UTAH GEOLOGICAL SURVEY
a division of
UTAH DEPARTMENT OF NATURAL RESOURCES

Plate 1
Utah Geological Survey Miscellaneous Publication 96-1
Geologic Map of the Logan Quadrangle

Base map from the U. S. Geological Survey
Logan 7.5' Quadrangle, 1986

SCALE 1:24 000

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS

14°18' E
254.2 MILS

1996 MAGNETIC DECLINATION
AT CENTER OF SHEET

UTAH
QUADRANGLE LOCATION

Geology mapped by J. P. Evans,
J. P. McCalpin and D. C. Holmes
between 1986 and 1991,
revisions by J. P. Evans and
Jon K. King (UGS) in 1993 and 1994.
Lori J. Douglas, Cartographer

GEOLOGIC MAP OF THE LOGAN QUADRANGLE, CACHE COUNTY, UTAH

by

James P. Evans
James P. McCalpin
David C. Holmes

1996

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Plate 2
Utah Geological Survey Miscellaneous Publication 96-1
Geologic Map of the Logan Quadrangle

EXPLANATION OF MAP UNITS

Qms — Holocene and Pleistocene (?) slides and slumps - *Fine-grained sediment with few clasts, derived from the base of the Wells Formation.*

Qac — Undivided alluvium and colluvium - *Holocene and Pleistocene (?) pebble, cobble, and boulder gravels mixed with sand, silt, and clay; deposited as hillslope colluvium and fan alluvium, with small areas of landslide deposits and stream alluvium.*

Qmsf — Holocene to latest Pleistocene slope-failure deposits - *Unsorted and unstratified matrix-supported sparse gravels with abundant sand and silt matrix; located at the base of steep hillsides of Lake Bonneville deltaic and sandy deposits, where the hillsides have failed by slide, slump and/or flow.*

Qlf — Undivided fine-grained Lake Bonneville deposits - *Lacustrine clay, silt, and fine sand deposits in deep and/or quiet water in Lake Bonneville, and not related to any specific shorelines; typically 40 to 50 feet (~12 to 15 m) thick.*

Qlps — Lacustrine sand and silt related to Provo and younger shorelines - *Nearshore deposits of coarse to fine sand, silt, and minor clay; typically rhythmically bedded; exposed thickness less than 16 feet (<5 m).*

Qlpg — Lacustrine sand and gravel related to Provo and younger shorelines - *Clast-supported pebble and cobble gravel in a sparse matrix of sand and silt with interbedded thin sands; deposited in beaches, bars, and spits, typically south of Provo deltas; exposed thickness less than 16 feet (<5 m).*

Qlpd — Deltaic deposits related to the Provo and younger shorelines - *Clast-supported pebble and cobble gravel in a matrix of sand and minor silt, with thin sand beds; mostly deposited at the time of the Bonneville flood; exposed thickness less than 82 feet (<25 m).*

Qlbs — Lacustrine sand and silt related to the Bonneville shoreline - *Coarse to fine sand, silt, and minor clay with typically rhythmical bedding; deposited in a nearshore environment and as lagoon fill; up to 170 feet (52 m) thick in subsurface below Provo deltas.*

Qlbg — Lacustrine gravel and sand related to the Bonneville shoreline - *Clast-supported pebble and cobble beds in a matrix of sand and silt, with interbedded sand; deposited in beaches, bars, spits, and small deltas; exposed thickness less than 33 feet (<10 m).*

Qlbd — Deltaic deposits related to the Bonneville shoreline - *Clast-supported pebble and cobble gravel in a matrix of sand and minor silt, with thin sand interbeds; deposited in deltas; exposed thickness less than 33 feet (<10 m).*

Qaf_1 — Late Holocene fan alluvium - *Clast-supported pebble and cobble gravel, locally bouldery, in a matrix of sand, silt, and clay; has sharper debris-flow levees and channels than the middle Holocene and older fans; exposed thickness less than 16 feet (<5 m).*

Qaf_2 — Middle Holocene to latest Pleistocene fan alluvium - *Clast-supported, locally bouldery, pebble and cobble gravel in a matrix of sand, silt, and clay; deposited in alluvial fans of post-Bonneville lake cycle; exposed thickness less than 16 feet (<5 m).*

