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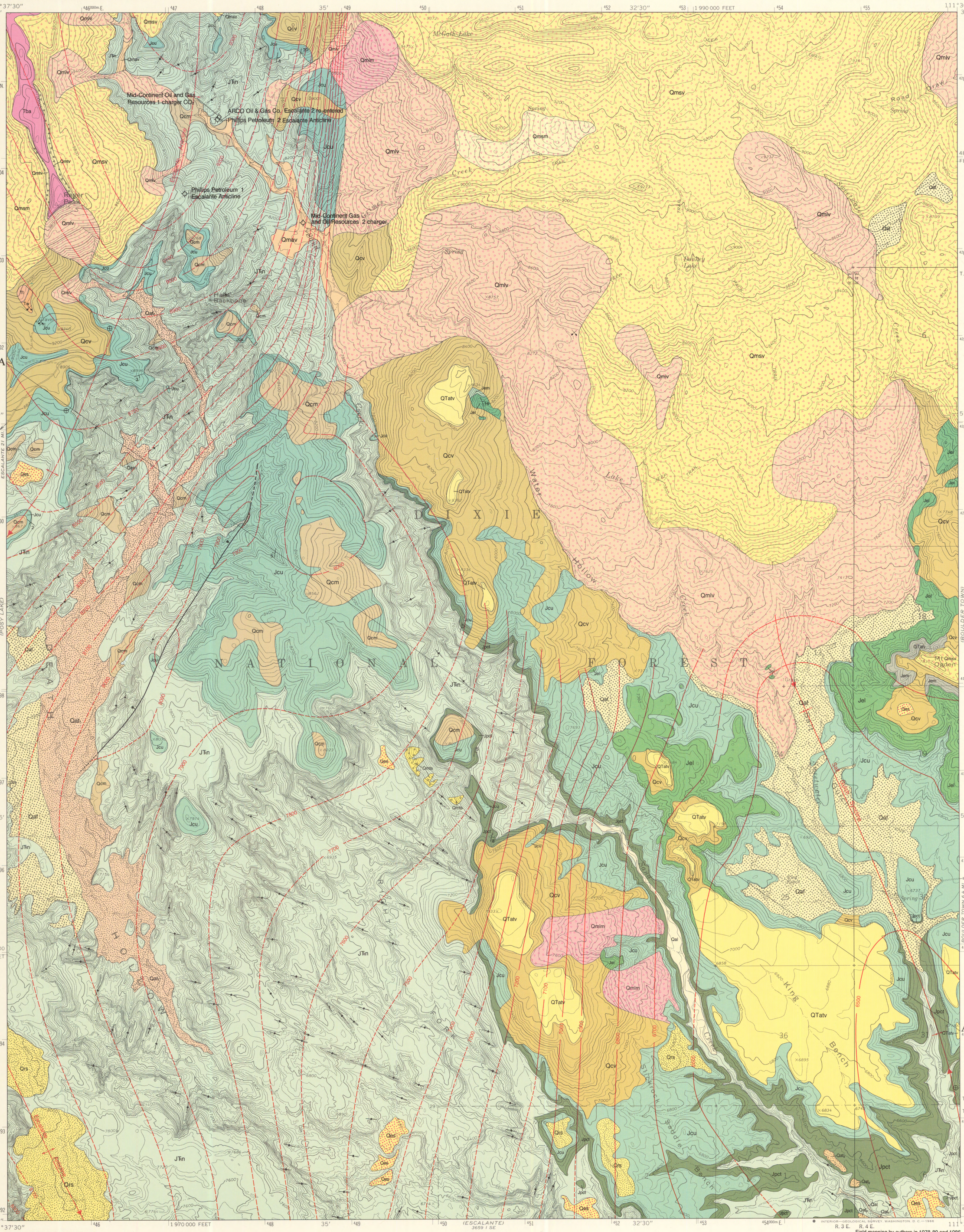

GEOLOGIC MAP OF THE ROGER PEAK QUADRANGLE, GARFIELD COUNTY, UTAH

by
Gordon W. Weir, Van S. Williams and L. Sue Beard
U.S. Geological Survey

1990

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CONTACT — Boundaries of surficial deposits approximately located.

FAULT — Dashed where inferred; dotted where concealed; bar and ball on downthrown side. Arrows on cross section indicate direction of relative movement.

ANTICLINE — Showing trace of axial plane and plunge of axis; dashed where approximately located.

SYNCLINE — Showing trace of axial plane and plunge of axis; dashed where approximately located.

STRIKE AND DIP OF BEDS

5 Inclined

Horizontal

STRIKE OF VERTICAL AND NEAR-VERTICAL JOINTS

BORROW PIT

OIL WELL — Dry hole, showing name of well.

STRUCTURE CONTOURS — Drawn on top of Navajo Sandstone. Long dashed where control less accurate. Short dashed where datum above land surface. Contours omitted in northeast sector because of insufficient data. Contour interval 100 ft.

