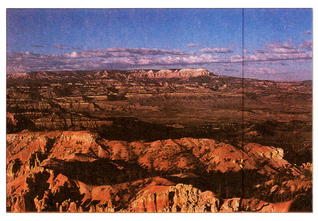
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PREPARED IN COLLABORATION WITH THE
U.S. NATIONAL PARK SERVICE

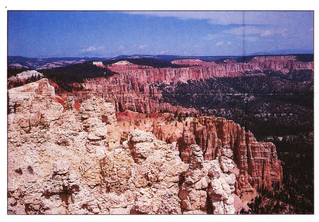
MISCELLANEOUS INVESTIGATIONS SERIES
MAP I-2108
Pamphlet accompanies map

REFERENCE ONLY
DOES NOT CIRCULATE

View north across Tropic Canyon of Rubys Inn thrust fault. Continuous white limestone ledge above highway road cut marks base of thrust in pink limestone member of the Claron Formation.



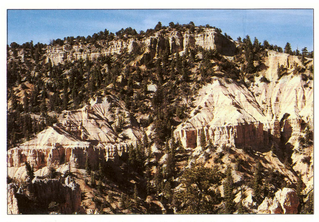
View east from Paunsaugunt Plateau across the Paria amphitheater. Town of Tropic, Utah, in right center. Table Cliff Plateau on the horizon.



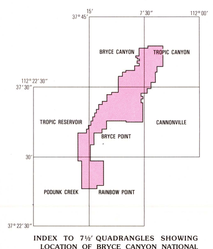
View northwest from Rainbow Point showing east face of Paunsaugunt Plateau. White limestone member of the Claron Formation in foreground also caps distant buttes and overlies near-vertical cliffs of pink limestone member of the Claron Formation.

View north from Lower Podunk Creek of the Pink Cliffs at the south end of Bryce Canyon National Park. Cap of white limestone member of the Claron Formation at Yovimpa Point lies on cliffs of pink limestone member of the Claron Formation. Drab-colored Upper Cretaceous rocks form tree-covered ridges below the Pink Cliffs.

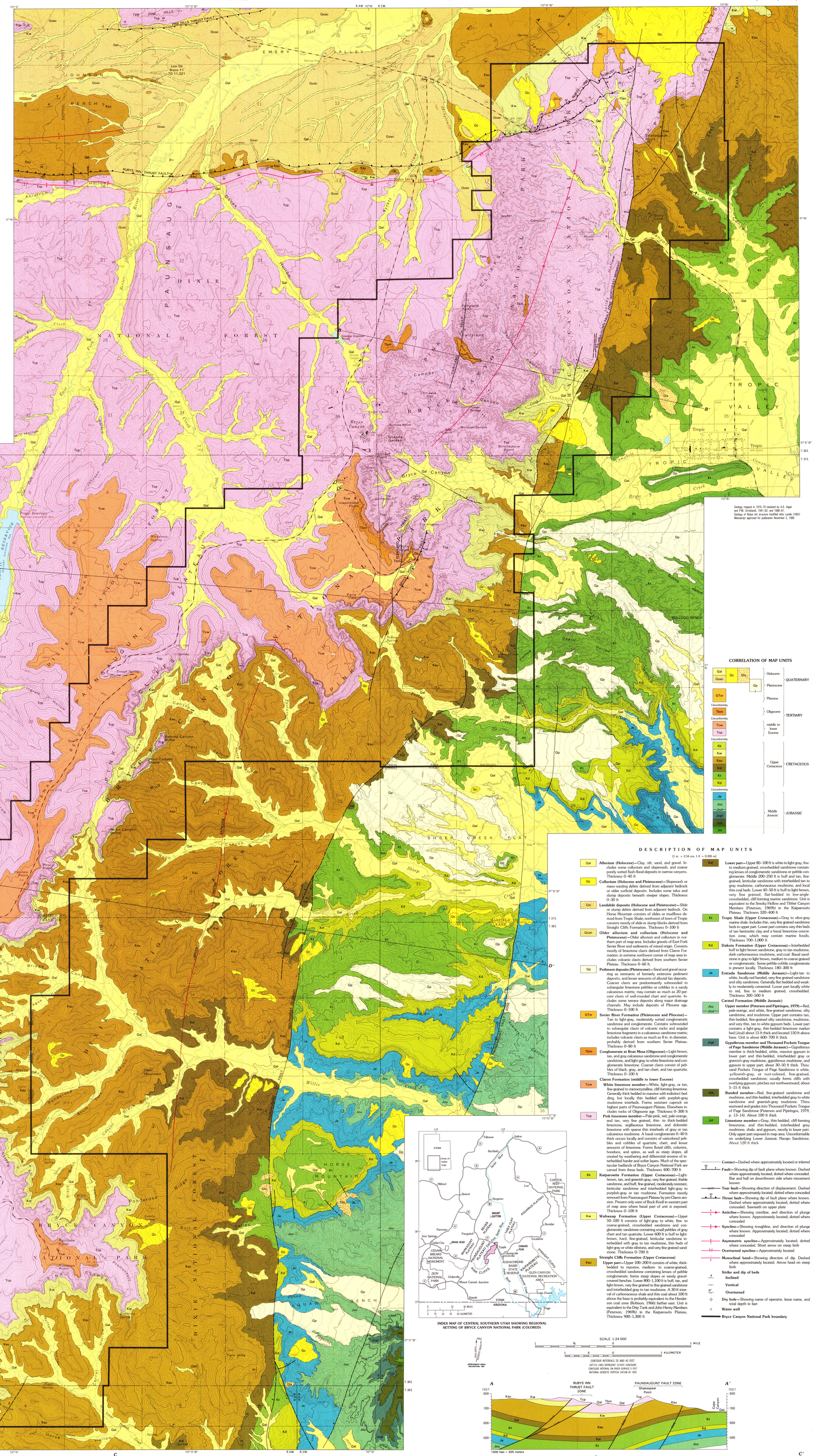
View north along strike of Paunsaugunt fault just north of Campbell Creek. Beds of pink limestone member of the Claron Formation on left are faulted down against beds of the Upper Cretaceous Straight Cliffs Formation. Vertical displacement on fault is about 1,200 ft.