Qaf_3 — Middle Pleistocene (pre-Bonneville lake cycle) fan alluvium - *Clast-supported pebble, cobble, and boulder gravel in a matrix of sand, silt, and minor clay; only exposed at the mouth of Logan Canyon where the Logan River has cut through younger deposits; maximum exposed thickness about 33 feet (~10 m).*

Qalu — Undivided Holocene to latest Pleistocene stream alluvium - *Sand, silt and gravel on undifferentiated post-Provo-stand floodplains and terraces; mapped where the age of the alluvium (Qal_1 vs. Qal_2) cannot be determined; probably less than 33 feet (<10 m) thick.*

Qal_1 — Late Holocene stream alluvium - *Clast-supported pebble and cobble gravel in a matrix of sand, silt, and minor clay, with thin sand lenses; located on modern floodplains and low terraces; exposed thickness less than 16 feet (<5 m).*

Qal_2 — Middle Holocene to latest Pleistocene stream alluvium - *Clast-supported pebble and cobble gravels, in a matrix of sand, silt, and minor clay, with thin sand lenses; present on terraces more than 16 feet above modern stream levels; exposed thickness less than 16 feet (<5 m).*

Qu — Undifferentiated Pre-Bonneville-lake-cycle deposits - *Uncemented sand, clay, and gravels of pre-Bonneville Quaternary deposits; only shown on cross sections.*

Tu — Undifferentiated Tertiary deposits - *Tuffaceous siltstone and sandstone, conglomerate, and fresh-water limestone of the Salt Lake Formation; basal deposits may be conglomerates of the Tertiary Wasatch Formation only shown on cross sections.*

IPPw — Wells Formation - *Incompletely exposed fine to medium-grained, brown to gray, calcareous, quartz sandstone and interbedded, gray limestone; thickness exposed in quadrangle is 600 feet (183 m).*

Mmc — Monroe Canyon Limestone equivalent - *Lower, gray to brown-gray, thick bedded, massive, cliff-forming limestone; middle, medium-bedded, yellow to yellow-brown, poorly exposed siltstone; and upper, cherty, gray to gray-brown limestone; thickness varies from 750 to 1,150 feet (228 - 350 m).*

Mlf — Little Flat Formation equivalent - *Brown, gray, light-yellow, and orange, quartz sandstone and siltstone; with minor limestone, phosphatic limestone, dolostone, shale, and chert; 1,206 feet (368 m) thick; may thin northward or thickness may vary due to bedding-plane thrust fault.*

Ml — Lodgepole Limestone - *Prominent, cliff-forming, medium- to dark-gray limestone consisting of micrite, biomicrite, and biosparite with chert layers throughout; contains brachiopod, coral, gastropod, and bryozoan fossils; 690 feet (210 m) thick.*

MDl — Leatham Formation - *Poorly exposed, thin-bedded, black, gray, and brown siltstone and limestone; 0 to 80 feet (0 - 24 m) thick.*

Db — Beirdneau Formation - *At top is 30 to 60 feet (9 - 18 m) thick, gray, resistant limestone known as the "contact ledge;" remainder is thin- to medium-bedded, gray, tan, yellow, and brown, arenaceous dolostone which grades upward to a predominantly tan, yellow, and white sandstone with cross bedding, thin laminations, ripple marks, and mud cracks; 524 to 1,087 feet (160 - 331 m) thick, and thins northward.*

Dh — Hyrum Dolomite - *Cliff-forming, massive, medium- to dark-gray dolostone in upper part, which lacks fossils; lower sequence is thin- to medium-bedded, yellow, gray, and tan dolostone and limestone; 932 to 1,011 feet (284 - 308 m) thick, thinning southward.*

Dwc — Water Canyon Formation - *Upper, Grassy Flat Member (not mapped separately) is purple, gray, brown, yellow, and white, interbedded dolomite, siltstone, intraformational breccia, calcareous sandstone, and thin beds of dolostone; lower, Card Member (not mapped separately) is light-gray, white, and light-brown, thin-bedded, argillaceous dolostone, with local intraformational breccia; total thickness 586 feet (179 m).*