DESCRIPTION OF MAP UNITS

Qal — Floodplain alluvium — *Fine sand to boulder gravel.*

Qes — Wind-blown sand — *Fine grains of quartz and minor silt.*

Qrs — Sandy residuum — *Fine grains of quartz and small rock fragments.*

Qcm — Mixed-lithology creep colluvium — *Subangular blocks of sandstone, limestone, and mudstone, dominant to abundant, and blocks of basaltic andesite.*

Qcv — Volcanic-rock creep colluvium — *Subangular to rounded clasts of basaltic andesite.*

Qmts — Sandstone talus — *Rockfalls of blocks of Navajo Sandstone and Page Sandstone.*

Qmtv — Volcanic-rock talus — *Rockfalls of basaltic andesite.*

Qat₁ — Low volcanic-gravel terrace allluvium — *Gravel of basaltic andesite as much as 20 ft. above stream level.*

Qmlm — Mixed-lithology lobate-slide debris — *Lobes of slide debris consisting of sandstone, shale, and volcanic rock.*

Qmlv — Volcanic-rock lobate-slide debris — *Lobes of slide debris composed chiefly of basaltic andesite.*

Qmsm — Mixed-lithology sheet-slide debris — *Irregular hummocky sheets of slide debris consisting of sandstone, shale, and volcanic rock.*

Qmsv — Volcanic-rock sheet-slide debris — *Irregular hummocky sheets of slide debris composed chiefly of basaltic andesite.*

Qaf — Fan alluvium — *Silt and fine sand and gravel of local derivation.*

Qmav — Volcanic-rock debris-flow colluvium and alluvium — *Angular to rounded clasts of basaltic andesite in unsorted colluvium that grades down-valley to well-sorted alluvium.*

Qat₂ — Intermediate volcanic-gravel terrace alluvium — *Gravel of basaltic andesite about 180-200 ft. above stream level.*

QTatv — High volcanic gravel terrace alluvium — *Poorly consolidated gravel composed of basaltic andesite as much as 1,000 ft. above stream level on terraces that pre-date cutting of canyons.*

UNCONFORMITY

Tba — Basaltic andesite — *Dark-gray, vesicular, porphyritic flows.*

UNCONFORMITY

Tt — Tuffaceous sediments — *Gray, yellow, orange, and brown tuffaceous conglomeratic sandstone.*

UNCONFORMITY

Tw — Wasatch Formation — *Light-gray conglomerate and tuffaceous conglomeratic sandstone.*

UNCONFORMITY

Jem — Entrada Sandstone, middle member — *Yellowish-gray and brownish-gray fine-grained, silty sandstone.*

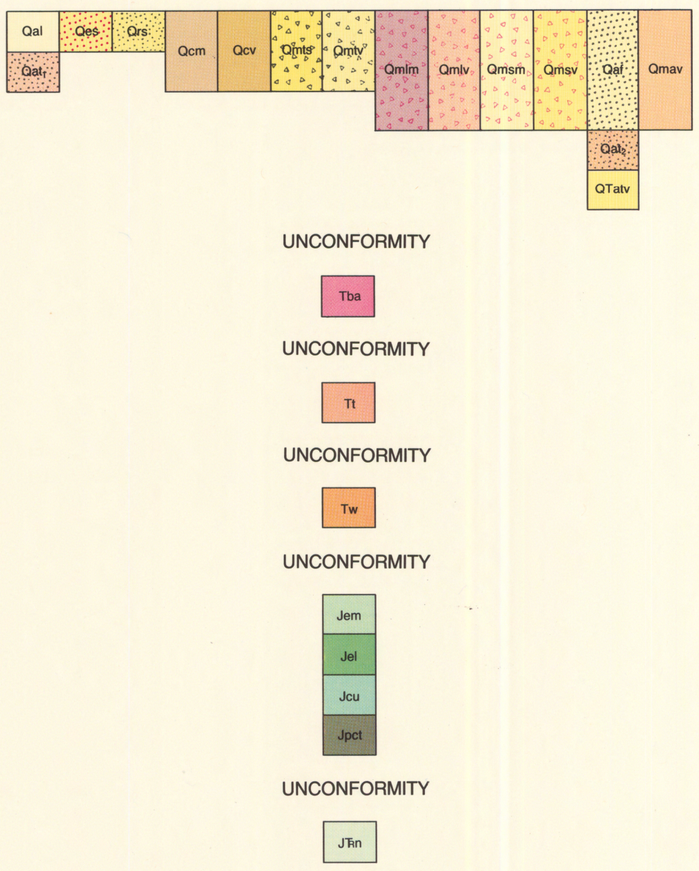
Jel — Entrada Sandstone, lower member — *Reddish-brown to pale-brown, crossbedded, fine-grained sandstone and minor dusky-red mudstone.*

Jcu — Carmel Formation, upper member — *Grayish-yellow to reddish-brown shale and minor sandstone, limestone, and gypsum.*

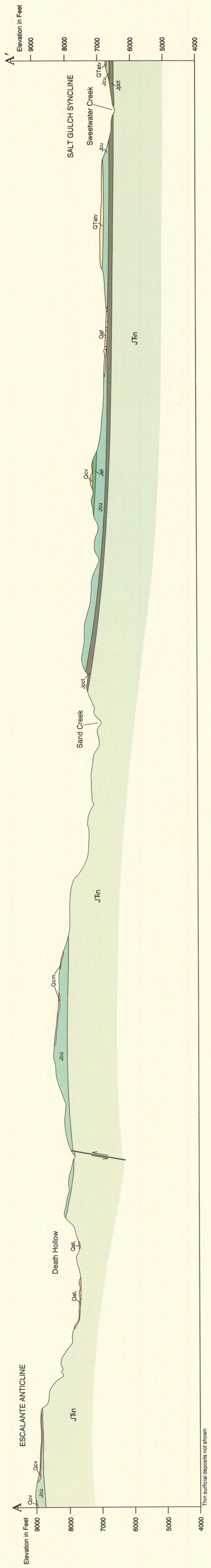
Jpct — Tongues of the Page Sandstone and Carmel Formation — *Thousand Pockets Tongue of the Page Sandstone: light-yellowish-gray, fine-grained sandstone. Judd Hollow Tongue of the Carmel Formation: reddish-brown siltstone and shale. Harris Wash Tongue of the Page Sandstone: light-grayish-orange, crossbedded, fine-grained sandstone.*

