



Slide debris
Boulders and large blocks of fragmental debris from the Glen Canyon group and Chinle formation in the landslide areas along the Vermilion Cliffs that consist of rubble to large segments of broken strata in which the beds have been so disturbed that rock units can not be reliably mapped; some surficial sand is present.

Landslide block
Large torva-type landslide blocks from the Vermilion Cliffs in which the strata are essentially undisturbed except for downward and rotational movements; (a) indicates landslide block. Jn, Navajo sandstone; Jk, Kayenta formation; Rmos, Springdale sandstone member, and Rmod, Dinosaur Canyon member of the Moenave formation; and Roo, Owl Rock member, and Rcp, Petrified Forest member of the Chinle formation.

UNCONFORMITY

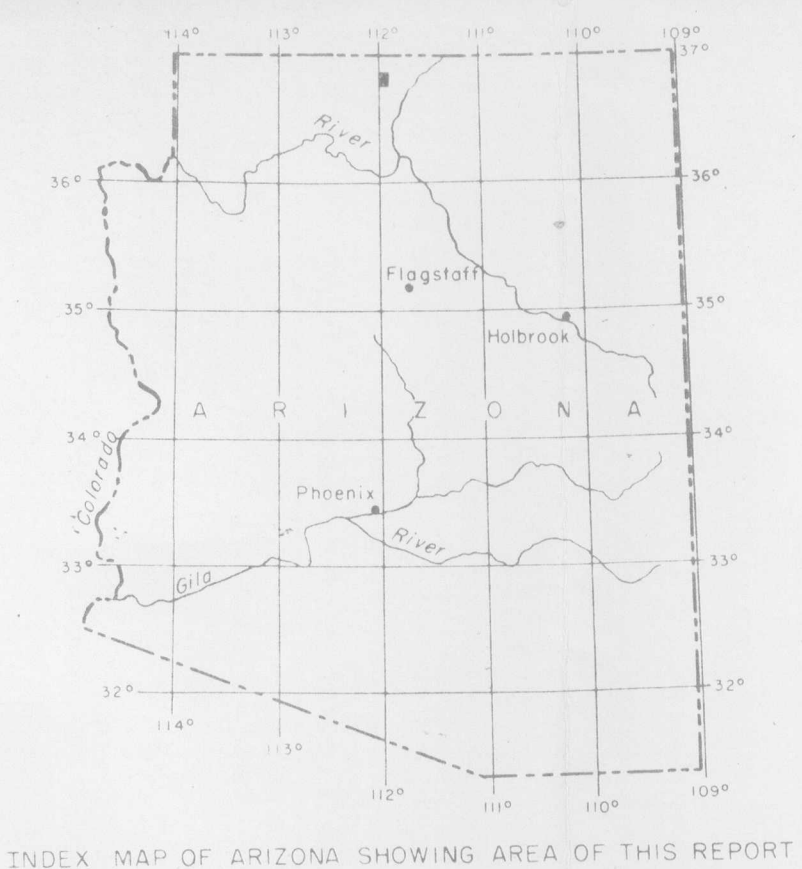
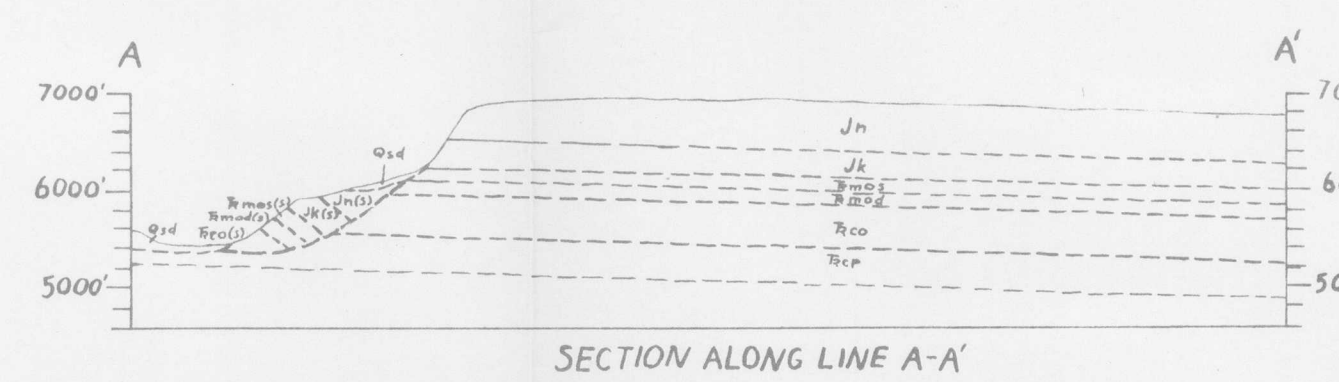
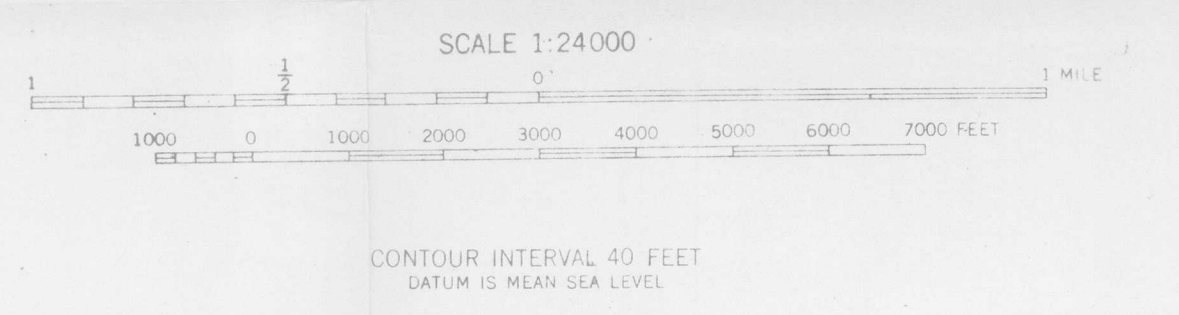
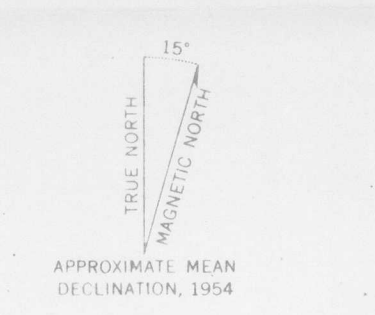
Jn
Navajo sandstone
White to shades of red, brown, and orange, coarse- to fine- to predominantly medium-grained crossbedded sandstone, approximately 1,700 feet thick, consisting of subrounded to well-rounded frosted quartz grains generally well cemented with iron oxide; locally calcite cement is present. Very locally lenses of sandy carbonate rock (caliche dolomite and dolomitic limestone) occur. Generally, distinctive, large- and medium-scale tangential crossbeds are prominent although parts of formation are nearly massive. Contorted crossbeds occur in numerous small widespread areas. Topographically the formation forms rounded knolls and cliffs in which prominent joints are visible. Although bare rock is exposed over much of the area, in many places the outcrop is covered by sand usually a few feet, but locally as much as 20 to 30 feet thick. Lower contact is sharp, marked by the lowest tangential crossbeds.

