper Triassic — TRIASSIC

UNCONFORMITY

Trmu, Trml — Moenkopi formation
Trmu, *upper unit; dark-reddish-brown limy siltstone and mudstone with thin-bedded ripple-marked limestone.*
Trml, *lower unit; pale-reddish-brown thin-bedded shaly siltstone and mudstone*

Lower and Middle(?) Triassic — TRIASSIC

UNCONFORMITY

Pk — Kaibab limestone
Pale-gray massive to thick-bedded sandy and cherty dolomitic limestone

Pt — Toroweap formation
Pale-gray cherty limestone and grayish-yellow quartzitic sandstone separated locally by thin beds of reddish mudstone

Pc — Coconino sandstone
White to pale-grayish-yellow massive crossbedded quartzitic sandstone

Ph — Hermit shale
Reddish-brown thin-bedded shaly mudstone and siltstone

PPs — Supai formation
Reddish- to yellow-gray massive- to thick-bedded limestone, siltstone, and crossbedded sandstone

Aubrey group — PERMIAN; PENNSYLVANIAN AND PERMIAN

Contact
Dashed where approximately located; dotted where concealed

Fault, showing dip
Dashed where approximately located; dotted where concealed; queried where inferred or indefinite. U, upthrown side; D, downthrown side; figure indicates vertical displacement, in feet

Vertical fault, showing vertical displacement in feet
Dashed where approximately located; dotted where concealed; queried where inferred or indefinite. U, upthrown side; D, downthrown side

Vertical fault
Dashed where approximately located; dotted where concealed; queried where doubtful. U, upthrown side; D, downthrown side

Anticline
Showing trace of axial plane and bearing and plunge of axis; dashed where approximately located

Syncline
Showing trace of axial plane and bearing and plunge of axis; dashed where approximately located

Asymmetric anticline
Showing trace of axial plane and bearing and plunge of axis. Dashed where approximately located. Short arrow indicates steeper limb

Asymmetric syncline
Showing trace of axial plane and bearing and plunge of axis. Dashed where approximately located. Short arrow indicates steeper limb

Anticlinal bend of monocline
Showing trace of axial plane and bearing and plunge of axis. Dashed where approximately located. Short arrow indicates steeper limb

Strike and dip of beds

Approximate strike and dip of beds

Strike and dip of joint

Strike of vertical joint

Structure contours
Drawn on base of Navajo sandstone; dashed where approximately located; short dashes indicate projection above surface. Contour interval 200 feet. Datum is mean sea level. Contours deleted in areas of landslide blocks

Prevailing trend of sedimentary structures in Entrada sandstone, Navajo sandstone, and the Shinarump member of the Chinle formation
Barb denotes direction of deposition

Edge of channel of Triassic age
Edge of channel cut in top of Moenkopi formation, as seen on exposed cliff faces. Hachures point toward center of channel

Carbonate rock
Reefs and linear bodies of sheared and crushed Navajo sandstone cemented by iron and manganese oxides and carbonate minerals. Dashed where approximately located; dotted where concealed; queried where doubtful

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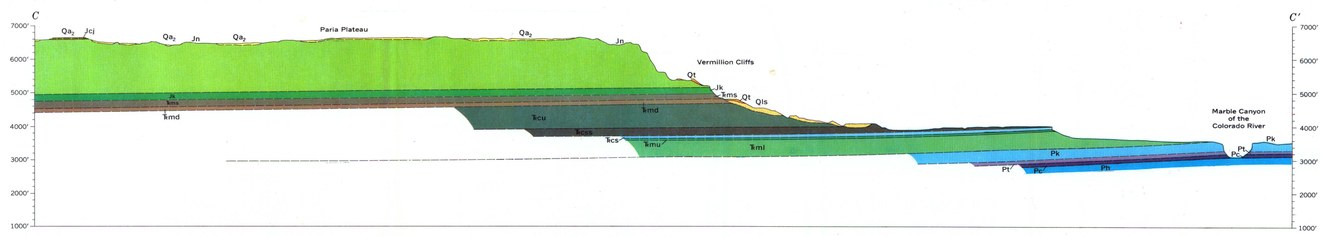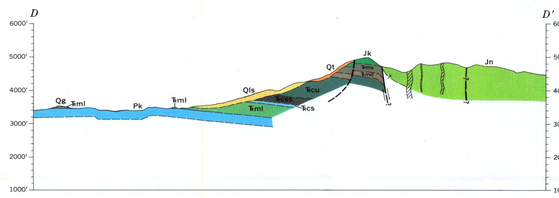
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