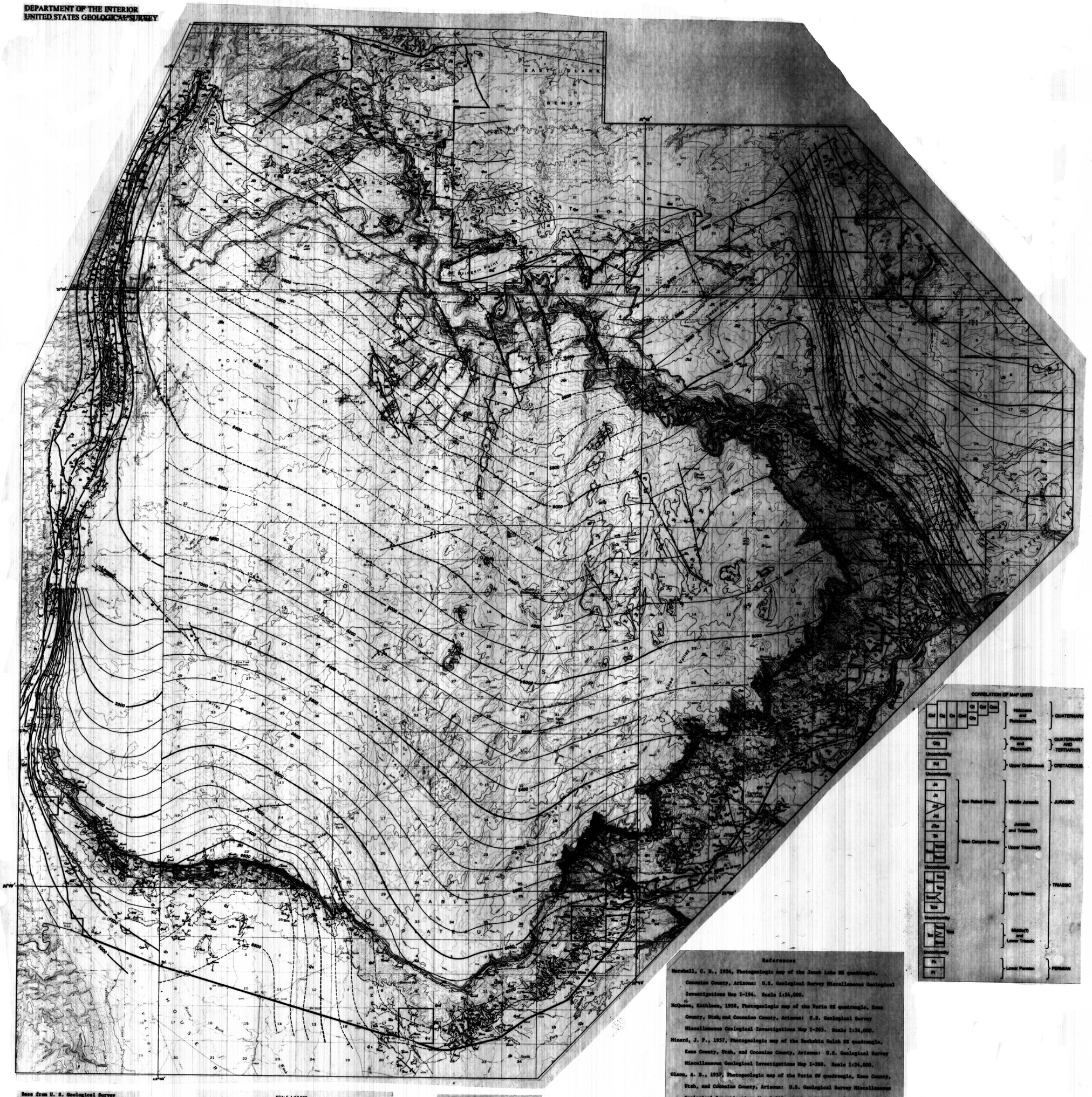
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

OPEN-FILE REPORT
80-[illegible]



Base from U. S. Geological Survey
Emmett Wash 1954, House Rock Spring 1955,
Jacob Lake 1956-57, Lees Ferry 1954,
Nipple Butte 1953, Paria Plateau 1954,
Paria 1954, Tanner Wash 1954,
Telegraph Flat 1954

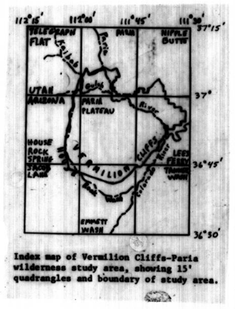
SCALE 1:62 500

1 ½ 0 1 2 3 4 MILES

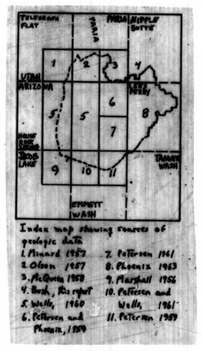
1 .5 0 1 2 3 4 KILOMETERS

CONTOUR INTERVAL 40 AND 80 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Geology from sources listed,
compiled by and with modifications
and additions by Bush, 1979



Index map of Vermilion Cliffs-Paria
wilderness study area, showing 15'
quadrangles and boundary of study area.