UNCONFORMITY

JTRn — Navajo Sandstone — *Chiefly light-grayish-orange, crossbedded, fine-grained sandstone.*



FORMATION		SYMBOL	THICKNESS feet		LITHOLOGY
Alluvium, colluvium, eolium and residuum		Q	0-400		
Oldest alluvium		QTat	0-120		
Basaltic andesite		Tba	200+		
Tuffaceous sediments		Tt	100?-500?		
Wasatch Formation		Tw	0-80?		
Entrada Sandstone	Middle member	Jem	600+	250+	
Entrada Sandstone	Lower member	Jel		350	
Upper member, Carmel Formation		Jcu	300-600		
Tongues of the Page Sandstone and the Carmel Formation	Thousand Pockets Tongue, Page Sandstone	Jpct	0-130	0-50	
				0-100	
				0-30	
	Judd Hollow Tongue, Carmel Formation		1000+		
	Harris Wash Tongue, Page Sandstone				
Navajo Sandstone		JTRn			



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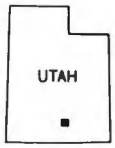

UTAH GEOLOGICAL AND MINERAL SURVEY

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UTAH DEPARTMENT OF NATURAL RESOURCES

MAP 115 **1990**

GEOLOGIC MAP OF THE ROGER PEAK QUADRANGLE, GARFIELD COUNTY, UTAH

By Gordon W. Weir,[1] Van S. Williams,[2] and L. Sue Beard[1]
U.S. Geological Survey

INTRODUCTION

The Roger Peak quadrangle is in central Garfield County, south-central Utah. It lies mostly in the Kaiparowits Plateau-Escalante Benches section of the Colorado Plateau physiographic province. The southeast-trending ridge of Roger Peak, in the northwest corner of the quadrangle, is a projection of the Aquarius Plateau, which is included in the lava-covered part of the Southern High Plateaus section of the Basin and Range-Colorado Plateau Transition province (Stokes, 1977). Dominant landforms are canyons, cliffs, and steep slopes and benches. The only permanent settlements are a few ranches near Salt Gulch. The nearest supply points are Escalante (1980 population, 652), about 21 miles (33 km) by road from the west side of the quadrangle, and Boulder (1980 population, 190) about 6.4 miles (10 km) from the east side.

The area was included in small-scale geologic maps by McFall (1956), McFall and Peterson (1971), Hackman and Wyant (1973), Doelling (1974), Sargent and Hansen (1982), and Williams (1985). Detterman (1956) compiled a photogeologic map of the quadrangle at the 1:24,000 scale.

The surficial deposits were mapped in reconnaissance at the 1:24,000-scale by V. S. Williams in 1978, generally using the classification of deposits developed for the surficial geologic map of the Kaiparowits coal-basin area (Williams, 1985). The bedrock geology south of the road across Hells Backbone was mapped by G. W. Weir and L. Sue Beard in 1979-1980, assisted by D. C. Ferris in 1980; Weir mapped the rest of the area in 1986.

STRATIGRAPHY

Bedrock formations exposed in the Roger Peak quadrangle are Upper Triassic(?) to Middle Jurassic and Tertiary in age and total about 2200 feet (670 m) in thickness. Much bedrock is buried beneath a thick complex of upper Tertiary(?) and Quaternary surficial deposits. Tertiary lava flows cap the ridge of Roger Peak.

TRIASSIC(?) AND JURASSIC SYSTEMS

Upper Triassic(?) and Lower Jurassic Series

Navajo Sandstone (JTRn)— The formation is composed almost wholly of well-sorted, subrounded, frosted, very fine-to medium-grained but dominantly fine-grained, clear quartz and small amounts of white chert and feldspar. The sandstone is mostly very light grayish orange, but locally it is reddish gray to yellowish orange. Iron staining ranging from reddish orange to black occurs sporadically. The rock is poorly to well cemented by calcite and readily weathers to yield loose sand. The sandstone is characterized by large-scale trough sets, commonly 6-18 feet (2-5 m) thick, of high-angle crossbeds. Contorted beds are locally common; horizontal beds are rare. Grayish-red siltstone is irregularly interstratified in sparse thin lenses. The formation erodes to form towering cliffs, fin-

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shaped ridges, irregular rounded knobs, and hummocky mesa tops commonly mantled by a thin layer of locally derived sand. In the Roger Peak quadrangle the base of the formation is below drainage; about 1000 feet (300 m) of formation are exposed near the southwest corner of the quadrangle. The total thickness of the Navajo is about 1500 feet (450 m), as shown by the log of the Phillips Petroleum Company Escalante No. 1 Anticline well, about 0.9 mile (1.4 km) east of Roger Peak (Heylmun and others, 1965, p. 68-69).

JURASSIC SYSTEM

Middle Jurassic Series

The Harris Wash and Thousand Pockets Tongues of the Page Sandstone and the interstratified Judd Hollow Tongue of the Carmel Formation are combined into a single map unit (Jpct), because the individual tongues are too small to show at the map scale. The combined tongues range from 0 to about 130 feet (0-40 m) in thickness.

