DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

BULLETIN 1842-C
PLATE C1

GEOLOGIC MAP OF PART OF EPHRAIM CANYON, CENTRAL UTAH

CORRELATION OF MAP UNITS

Ql_2	Ql_2 f	Qd_2	Qd_2 f	Qal	Qc	QUATERNARY
Ql_1 ?		Qd_1 ?		?	?	
Unconformity						
Tc						TERTIARY
Tf						TERTIARY AND CRETACEOUS
TKn						

Tc — Eocene
Tf — Eocene and Paleocene
TKn — Paleocene and Upper Cretaceous

DESCRIPTION OF MAP UNITS

QUATERNARY DEPOSITS

Ql_2 **1983–1986 landslide deposits, undivided**—Brown, reddish-brown, and gray, unconsolidated, unsorted debris: boulder-, cobble-, and pebble-sized clasts of limestone and sandstone, supported by a matrix of sandy clay. Deposits made by earthflows, slumps, and similar landslides that occurred in pre-1983 landslide debris sometime between 1983 and 1986. Surfaces of deposits cracked and deformed. Heads of landslides slope gently, bodies slope parallel to neighboring ground, and toes slope more steeply than neighboring ground. Thickness as much as 30 m

Ql_2 f **1983–1986 landslide deposits, first-time failures**—Deposits made by rockslides and earthflows that occurred in previously unfailed materials between 1983 and 1986. Gray or reddish-brown porous rubble consisting of blocks and cobble- and pebble-sized clasts mixed with clay. Upper parts of deposits clast supported, lower parts matrix supported. Earthflow deposits resemble those of Ql_2 in lithology, color, and texture. Thickness as much as 15 m. Locally includes areas of bedrock exposed in headscarps of rockslides

Qd_2 **1983–1986 debris flow deposits**—Brown, unconsolidated, unsorted, unstratified debris; angular boulder-, cobble-, and pebble-sized clasts of limestone and sandstone in matrix of sandy or silty clay. Deposits left by debris flows that were active between 1983 and 1986. Deposits form long, narrow strips in and adjacent to gullies on steep slopes. Thickness as much as 3 m

Qd_2 f **1983–1986 debris flow deposits, first-time failures**—Brown, unconsolidated, unstratified, unsorted debris; angular boulder-, cobble-, and pebble-sized clasts of limestone and sandstone in matrix of sandy clay or silty clay. Primarily matrix supported. Unit was deposited by debris flows during 1983–1986. Flows mobilized from bedrock or weathered bedrock that had not previously failed and moved downslope. Thickness less than 10 m

Qal **Alluvium**—Brown, sorted, stratified, unconsolidated deposits of clay, silt, sand, pebbles, cobbles, and boulders. Alluvium occurs in and adjacent to channels of Ephraim Creek and its tributaries. Upper few decimeters of terrace deposits commonly weathered to dark brown. Thickness as much as 5 m

Qc **Colluvium, residuum, and slope wash, undifferentiated**—Poorly sorted, unstratified or locally stratified, unconsolidated deposits of boulder-, cobble-, and pebble-sized clasts of limestone and sandstone in a gray or brown matrix of sandy or silty clay. Upper few decimeters commonly brown or dark brown topsoil. Material derived from local bedrock and transported downslope by gravity or sheet flow. Includes talus deposit (SE1/4 sec. 9, T. 17 S., R. 4 E.) at base of White Ledge, fan- and cone-shaped deposits at base of steep slopes, and sheetlike deposits that mantle gentle to steep slopes. Deposits typically from 1 to 10 m thick. Locally includes area of bedrock and alluvium

Ql_1 **Pre–1983 landslide deposits**—Unsorted, unstratified, unconsolidated debris; boulder-, cobble-, and pebble-sized clasts of sandstone and limestone supported by a brown or gray matrix of sandy clay. Dark brown soil, from 50 to 100 cm thick, developed on this unit. Toes, benches, ridges, closed depressions, and other morphologic features, characteristic of landsliding, are subdued on these deposits. Thickness as much as 50(?) m