View south of Boat Mesa along strike of near-vertical Fairyland fault. Note offset of lower white limestone ledge in pink limestone member of the Claron Formation. Fault does not cut light-colored conglomeratic beds that cap the mesa.



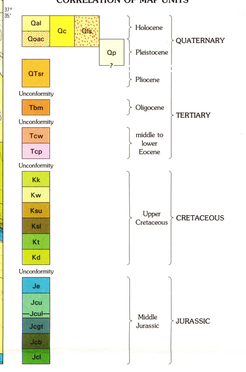
INDEX TO 7½' QUADRANGLES SHOWING LOCATION OF BRYCE CANYON NATIONAL PARK (COLORED)



Base from U.S. Geological Survey
Bryce Canyon, Bryce Point, Cannonville, Podunk Creek, Rainbow Point, Tropic Canyon, Tropic Reservoir, 1966

Geology mapped in 1976–79 (assisted by A.A. Aitken and P.M. Sirkland, 1981–82, and 1986–87)
Geology of Rubys Inn structure modified after Lundin (1987)
Manuscript approved for publication November 2, 1989

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

[1 in. = 2.54 cm; 1 ft = 0.305 m]

Qal **Alluvium (Holocene)**—Clay, silt, sand, and gravel. Includes some colluvium and slopewash, and coarse poorly sorted flash flood deposits in narrow canyons. Thickness 0–40 ft

Qc **Colluvium (Holocene and Pleistocene)**—Slopewash or mass-wasting debris derived from adjacent bedrock or older surficial deposits. Includes some talus and slump deposits beneath steeper slopes. Thickness 0–30 ft

Qls **Landslide deposits (Holocene and Pleistocene)**—Slide or slump debris derived from adjacent bedrock. On Horse Mountain consists of slides or mudflows derived from Tropic Shale; northwest of town of Tropic consists mostly of slide or slump blocks derived from Straight Cliffs Formation. Thickness 0–100 ft

Qoac **Older alluvium and colluvium (Holocene and Pleistocene)**—Older alluvium and colluvium in northern part of map area. Includes gravels of East Fork Sevier River and sediments of mixed origin. Consists mostly of limestone clasts derived from Claron Formation; in extreme northwest corner of map area includes volcanic clasts derived from southern Sevier Plateau. Thickness 0–60 ft.