Harris Wash Tongue of the Page Sandstone— The Harris Wash is light-grayish-orange, fine-grained quartz sandstone in large-scale trough sets, commonly 3-10 feet (.9-3 m) thick; a persistent layer, a few feet thick, at the top of the tongue is generally in horizontal beds a few inches to a few feet thick, which are locally iron stained. The Harris Wash Tongue of the Page Sandstone is lithologically similar to the underlying Navajo Sandstone and is separated from that formation by an obscure unconformity marked by sparse granules and very small pebbles of chert (Peterson and Pipiringos, 1979, p. 20-29). It is separated from the overlying Thousand Pockets Tongue of the Page Sandstone by the Judd Hollow Tongue of the Carmel Formation. The Harris Wash forms a ledge which caps cliffs and mesas carved in the Navajo Sandstone. The tongue is recognized only in the southeastern part of the quadrangle where it is as much as 30 feet (9 m) thick. It apparently pinches out near the middle of the quadrangle on the poorly exposed clifftops along Sand Creek.

Judd Hollow Tongue of the Carmel Formation— This tongue consists of reddish-brown, thin-bedded siltstone and lesser amounts of reddish-brown and yellowish-gray, mostly thin-bedded sandstone near the base. It is a poorly exposed slope-forming unit that ranges in thickness from 0 to about 100 feet (0-30 m) and thickens irregularly northward. The Judd Hollow is recognized only in the southeastern part of the quadrangle where it lies between the ledge-forming Harris Wash and Thousand Pockets Tongues of the Page Sandstone. Beyond the pinchout of the Thousand Pockets Tongue the Judd Hollow cannot be separated from the upper member of the Carmel Formation.

Thousand Pockets Tongue of the Page Sandstone— The upper tongue of the Page Sandstone is chiefly yellowish-gray, fine-grained quartz sandstone. A conspicuous layer, about 9 to 15 feet (2.7-4.5 m) thick, of moderately reddish-brown siltstone and shale lies near the middle of the tongue along Sweetwater Creek; the overlying sandstone of the Thousand Pockets pinches out northward along Sand Creek so that the siltstone and shale merge with similar rocks of the Carmel Formation and only the basal layer of sandstone, about 20 to 30 feet (6-9 m) thick, remains. Trough and planar sets of crossbeds are dominant in sandstone, but horizontal beds are common and much of the bedding is wavy to very contorted. The Thousand Pockets Tongue is a ledge-forming unit that is recognized only in the southeastern part of the quadrangle. North of King and Slickrock Saddle Benches, an area generally characterized by several poorly exposed sandstone units, the tongue's identity is less certain than to the south. The tongue ranges greatly in thickness because of the irregular wavy top and bottom, the pinchout of the upper layer of sandstone, and a general northward thinning. It is as much as 50 feet (15 m) thick along Sweetwater Creek and thins to about 10 feet (3 m) where it disappears and apparently pinches out under surficial deposits about 4 miles (6.4 km) northwest of King Ranch.

Upper member of the Carmel Formation (Jcu)— The upper member constitutes the bulk of the formation and includes strata equivalent to the Judd Hollow Tongue northwest of the pinchout of the Thousand Pockets Tongue of the Page Sandstone. The member is composed of shale interbedded with minor amounts of sandstone, limestone, and gypsum. The shale is silty to clayey, commonly calcitic, mostly grayish yellow but in part reddish brown mottled with light gray and light green. It is laminated to thin bedded and weathers readily to form a slope littered with small chips. The sandstone is reddish brown and yellowish gray, very fine to fine grained and silty, in part calcitic, rarely gypsiferous, and poorly to firmly cemented. The sandstone is mostly in thin horizontal beds. Locally conspicuous are small-scale trough and planar sets of crossbeds, grouped into small ledge-forming lenses. The limestone is grayish yellow to yellowish gray and is commonly silty and dolomitic and locally grades to dolomite. The limestone is in laminae and thin beds that are commonly ripple marked. A few beds contain fragments of pelecypods and other comminuted shell material. The limestone generally forms ledges that weather to yield abundant platy fragments to the slopes below. Very light gray to brownish-gray, clayey to sandy gypsum occurs sporadically in thin horizontal beds and irregular lenses, as much as about 4 feet (1.2 m) thick and 100 feet (30 m) long. Most gypsum layers and enclosing beds are more or less contorted. The upper member is generally poorly exposed on an irregular slope studded with small ledges. It overlies the Thousand Pockets Tongue of the Page Sandstone in the southeastern part of the quadrangle; elsewhere it overlies the Navajo Sandstone and constitutes the whole Carmel Formation. The member ranges in thickness from about 300-600 feet (90-180 m).

Lower member of the Entrada Sandstone (Jel)— The basal member is made up chiefly of reddish-brown to pale-brown, cross-bedded, fine-grained, locally silty sandstone. Interstratified with the sandstone are sparse sets, as much as 4 feet (1.2 m)

thick, of dusky-red mudstone and very sparse beds, 1-12 inches (2.5-3.0 cm) thick, of light-yellowish-gray, fine-grained sandstone. The member is generally exposed only on steep slopes. The map unit is approximately equivalent to the Gunsight Butte Member of the Entrada Sandstone of Thompson and Stokes (1970, p. 13-15). It is about 350 feet (105 m) thick.