Index map showing sources of
geologic data.
1. Pinard 1957
2. Olson 1957
3. McQueen 1959
4. Bush, Bissell
5. Wells, 1960
6. Petersen and Phoenix, 1959
7. Petersen 1961
8. Phoenix 1963
9. Marshall 1956
10. Petersen and Wells, 1961
11. Petersen 1959

DESCRIPTION OF MAP UNITS

HOLOCENE AND PLEISTOCENE(?)

Qaf Coalescing alluvial fans consisting of poorly sorted sand and partly rounded fragments of Triassic and Jurassic rocks in east and southeast, and of cherty, angular gravels and boulders of Kaibab limestone in southwest and west

Qg Stream-washed sand and gravel on terraces bordering Holocene stream courses

Qs Eolian and fluvial sands and silts, reddish-brown below Vermilion Cliffs, light tan and pale reddish-brown on Paria Plateau and high flats north of Paria River. Shown only below Vermilion Cliffs

Qsd Boulders and large blocks of angular slide debris from the Glen Canyon Group along the Vermilion Cliffs (including "coreva" blocks) and coherent and incoherent masses and mudflows of the Chinle Formation; in places includes talus not mapped separately. Equivalent to Qls of the Lees Ferry quadrangle

Qt Talus, broken blocks and angular fragments of rock at base of cliffs; forms cones, in places merges downslope with Qls and Qsd

Qls Jumbled blocks and fragments, mostly of sandstone from the Glen Canyon Group along the Vermilion cliffs (including "coreva" blocks) and coherent and incoherent masses and mudflows of the Chinle Formation. Shown only in Lees Ferry quadrangle

Qal Alluvium, stream-washed silt, sand, and gravel in canyons and along Holocene stream courses

Qes Light tan windblown sand and silt derived mostly from the San Rafael and Glen Canyon Groups. Covers much of Paria Plateau, East and West Clark Benches, Flat Top, and the area east of the Echo Cliffs monocline, but unmapped on most of Paria Plateau and in Echo Cliffs monocline area

PLEISTOCENE AND/OR PLIOCENE(?)

Qtg Poorly to well cemented stream-washed sand and gravel in places on plateaus and high flats, well above and unrelated to present stream courses.

UPPER CRETACEOUS

Kd Dakota Sandstone, pink to pale brown crossbedded sandstone and conglomerate, overlain by yellow-green to light brown ripple-marked siltstone; coal-bearing; present only along northeast edge of area

MIDDLE JURASSIC

San Rafael Group

Je Entrada Sandstone, pale gray, massive, crossbedded medium- to fine-grained sandstone

Jc Carmel Formation, red-brown to gray-green mudstone; red calcareous siltstone and silty limestone; interbedded red sandstone and red-brown siltstone; pale brown and white crossbedded sandstone

Jct Thousand Pockets Tongue, pale yellow massive medium- to fine-grained sandstone, crossbedded. Resembles Navajo Sandstone[1/]

Jcj Judd Hollow Tongue, dark brown sandstone and siltstone, evenly bedded. Resembles main Carmel Formation

LOWER JURASSIC AND UPPER TRIASSIC(?)

Glen Canyon Group

JTR n Navajo Sandstone, white to gray, red-brown and orange, massive, markedly crossbedded, coarse- to fine-grained sandstone, with lenses of dark brown chert in places. Copper-bearing in at least one place. Caps Paria Plateau and flats north of Kaibab Gulch and Paria River

UPPER TRIASSIC(?)

Glen Canyon Group

TR k Kayenta Formation, in east, pale red-brown, massive, even-bedded medium- to fine-grained sandstone; in west, alternating red and pale red-brown siltstone and sandstone, crossbedded and ripple marked in part, siltstone thin-bedded and fissile

TR mo Moenave Formation, shown undivided in places, consists of:

TR mos Springdale Sandstone Member, darkly stained, pale red-brown, broadly lenticular massive beds, medium- to fine-grained sandstone, poorly cemented in places

TR mod Dinosaur Canyon Sandstone Member, red-orange thin- to thick-bedded fine-grained sandstone and siltstone and varicolored mudstone

UPPER TRIASSIC

Chinle Formation

TR cu Owl Rock and Petrified Forest Members, undifferentiated in Lees Ferry quadrangle only