Qd_1 **Pre–1983 debris or mud-flow deposits**—Gray or brown, weathered, crudely stratified debris. Angular boulder-, cobble- and pebble-sized clasts of limestone or sandstone supported by matrix of silty clay or clay. Deposits result from single debris-flow events, occur in and near channels, and have subdued levees and tongue-like terminations. Dark brown soil, from 10 to 40 cm thick, is developed on these deposits. Thickness less than 2 m

TERTIARY AND CRETACEOUS UNITS

Tc **Colton Formation (Eocene)**—Green, variegated, and brown claystones interbedded with gray limestones and fine- to medium-grained yellow or brown sandstones. Conformable with and interfingers with underlying Flagstaff Limestone. Only lower 20–30 m exposed in study area. (Spieker, 1946; Bonar, 1948; Zwiskie and others, 1982)

Tf **Flagstaff Limestone (Eocene and Paleocene)**—White, gray, and light-brown limestones interbedded with gray, green, and black claystones. Conformably and gradationally overlies North Horn Formation. Lower 80–90 m (Ferron Mountain Member): gray, bluish-gray, and light-brown carbonate rocks interbedded with dark-gray, massive or laminated, from 0.05- to 2.4-m-thick claystones. Carbonate beds, from 0.1 to 1.9 m thick, fine grained or micritic. Mud cracks filled with dark micrite common. Gastropods and pelecypods common in fine-grained, sparry carbonate beds. Middle 132–142 m (Cove Mountain Member): white, pale gray, and pale yellowish-brown, micritic, massive carbonates in beds from 0.1 to 8.0 m thick; white or gray, limy, medium-grained sandstones; gypsum nodules in gray, green, red, or orange claystone beds. Cove Mountain Member consists of, from bottom to top: 20 m of green and gray claystones containing abundant gypsum nodules; 15 m of thick, resistant, massive limestone with solution cavities; from 20 to 25 m of red and gray claystones interbedded with limestones and lenticular, limy sandstones; and from 72 to 87 m of alternating white, massive or laminated limestones; fissile, black or green claystones; and beds of chert nodules. The Cove Mountain Member does not contain fossil mollusks. Upper 50 m (Musinia Peak Member): olive-green or light-brown claystones; laminated and massive, gray and light-gray, cherty, fossiliferous limestones; brown chert nodules; silicified, fossiliferous limestones. Mollusk fossils abundant. Total thickness of Flagstaff Limestone in Ephraim Canyon is about 275 m (Spieker, 1946; Bonar, 1948; LaRocque, 1960; Stanley and Collinson, 1979)

TKn **North Horn Formation (Paleocene and Upper Cretaceous)**—Orange to buff sandstones and variegated mudstones. Only upper 250 m exposed in Ephraim Canyon. Upper 150 m: evenly bedded, red, orange, brown, gray, green, purple, or variegated mudstones; thick, evenly bedded yellow, orange, or gray, well-cemented, fine- to coarse-grained, massive sandstones; and (uncommon) gray fossiliferous limestones. Lower 100 m: irregularly bedded, red, orange, brown, gray, green, purple, or variegated mudstones; yellow, orange, or gray, well-cemented, crossbedded, lenticular sandstones; green, fine-grained sandstones and nodular green siltstones (Bonar, 1948)

Contact—Dashed where approximately located; hachured where separate debris flow or landslide deposits, belonging to a single map unit, are in contact

Fault—Dashed where approximately located. Bar and ball on downthrown side

25 Strike and dip of beds

Seep or spring

P Pond

Wetland

Boundary of map area

Base from U.S. Geological Survey
Ephraim, 1966, and Danish Knoll, 1966

Geology mapped by Rex L. Baum in 1984-85

SCALE 1:12 000
½ 0 1 MILE
.5 0 1 KILOMETER
CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

15° TRUE NORTH MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1985

UTAH
QUADRANGLE LOCATION