Middle member of the Entrada Sandstone (Jem)— This member is composed of alternating layers, commonly about 6-12 feet (2-3.5 m) thick, of yellowish-gray and brownish-gray, fine-grained, in part silty, sandstone. It is less resistant than the lower member but forms steep slopes where capped by resistant Quaternary deposits. The basal contact is arbitrary in a zone, several tens of feet thick, of intergrading lithology. The top of the member is not exposed; the maximum exposed thickness is about 250 feet (76 m) on Mt. Ogden near the east edge of the quadrangle. The map unit is approximately equivalent to the banded earth facies of the Cannonville Member of the Entrada of Thompson and Stokes (1970, p. 16-17). The upper member of the Entrada, a cliff-forming, light-gray to very pale orange, crossbedded, fine-grained sandstone (Zeller and Stephens, 1973), does not crop out in this quadrangle. The maximum thickness of Entrada exposed in the Roger Peak quadrangle is about 600 feet (180 m); Weir and Beard (1981b) estimated the full thickness of Entrada Sandstone in adjoining areas to be about 700 feet (213 m).

TERTIARY SYSTEM

Eocene Series

Wasatch Formation (Tw)— This unit consists of light-gray conglomerate and tuffaceous conglomeratic sandstone that crop out poorly in a small area south of Roger Peak. It is apparently part of the variegated sandstone member recognized by Bowers (1972, p. 27-28) as the upper part of the Wasatch Formation. Well-rounded pebbles of black chert are mostly 1-3 inches (2.5-7.5 cm) in diameter near the base of the outcrop but diminish upward to average less than 0.5 inches (1.2 cm) in diameter at the top. The matrix is a calcitic, fine- to medium-grained, feldspathic sandstone. The base of the formation is covered; maximum exposed thickness is about 50 feet (15 m). The bedrock relations inferred by Sargent and Hansen (1982) suggest that this unit is about 80 feet (24 m) thick near the west edge of the quadrangle and pinches out to the east near Roger Peak. Although this unit and the overlying tuffaceous sandstone and siltstone appear to be in place, these poor exposures in a landslide terrane may be part of a landslide block.

Eocene(?) and Oligocene Series

Tuffaceous sediments (Tt)— This unit, composed of tuffaceous sandstone and siltstone in light hues of gray, yellow, orange, and brown, is poorly exposed in a small area south of Roger Peak. The sandstone is feldspathic, slightly to very calcitic, and mostly fine- to medium-grained but commonly silty and grading to siltstone. Minute black minerals are abundant. Near the base are thin lenses of rounded black chert pebbles about 5 mm in diameter. The unit is mostly covered by landslide deposits. The base is obscure, the top covered, and the exposed thickness is about 80 feet (24 m). Sargent and Hansen (1982) infer that the tuffaceous sediments may be about 500 feet (150 m) thick near Roger Peak and thin rapidly eastward to less than 100 feet (30 m) beneath surficial deposits at the east edge of the quadrangle.

Oligocene or Miocene Series

Basaltic andesite (Tba) — Volcanic rock, poorly exposed only on the ridge of Roger Peak, is medium- to dark-gray, less commonly brownish-gray and dark-red, vesicular, porphyritic trachyandesite. Clear to light-gray equant crystals, as much as 1 inch (2.5 cm) long, of plagioclase are common to abundant. Smaller phenocrysts of greenish-black pyroxene and greenish-brown olivine are sparse to common. The base of the volcanic pile is covered, the top eroded. About 200 feet (60 m) are exposed on Roger Peak in the northwest corner of this quadrangle; it is as much as 700 feet (213 m) thick in adjacent parts of the Aquarius Plateau, north and west of the quadrangle (Sargent and Hansen, 1982). The unit is not closely dated. Hackman and Wyant (1973, sheet 1) correlated this unit with volcanic rocks of inferred Oligocene age in west-central Utah; later studies by Anderson and Rowley (1975; p. 32-35) suggest that the presumed equivalent rocks are of early Miocene age.

TERTIARY(?) AND QUATERNARY SYSTEMS

Pliocene(?) and Pleistocene Series

High volcanic-gravel terrace alluvium (QTatv)— This unit consists of gray to yellowish-gray, poorly consolidated deposits chiefly of cobbles and boulders, up to 6 feet (1.8 m) across, in a matrix of pebbles and sand irregularly cemented by calcite. The clasts are composed chiefly of medium- to dark-gray basaltic andesite and minor amounts of other volcanic rocks and locally include near the base sparse cobbles of sandstone from the Entrada Sandstone and the Carmel Formation. Many boulders and cobbles are coated in whole or part by very light gray pedogenic calcium carbonate. Yellow-brown, red, and orange chert in irregular block fragments and small rounded pebbles of black chert are sparse but locally conspicuous. Bedding is generally obscure, but a few exposures display crudely graded beds and trough sets of crossbeds in small channel fills. The deposits are veneered irregularly by wind-blown sand. On Mt. Ogden, near the east edge of the quadrangle, a thin remnant of the high terrace alluvium is overlain by volcanic-rock sheet-slide debris (Qmsv). Thin creep colluvium shed from the deposits commonly obscures their base. The high volcanic-gravel alluvium was derived by streams probably from debris slides and flows, now destroyed, that issued from the Aquarius Plateau onto a relatively flat lowland. The deposits rest on a surface that predates cutting of canyons and that now lies about 250 to 1000 feet (75-300 m) above floors of

nearby canyons carved in the Navajo Sandstone. The deposits are estimated to be as much as 120 feet (36 m) thick. The high volcanic-gravel terrace alluvium is equivalent to the pediment gravels of Hackman and Wyant (1973) and in part to the igneous debris of McFall and Peterson (1971).