TR co Owl Rock Member, in east light-colored, interbedded cherty limestone, limestone conglomerate, sandstone, and soft pink and light red mudstone, more silty westward; in west nonbentonitic dark-red mudstone, siltstone, in places thin nodular limestones

Chinle Formation—Continued

TR cp Petrified Forest Member, variegated bentonitic unit, shades of red, pink, yellow, gray-green, and gray-blue, mostly claystone and mudstone, some siltstones, occasional sandstones and limestone pebble conglomerates. Sandstones uranium- and copper-bearing in a few places. Low gold and mercury content in many zones. Substrate for and involved in all Qls and Qsd masses in area

TR ces Unnamed sandstone and mudstone unit, light-colored crossbedded arkosic sandstones separated by dark red, gray, or gray-green mudstones. Scattered fossil logs near base. Uranium- and copper-bearing in places. Low gold and mercury content in places. Mapped only in Lees Ferry quadrangle, dies out to west

TR cs Shinarump Conglomerate Member, white to pale brown crossbedded conglomeratic sandstone and conglomerate; uranium- and copper-bearing in places along channels cut into underlying Moenkopi Formation. In places, abundant carbonaceous material and petrified logs. Low content of gold in some uranium occurrences. Caps prominent bench in Lees Ferry and Tanner Wash quadrangles, very variable in thickness, becomes lenticular and discontinuous to south and west

MIDDLE(?) AND LOWER TRIASSIC

TR n Moenkopi Formation, undivided in House Rock Spring and Telegraph Flat quadrangles, reddish-brown and grayish-green siltstone and clayey siltstone, micaceous, in part gypsiferous

TR mu Upper Red Member, dark reddish-brown limy siltstone, mudstone, and silty claystone, micaceous, with thin ripple-marked limestone in east; prominent massive pale brown sandstone up to 50 feet thick forms marker bed at base. Low gold content in one sample

TR ms Shnabkaib Member, uniform light gray-green, highly gypsiferous, micaceous, noncalcareous, thin-bedded clayey siltstone; dies out northeast in Lees Ferry quadrangle, recognized but not mapped in the west

TR mm Middle Red Member, uniform pale red-brown, micaceous, highly gypsiferous, noncalcareous, thin-bedded ripple-marked siltstone and mudstone.

LOWER PERMIAN

Pk Kaibab Limestone, pale gray to pale yellow and tan, massive to thick-bedded sandy and cherty dolomitic limestone and dolomite. Thin shale interbeds, fossiliferous

Pt Toroweap Formation, interbedded light-colored, crossbedded sandstone, dark red silty sandstone and siltstone, light gray cherty limestone

CONTACT—Dashed where approximately located or concealed

FAULT—Showing direction of displacement, dashed where approximately located

ANTICLINE—Showing axial trace and plunge, dashed where approximately located

SYNCLINE—Showing axial trace and plunge, dashed where approximately located

ANTICLINAL BEND OF MONOCLINE—Showing axial trace and plunge, dashed where approximately located. Short arrow indicates steeper limb

STRIKE AND DIP OF BEDS

Observed: Inclined; Horizontal

Estimated: By photointerpretation; By photogrammetric methods

CARBONATE ROCK—Knobs and linear bodies of sheared and crushed Navajo sandstone cemented by iron and manganese oxides and carbonate minerals. Dashed where approximately located

STRUCTURE CONTOUR—Interval 100', 200', and 500'. Drawn on base of upper part of Kaibab Limestone in House Rock Spring quadrangle; on base of Navajo Sandstone in Emmett Wash, Lees Ferry, Nipple Butte, and south half of Paria Plateau quadrangles; on base of Carmel Formation (including Judd Hollow Tongue) in north half of Paria Plateau quadrangle and in Telegraph Flat and Paria quadrangles. Control scanty, even at outcrops of contacts. Dashed where projected above surface.

MINE

ADIT

PROSPECT

SHAFT

1/ The Thousand Pockets Tongue is a member of the Page Sandstone, which interfingers with the Carmel Formation.

References

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Phoenix, D. A., 1963, Geology of the Lees Ferry area, Coconino County, Arizona: U.S. Geological Survey Bulletin 1137, 86 p.

Wells, J. D., 1960, Stratigraphy and structure of the House Rock Valley area, Coconino County, Arizona: U.S. Geological Survey Bulletin 1081-D, p. 117-158.

PLATE 1.- PRELIMINARY GEOLOGIC MAP OF THE VERMILION CLIFFS-PARIA CANYON INSTANT STUDY AREA, COCONINO COUNTY, ARIZONA AND KANE COUNTY, UTAH, BY ALFRED L. BUSH, U.S. GEOLOGICAL SURVEY.