Qp **Pediment deposits (Pleistocene)**—Sand and gravel occurring as remnants of formerly extensive pediment deposits, and lesser amounts of alluvial fan deposits. Coarser clasts are predominantly subrounded to subangular limestone pebbles or cobbles in a sandy calcareous matrix; may contain as much as 20 percent clasts of well-rounded chert and quartzite. Includes some terrace deposits along major drainage channels. May include deposits of Pliocene age. Thickness 0–100 ft

QTsr **Sevier River Formation (Pleistocene and Pliocene)**—Tan to light-gray, moderately sorted conglomeratic sandstone and conglomerate. Contains subrounded to subangular clasts of volcanic rocks and angular limestone fragments in a calcareous sandstone matrix; includes volcanic clasts as much as 8 in. in diameter, probably derived from southern Sevier Plateau. Thickness 0–80 ft

Tbm **Conglomerate at Boat Mesa (Oligocene)**—Light-brown, tan, and gray calcareous sandstone and conglomeratic sandstone, and light-gray to white limestone and conglomeratic limestone. Coarser clasts consist of pebbles of black, gray, and tan chert, and tan quartzite. Thickness 0–100 ft

Claron Formation (middle to lower Eocene)

Tcw **White limestone member**—White, light-gray, or tan, fine-grained to microcrystalline, cliff-forming limestone. Generally thick bedded to massive with indistinct bedding, but locally thin bedded with purplish-gray mudstone interbeds. Forms resistant caprock on highest parts of Paunsaugunt Plateau. Elsewhere includes rocks of Oligocene age. Thickness 0–300 ft

Tcp **Pink limestone member**—Pale-pink, red, pale-orange, and tan, very fine grained, thin- to thick-bedded limestone, argillaceous limestone, and dolomitic limestone with sparse thin interbeds of gray or tan calcareous mudstone. A basal conglomerate 0–40 ft thick occurs locally and consists of varicolored pebbles and cobbles of quartzite, chert, and lesser amounts of limestone. Forms fluted cliffs, columns, hoodoos, and spires, as well as steep slopes, all created by weathering and differential erosion of interbedded harder and softer layers. Much of the spectacular badlands of Bryce Canyon National Park are carved from these beds. Thickness 400–700 ft

Kk **Kaiparowits Formation (Upper Cretaceous)**—Light-brown, tan, and greenish-gray, very fine grained, friable sandstone, and buff, fine-grained, moderately resistant, lenticular sandstone and interbedded light-gray to purplish-gray or tan mudstone. Formation mostly removed from Paunsaugunt Plateau by pre-Claron erosion. Present only west of Buck Knoll in western part of map area where basal part of unit is exposed. Thickness 0–100 ft

Kw **Wahweap Formation (Upper Cretaceous)**—Upper 50–100 ft consists of light-gray to white, fine- to coarse-grained, crossbedded sandstone and conglomeratic sandstone containing small pebbles of gray chert and tan quartzite. Lower 600 ft is buff to light-brown, hard, fine-grained, lenticular sandstone interbedded with gray to tan mudstone, thin beds of light-gray or white siltstone, and very fine grained sandstone. Thickness 0–700 ft

Ksu **Straight Cliffs Formation (Upper Cretaceous)**

Upper part—Upper 100–200 ft consists of white, thick-bedded to massive, medium- to coarse-grained, crossbedded sandstone containing lenses of pebble conglomerate; forms steep slopes or sandy gravel-covered benches. Lower 800–1,100 ft is buff, tan, and light-brown, very fine grained to fine-grained sandstone and interbedded gray to tan mudstone. A 30 ft interval of carbonaceous shale and thin coal about 100 ft above the base is probably equivalent to the Henderson coal zone (Robison, 1966) farther east. Unit is equivalent to the Drip Tank and John Henry Members (Peterson, 1969b) in the Kaiparowits Plateau. Thickness 900–1,300 ft