QUATERNARY SYSTEM

Pleistocene Series

Intermediate volcanic-gravel terrace alluvium (Qat_2)— This unit consists of poorly sorted gravel containing pebbles, cobbles, and boulders, as much as 6 feet (1.8 m) across, in a sand matrix. The clasts are dominantly medium- to dark-gray basaltic andesite but include sand and blocky clasts of sandstone derived from Jurassic rocks and sparse cobbles of quartzite derived from Cretaceous or Tertiary formations north of this quadrangle. The intermediate volcanic terrace deposits were recognized in only two small outcrops on the east side of Sand Creek near the southeast corner of the quadrangle. They are perched on canyon walls about 180 to 200 feet (55-60 m) above the creek and are estimated to be as much as 40 feet (12 m) thick.

Pleistocene(?) and Holocene Series

Volcanic-rock debris-flow colluvium and alluvium (Qmav)— This unit is an unconsolidated, coarse, unsorted to crudely graded colluvial deposit that grades downslope into thinner, moderately well sorted, finer grained alluvium. It forms a valley fill in upper Sand Creek near the northwest corner of the quadrangle. The deposit is composed of cobbles and boulders of medium- to dark-gray basaltic andesite in a pebbly, sandy to silty matrix. The maximum thickness is estimated to be as much as 60 feet (18 m).

Fan alluvium (Qaf)— This unit consists of light-gray, yellowish-gray, and reddish-brown sand and silt and locally pebbles to boulders derived from volcanic gravels. The alluvium forms coalesced fans on slopes and flats flanked by higher ground. The bulk of the deposit in Salt Gulch is derived from the Carmel Formation and Entrada Sandstone; in Death Hollow it is derived from the Navajo Sandstone. Bedding is generally obscure but in part it is in lenses of thin, low-angle crossbeds. The deposits are probably as much as 30 feet (9 m) thick.

Volcanic-rock sheet-slide debris (Qmsv)— These deposits are irregular hummocky sheets of breccia composed of angular to subrounded fragments of basaltic andesite in a pebbly, sandy to clayey matrix. Rocks derived from Mesozoic and Tertiary formations make up a minor proportion of the volcanic sheet-slide debris. The deposits locally include ridge-forming areas of slumped broken blocks whose layers retain in part their original stratigraphic position. Some ridge-forming groups of fairly coherent blocks south of McGath Lake in the northern part of the quadrangle appear to be about 9000 feet (2740 m) long, 1500 feet (450 m) wide, and 400 feet (120 m) thick. Sheet-slide debris covers much of the uplands in the northeastern part of the quadrangle. Thicknesses of the debris is variable but probably is about 400 feet (120 m) near McGath Lake.

Volcanic-rock sheet-slide debris is exceptionally well exposed on Mt. Ogden, near the east edge of the quadrangle, where it covers the top and parts of the flanks of the mountain. The deposit consists of volcanic-rock breccia about 80 feet (25 m) thick, overlying a fairly coherent layer of slide-rock, as much as 25 feet (7.5 m) thick, consisting of Cretaceous brownish-yellow and medium- to dark-gray shale and sandstone. The base of the landslide rests unconformably on a bouldery alluvial deposit about 20 feet (6 m) thick, correlated with the high-volcanic-gravel alluvium (QTatv).

Mixed-lithology sheet-slide debris (Qmsm)— These deposits are similar to the volcanic-rock sheet-slide debris but are composed in large part of blocks of Cretaceous shale and sandstone and Tertiary tuffaceous sandstone and conglomerate. Boundaries are indefinite and the mapped contacts are generalized. Maximum thickness is probably about 200 feet (60 m).

Volcanic-rock lobate-slide debris (Qmlv)— These deposits are individual lobes and aggregates of lobes of subangular to rounded cobbles and boulders of medium- to dark-gray basaltic andesite in a pebbly sand matrix. Individual lobes are as much as about 8000 feet (2440 m) long, 2000 feet (610 m) wide, and probably as much as about 100 feet (30 m) thick. The semicircular heads of the deposits are characterized by degraded, crescent-shaped blocks. Stream courses commonly define the flanks of these deposits. Most of the volcanic-rock lobate-slide debris fringes areas of sheet-slide debris in the northeastern part of the quadrangle.

Mixed lithology lobate-slide debris (Qmlm)— Three deposits are mapped as mixed lithology lobate-slide debris. Two lobes of slide debris are conspicuous on the east slope of a small mesa north of Slickrock Saddle Bench in the southeastern part of the quadrangle. They are composed of subangular to angular fragments of reddish-brown sandstone and shale from the Carmel Formation, yellowish- to light-brown sandstone from the Entrada Sandstone, and boulders and cobbles of dark-gray basaltic andesite from high terrace alluvium. Lunate slump blocks and scarps are common at the upper end of the slides. These lobes are as much as 5500 feet (1675 m) long, 2000 feet (610 m) wide, and probably as much as 60 feet (18 m) thick. The third deposit is a lobate slide southwest of McGath Lake near the north edge of the quadrangle. It is composed largely of blocks of Cretaceous shale and sandstone admixed with volcanic debris. This lobe, which is about 2000 feet (610 m) wide and nearly 3000 feet (915 m) long, is probably more than 50 feet (15 m) thick.

Holocene Series

Low volcanic-gravel terrace alluvium (Qat_1)— Low-level volcanic alluvium, exposed chiefly in Death Hollow is poorly sorted gravel containing pebbles, cobbles and boulders in a sand matrix. The clasts are dominantly medium- to dark-gray basaltic andesite but include sand and blocks of sandstone

derived from the Navajo Sandstone. The low volcanic-gravel is as much as 20 feet (6 m) above stream level and locally includes flood-plain alluvium. The deposit if probably as much as 10 feet (3 m) thick.