Jk
Kayenta formation
About 295 feet of alternating beds of moderate reddish-brown/ with thin layers of light greenish-gray/ siltstone and similarly colored fine-grained sandstone. The sandstone forms ledges 10 to 40 feet thick and the interbedded parts that are mostly siltstone form slopes of similar dimensions. In the middle part of the formation, prominent beds of white, fine-grained sandstone about 1 foot thick occur. The sandstone consists of well-sorted subangular to rounded quartz grains with sparse mica, very poorly to finely cemented; noncalcareous clay and iron oxide cement the reddish-brown sandstone; calcite and dolomite cement the white sandstone. The siltstone is thin bedded and in places cross-bedded on a small scale; the sandstone is thin- to thick-bedded, ripple-marked, and crossbedded on a small scale in the lower part and a medium scale at the top. The Kayenta formation forms a ledge slope in contrast to the cliffs formed by the Navajo. The lower contact is sharp and conformable and is located at the base of the siltstone slope immediately above the prominent sandstone cliff formed by the Moenave formation.

Rmos
Rmod
Moenave formation
Springdale sandstone member, Rmos, pale reddish-brown/ medium-grained massive sandstone about 140 feet thick, consisting of well-sorted rounded quartz grains with some mica flakes, poorly to well cemented with noncalcareous clay and iron oxide. Large crescent-shaped areas of yellow staining, probably iron oxide, are characteristic. Lenticular stringers of conglomerate with angular sandstone and siltstone pebbles, crossbedded in part, occur near commonly near the base. The prominent Springdale ledge and the color difference between the Springdale member and the Kayenta formation are used to separate the two units. Basal contact is gradational and is placed at the top of the uppermost continuous even-bedded stratum of the Dinosaur Canyon member. Dinosaur Canyon member, Rmod, predominantly red with few gray beds and streaks, coarse- to fine-grained thin- to thick-bedded calcareous to noncalcareous siltstone, about 145 feet thick, which form a series of 10- to 15-foot ledges and slopes. About 80 feet from the base of the formation occurs a 10-foot bed of very thin to thin-bedded calcareous siltstone colored in shades of gray, yellow, and red; an ostracod fossil zone about 1 foot thick occurs in the middle part of the 10-foot bed. Lower contact is conformable, sharp, and regular at the base of the red, ledge, siltstone slope and the top of the darker red, rounded slopes of the Chinle formation.

Roo
Rcp
Chinle formation
The Chinle formation stands out from the other rock units because of its characteristic rounded slopes, dark-red upper part, and gray lower part. Owl Rock member, Roo, variable unit about 430 feet thick consisting of: (1) interbedded and interlined fine- to medium-grained red, brown, and green massive to crossbedded sandstone consisting of poorly to well-sorted rounded quartz grains with minor feldspar and biotite, which are very poorly to finely cemented by calcareous to noncalcareous clay; (2) massive, calcareous to noncalcareous, clayey siltstone and sandstone characteristically dark reddish-brown/ but also occurring in shades of red, brown, and gray with green spots; and (3) conglomeratic sandstone with angular to rounded, variable sized fragments of sandstone, siltstone, siltstone, and earthy limestone well cemented by calcite. Siltstone comprising about 80 percent of the unit, is mostly in the lower part; sandstone, about 15 percent, is mostly in the middle part; siltstone, about 4 percent, is mostly in the upper part; and conglomeratic sandstone lenses, about 1 percent, are in the middle and upper parts. Although the Owl Rock member generally forms rounded slopes, cliffs occur at the upper end of gulches. Lower contact is sharp and conformable at the base of the red siltstone and the top of the gray sandstone. Petrified Forest member, Rcp, only upper part exposed; grayish-red purple/ with small spots of grayish-yellow green/ bentonitic, non-calcareous, massive sandstone about 360 feet thick; weathers to characteristic light-gray rounded slopes with frothy surface. Isolated small outcrops of sandstone from the lower part of the member occur; the sandstone is white and massive, consisting of coarse angular well-sorted quartz grains well cemented by clay. The usual uranium-bearing unit in quadrangles, the Shinarump member, is absent in the map area.

Mapped by the Geological Survey 1954
Topography by multiple methods from aerial photographs taken 1951
Dashed land lines indicate approximate locations
Symbols and other detail herein drawn for 1:62,500 scale publication



Colors determined by comparison with rock-color chart (Goddard, E. H., and others, 1948, Rock-color chart: National Research Council).

Contact
(Dashed where approximately located; short dashes where indefinitely located)

Fault, showing dip
(Dashed where approximately located; short dashes where indefinitely located; U, upthrown side; D, downthrown side)

Vertical fault
(Dashed where approximately located; short dashes where indefinitely located; U, upthrown side; D, downthrown side)

High angle fault
(Dashed where approximately located; short dashes where indefinitely located; U, upthrown side; D, downthrown side)

Strike and dip of beds
65°

Structure contour
Drawn on base of Navajo sandstone; dashed where approximately located; short dashes indicate projection above surface. Contour interval 100 feet. Datum is mean sea level. Data from adjacent quadrangles are used to locate contour lines.

PRELIMINARY GEOLOGIC MAP OF THE PARIA PLATEAU SW QUADRANGLE, COCONINO COUNTY, ARIZONA
BY
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Structural geology
The western boundary of this quadrangle is a few miles east of the north-trending East Kaibab monocline. The regional dip is about 180 feet per mile (2°) toward the north-northeast. The low amplitude anticline shown in the southwest corner of the quadrangle extends southwestward across the adjacent quadrangle. This anticline is flanked to the east and west by similar low amplitude synclines in the next quadrangles. The faulted area in the northeast corner extends northward a few miles into the two adjacent quadrangles. The amount of offset on the faults in the quadrangle is not known except for the small ones on Vermilion Cliffs, which have a maximum of 5 to 10 feet displacement. The fault zone generally consists of a zone of fracturing several feet wide. The short fault in the northeastern part consists of a complex fracture zone in which the fractures stand up as small resistant ridges.