Ksl **Lower part**—Upper 80–100 ft is white to light-gray, fine- to medium-grained, crossbedded sandstone containing lenses of conglomeratic sandstone or pebble conglomerate. Middle 200–250 ft is buff and tan, fine-grained, lenticular sandstone with interbedded tan to gray mudstone, carbonaceous mudstone, and local thin coal beds. Lower 40–50 ft is buff to light-brown, very fine grained, flat-bedded to low-angle-crossbedded, cliff-forming marine sandstone. Unit is equivalent to the Smoky Hollow and Tibbet Canyon Members (Peterson, 1969b) in the Kaiparowits Plateau. Thickness 320–400 ft

Kt **Tropic Shale (Upper Cretaceous)**—Gray to olive-gray marine shale. Includes thin, very fine grained sandstone beds in upper part. Lower part contains very thin beds of tan bentonitic clay and a basal limestone concretion zone, which may contain marine fossils. Thickness 700–1,000 ft

Kd **Dakota Formation (Upper Cretaceous)**—Interbedded buff to light-brown sandstone, gray to tan mudstone, dark carbonaceous mudstone, and coal. Basal sandstone is gray to light brown, medium to coarse grained or conglomeratic. Some pebble-cobble conglomerate is present locally. Thickness 180–300 ft

Je **Entrada Sandstone (Middle Jurassic)**—Light-tan to white, locally red banded, very fine grained sandstone and silty sandstone. Generally flat bedded and weakly to moderately cemented. Lower part locally white to red, fine to medium grained, crossbedded. Thickness 300–500 ft

Carmel Formation (Middle Jurassic)

Jcu **Upper member (Peterson and Pipiringos, 1979)**—Red, pale-orange, and white, fine-grained sandstone, silty sandstone, and mudstone. Upper part contains tan, thin-bedded, fine-grained silty sandstone, mudstone, and very thin, tan to white gypsum beds. Lower part contains a light-gray, thin-bedded limestone marker bed (Jcul) about 15 ft thick and located 150 ft above base. Unit is about 600–700 ft thick

Jcul

Jcgt **Gypsiferous member and Thousand Pockets Tongue of Page Sandstone (Middle Jurassic)**—Gypsiferous member is thick-bedded, white, massive gypsum in lower part and thin-bedded, interbedded gray or greenish-gray mudstone, gypsiferous mudstone, and gypsum in upper part; about 30–50 ft thick. Thousand Pockets Tongue of Page Sandstone is white, yellowish-gray, or rust-colored, fine-grained, crossbedded sandstone; usually forms cliffs with overlying gypsum; pinches out northwestward, about 5–15 ft thick

Jcb **Banded member**—Red, fine-grained sandstone and mudstone, and thin-bedded, interbedded gray to white sandstone and greenish-gray mudstone. Thins eastward and grades into Thousand Pockets Tongue of Page Sandstone (Peterson and Pipiringos, 1979, p. 13–14). About 100 ft thick

Jcl **Limestone member**—Gray, thin-bedded, cliff-forming limestone, and thin-bedded, interbedded gray mudstone, shale, and gypsum, mostly in lower part. Only upper part exposed in map area. Unconformable on underlying Lower Jurassic Navajo Sandstone. About 120 ft thick

Contact—Dashed where approximately located or inferred

Fault—Showing dip of fault plane where known. Dashed where approximately located; dotted where concealed. Bar and ball on downthrown side where movement known

Tear fault—Showing direction of displacement. Dashed where approximately located; dotted where concealed

Thrust fault—Showing dip of fault plane where known. Dashed where approximately located; dotted where concealed. Sawteeth on upper plate

Anticline—Showing crestline, and direction of plunge where known. Approximately located; dotted where concealed

Syncline—Showing troughline, and direction of plunge where known. Approximately located; dotted where concealed

Asymmetric syncline—Approximately located; dotted where concealed. Short arrow on steep limb

Overturned syncline—Approximately located

Monoclinal bend—Showing direction of dip. Dashed where approximately located. Arrow head on steep limb