Volcanic-rock talus (Qmtv)— These small deposits of fallen angular blocks of basaltic andesite have accumulated at the base of cliffs rimming the volcanic rock outcrops of the ridge of Roger Peak. This talus or rockfall colluvium grades downslope into volcanic creep colluvium. The deposits are probably as much as 15 feet (4.5 m) thick.

Sandstone talus (Qmts)— Narrow fan-shaped deposits of blocks of Navajo Sandstone and Page Sandstone have accumulated on the southwest side of an unnamed sandstone ridge near the center of the quadrangle. The deposits are probably about 20 feet (6 m) thick near their toes. Other sandstone rockfalls in the quadrangle are too small to show at the map scale.

Volcanic-rock creep colluvium (Qcv)— Unconsolidated deposits of sand and subangular to well-rounded pebbles to large boulders of dark-gray basaltic andesite cover many slopes in the quadrangle. Locally the deposits include sparse blocks of sandstone from underlying Jurassic formations. The volcanic-rock colluvium is estimated to be as much as 30 feet (9 m) thick. Contacts are generalized and locally arbitrary. Some mapped areas of colluvium include small outcrops of bedrock and commonly grade into areas that are mostly bedrock containing small patches of colluvium. Colluvium shed from high volcanic-gravel terrace alluvium (QTatv) is not shown where the bedrock can be readily inferred.

Mixed-lithology creep colluvium (Qcm)— This colluvium is similar to the volcanic-rock colluvium described above, but blocks of sandstone, limestone, and mudstone from the Carmel Formation and sandstone from the Entrada and Navajo Sandstones are common. It probably is as much as 30 feet (9 m) thick.

Sandy residuum (Qrs)— Residuum lying on the Navajo Sandstone consists of yellowish-gray sand and unsorted subangular fragments of sandstone and, in places, fragments of reddish-brown to black, iron-impregnated sandstone. Residuum lying on the Carmel Formation is similar but includes reddish-brown silty shale and silt. The deposits are commonly veneered with wind-blown sand, and boundaries of the residuum are generally indefinite. Only relatively large patches are mapped. The maximum thickness of the residuum is about 3 feet (1 m).

Windblown sand (Qes)— These eolian deposits are composed of unconsolidated yellowish-gray to pale-red, fine grains of quartz, derived mainly from the Navajo Sandstone on which most of the deposits rest. Bedding is generally obscure, but in part the sand is in small-scale trough and planar sets of low-angle crossbeds. Some deposits, especially those resting on formations other than the Navajo, intergrade with laminated sheetwash alluvium. Most of the eolian sand forms sheets and small dunes on and near Slickrock Saddle Bench in the southeast corner of the quadrangle. Some of the sand has been stabilized by desert grasses, but most of the sheets and dunes are probably altered during windstorms. Maximum thickness is estimated to be about 12 feet (3.5 m).

Floodplain alluvium (Qal)— Yellowish-gray to grayish-orange-pink alluvium, consisting of fine sand to boulder gravel, is mapped along Sand Creek in the southeastern part of the quadrangle. There, it is less than 10 feet (3 m) thick. Thinner patches of alluvium along stream courses elsewhere in the quadrangle are too small to show at the map scale.

STRUCTURAL GEOLOGY

The Roger Peak quadrangle contains parts of two major south-plunging folds, the Escalante anticline and the Salt Gulch syncline. The Escalante anticline in the western part of the quadrangle has gently dipping flanks except near the head of Sand Creek in the northwestern part of the quadrangle where the east flank dips more than 30 degrees. West and south of this quadrangle the west flank of the anticline steepens abruptly to form the Escalante monocline (Hackman and Wyant, 1973, sheet 2). The Salt Gulch syncline in the southeastern part of the quadrangle is characterized by low dips. It is probably the northern extension of the Sand Creek syncline of Hackman and Wyant (1973, sheet 2). Both folds die out about 8-9 miles (13-14 km) south of this quadrangle (Weir and Beard, 1981a). The northern limits of the folds are obscured by surficial deposits, but they probably underlie horizontal Tertiary beds of the Aquarius Plateau.

The only fault in the quadrangle is a high-angle normal fault cutting the east flank of the Escalante anticline near upper Death Hollow south of Hells Backbone in the western part of the quadrangle. It has a maximum displacement of about 150 feet (45 m).

The Navajo Sandstone, which crops out in the southern and western parts of the quadrangle, is cut by many vertical and near-vertical joints. The joints are mostly closely spaced and, although locally obscure, are generally conspicuous because they control many small landforms. Not all joints are shown on the map; the symbols represent well-defined sets of joints. The joint pattern is in places complex, but west-northwest and north-northeast trends are dominant.

ECONOMIC GEOLOGY

No mineralized rock is known in the Roger Peak quadrangle. A geochemical reconnaissance, which included most of the quadrangle as well as adjoining areas on the west, south, and east, did not indicate the presence of mineralized terranes (Weir and Lane, 1981; 1983). Small, low-grade uranium-copper deposits are in Triassic formations about 15 miles (24 km) east of the quadrangle in the Circle Cliffs upwarp (Davidson, 1967, p. 65-91; Doelling, 1975, p. 107-109, 131-135). The same Triassic formations underlie the Roger Peak quadrangle at depths of several thousand feet and may contain similar deposits, but they are unlikely to warrant exploration. Gypsum occurs in lenses as much as 27 feet (8.2 m) thick in the upper member of the Carmel Formation near Hells Backbone (Doelling, 1975, p. 148), but because of favorably located, thick deposits of gyp-

sum elsewhere in Utah and the lack of local market, these deposits are unlikely to be exploited (Doelling, 1975, p. 149). Small borrow pits are in the Carmel Formation and Tertiary sediments near Roger Peak. Gravel for use as fill and road metal has been sorted from volcanic-rock sheet-slide debris near Lake Creek and can be obtained from any of the dominantly volcanic-rock surficial deposits that cover most of the northern part of the quadrangle. Of interest to mineral collectors are fragments of brightly colored chert, probably originally associated with volcanic rocks on the Aquarius Plateau, that occur sparsely in volcanic-rock gravels and colluvium.

The oil and gas potential of the Roger Peak quadrangle and the adjacent area has been tested by six wells drilled on the Escalante anticline, the chief structure of the area. The wells have not produced oil and gas in commercial quantities, though shows of hydrocarbons in Triassic and Permian rocks were common (table 1). All of the wells had flows of CO_2 gas and two have been completed as producers of CO_2 gas. Oil is produced from Triassic and Permian strata in a fold similar to the Escalante anticline in the Upper Valley field, only about 16 miles (25 km) south-southwest of the Roger Peak quadrangle (Peterson, 1973). By analogy with the Upper Valley field, Brandt (1987) concludes that an area spanning the Escalante anticline and including the Roger Peak quadrangle has potential for commercial oil and gas that has not been adequately tested.

A major natural resource in the quadrangle is the magnificent canyon and mountain scenery. The Navajo Sandstone, which crops out over much of the quadrangle, has been eroded to form near-vertical cliffs, steep rock slopes, and deep canyons. From Hells Backbone, visitors can look both northeast and south into bare-rock canyons. Two U.S. Forest Service campgrounds are a few miles west of the quadrangle (U.S. Bureau of Land Management, 1979). The trailhead for the strenuous hike down Death Hollow to Escalante is about 0.8 mile (1.3 km) southwest of Hells Backbone. Trails down Death Hollow and Sand Creek are described by Lambrechtse (1985, p. 49-56).

GEOLOGIC HAZARDS

Floods are the chief natural hazard in the Roger Peak quadrangle. Summertime cloudbursts in the northern part of the quadrangle or adjacent areas can result in rock-laden floods suddenly coursing down narrow canyons. In addition, temporary dams formed by rockfalls may give way to release an unexpected torrent far downstream. Hikers should also be aware of potential rockfalls and slides as well as the possibility of flash floods.

Care should be taken for any construction on surficial deposits; alluvial, colluvial and eolian deposits may be unstable

Table 1. *Record of exploratory wells drilled in and near the Roger Peak quadrangle, Utah [Sources of data: Heylmun and others (1965, p. 68-69), Brandt (1987), and unpublished records of the Utah Geological and Mineral Survey and of the U.S. Bureau of Land Management, Salt Lake City, Utah]*

Section	Operator	Well	Total depth (feet)	Year Completed	Oldest formation	Remarks
		Roger Peak quadrangle T. 32 S., R. 3 E.				
29	Phillips Petroleum	2 Escalante	6,062	1961	Ouray Limestone (Devonian)	CO_2 gas flows from Triassic and Permian rocks. Oil show in Kaibab Limestone (Permian)
29	ARCO Oil and Gas Co.	2 Escalante	3,878	1980	Kaibab Limestone (Permian)	Re-entry of Phillips Petroleum 2 Escalante well. CO_2 gas flow from Kaibab Limestone
29	Mid-Continent Oil and Gas Resources	1 (Charger)	3,443	1986	Cedar Mesa Sandstone Member of Cutler Formation	Completed as CO_2 gas well. CO_2 flows from Triassic and Permian rocks. Hydrocarbon shows in Triassic and Permian rocks
32	Phillips Petroleum	1 Escalante Anticline	3,384	1960	Kaibab Limestone (Permian)	Shows of CO_2 gas in Triassic rocks. Show of oil in Kaibab Limestone (Permian)
33	Mid-Continent Oil and Gas Resources	2 Charger	3,035	1984	Moenkopi Formation (Triassic)	Shows of CO_2 gas and hydrocarbon in Triassic rocks
		Posy Lake quadrangle T. 33 S., R. 2 E.				
12	Skyline Oil Co.	12-44 Escalante Federal	4,166	1969	Toroweap Formation (Permian)	CO_2 gas flow from Kaibab Limestone (Permian)
13	Mid-Continent Oil and Gas Resources	4 Charger	3,722	1986	White Rim Sandstone Member of Cutler Formation (Permian)	Completed as CO_2 gas well. CO_2 flows from Triassic and Permian rocks

even on moderate slopes. Much of the quadrangle is covered by old and relatively recent landslide deposits that may slide when disturbed (Fuller and others, 1981). Planning for construction in such areas should take this danger into account.

Seismic risks in the quadrangle appear small. Only two earthquakes of magnitude 4.0 or greater in eastern Garfield County have been recorded in historic time (Ward, 1979, fig. 1). Faults in this quadrangle and in adjacent quadrangles show no evidence of geologically recent movement. The Rogers Peak quadrangle lies relatively inactive in seismic zones U-1 and U-2, on a scale of 1 to 4, of the Utah Uniform Building Code (Ward, 1979, fig. 3). Earthquakes transmitted from tectonically more active regions, however, may result in rockfalls or sliding of slope deposits.

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