Strike and dip of beds

Inclined

Vertical

Overturned

Dry hole—Showing name of operator, lease name, and total depth in feet

Water well

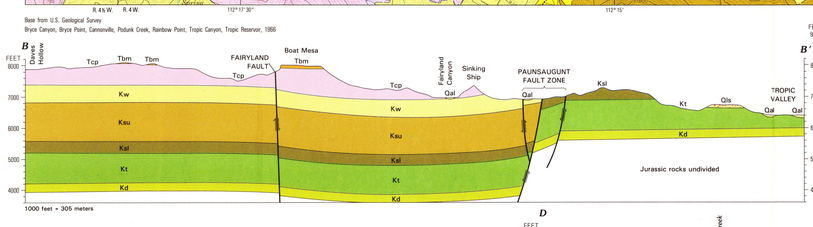
Bryce Canyon National Park boundary

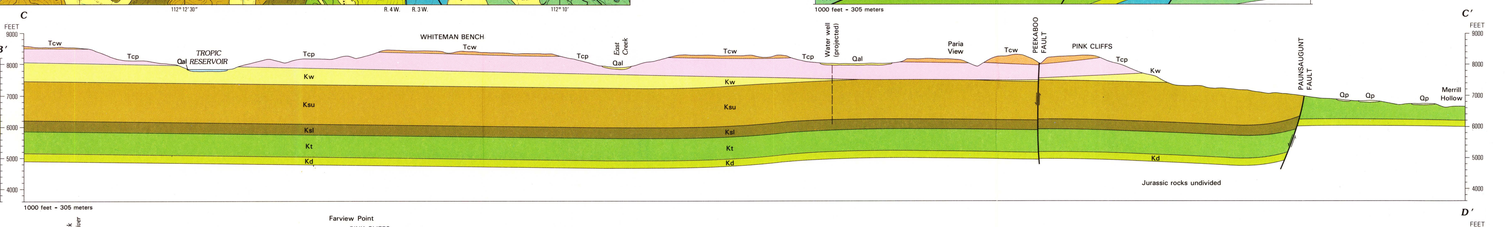
INDEX MAP OF CENTRAL SOUTHERN UTAH SHOWING REGIONAL SETTING OF BRYCE CANYON NATIONAL PARK (COLORED)

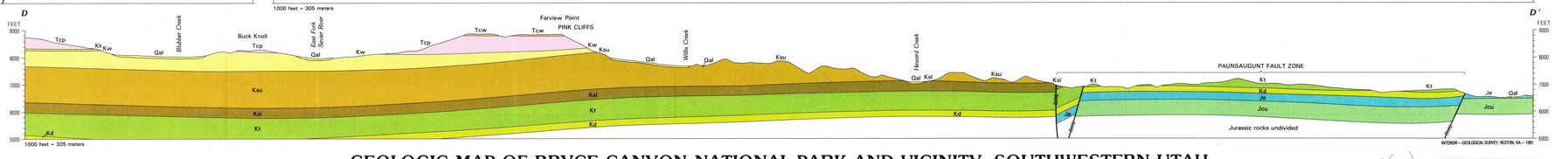
APPROXIMATE MEAN DECLINATION, 1991

SCALE 1:24 000
1 ½ 0 1 MILE
1 .5 0 1 KILOMETER

CONTOUR INTERVALS 20 AND 40 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
CONTOURS INTERVAL ON RIVER SURFACE 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

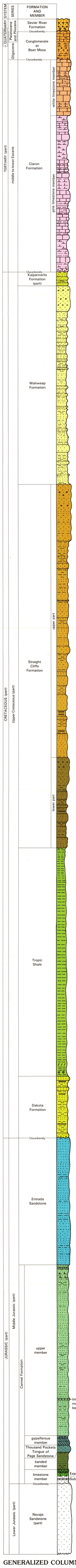






EXPLANATION

- Conglomerate
- Sandstone
- Mudstone or shale
- Carbonaceous mudstone or coal
- Limestone or dolomitic limestone
- Calcareous mudstone or argillaceous limestone
- Gypsiferous mudstone
- Gypsum
- Bentonite
- Marine fossils



GENERALIZED COLUMNAR SECTION

GEOLOGIC MAP OF BRYCE CANYON NATIONAL PARK AND VICINITY, SOUTHWESTERN UTAH

By
William E. Bowers
1991

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