Sl — Laketown Dolomite - *Massive, cliff-forming, light-gray, fine- and medium-crystalline, medium- to thick-bedded dolostone, with coral, brachiopod, and cephalopod fossils, and algal structures; 1,150 to 1,610 feet (350 - 490 m) thick.*

Ofh — Fish Haven Dolomite - *Dark-gray to black, thick-bedded, fine- to medium-crystalline dolostone with rare bioturbated sandy layers, remnants of algal mats, tabulate corals (*Halysites *sp. and* Favosites *sp.), and rugose corals; 130 to 145 feet (40 - 44 m) thick.*

Osp — Swan Peak Formation - *Upper part is light-brown to white and tan, well-indurated, medium-grained quartzite with burrows in the lower portion; middle part is purple and gray quartzite with burrows, ripple marks, fish fragments, and disarticulated trilobites and cephalopods; lower part in interbedded blue, gray, and brown shale, minor, thin-bedded quartzite, and gray limestone; total thickness 134 to 283 feet (41 - 86 m).*

Ogc — Garden City Formation - *Only upper part is exposed in quadrangle; it contains light- to medium-gray, crystalline and fossiliferous limestone, micritic limestone, silty limestone, and thin- to medium-bedded dolostone; black chert lenses and stringers common; 1,160 to 1,400 feet (354 - 427 m) thick, thins southward.*

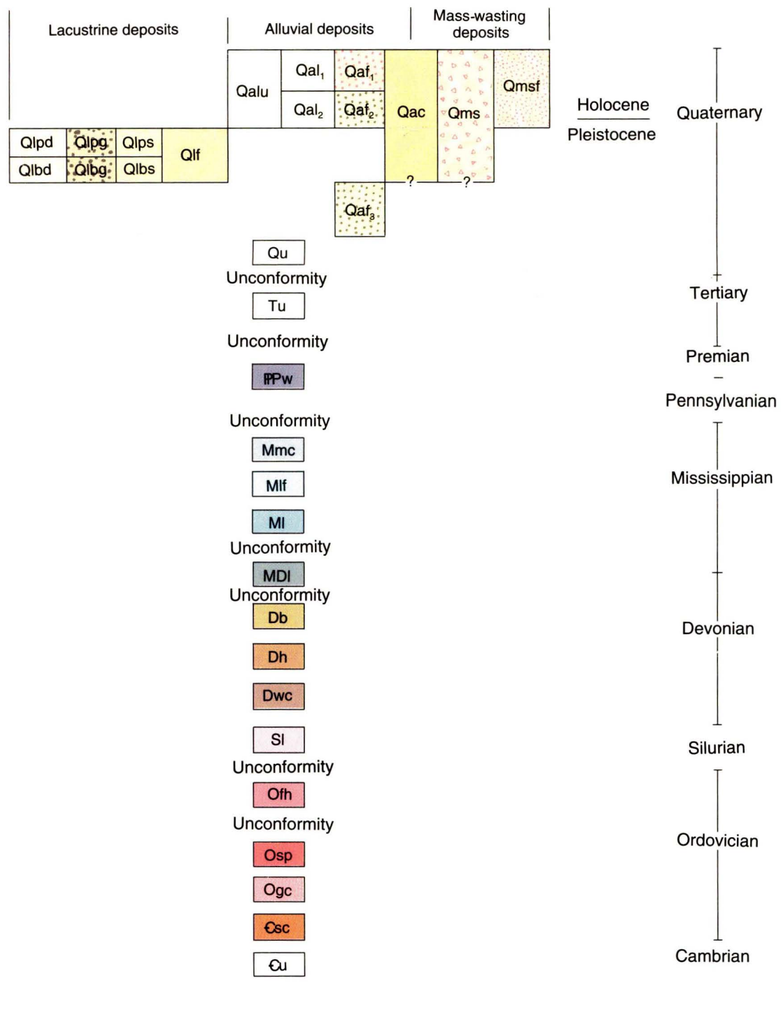
Csc — St. Charles Formation - *Thin-bedded, gray and black limestone and massive, gray dolostone; incompletely exposed in hanging wall of thrust fault.*

Cu — Undifferentiated Cambrian strata - *Only shown on cross sections.*

MAP SYMBOLS

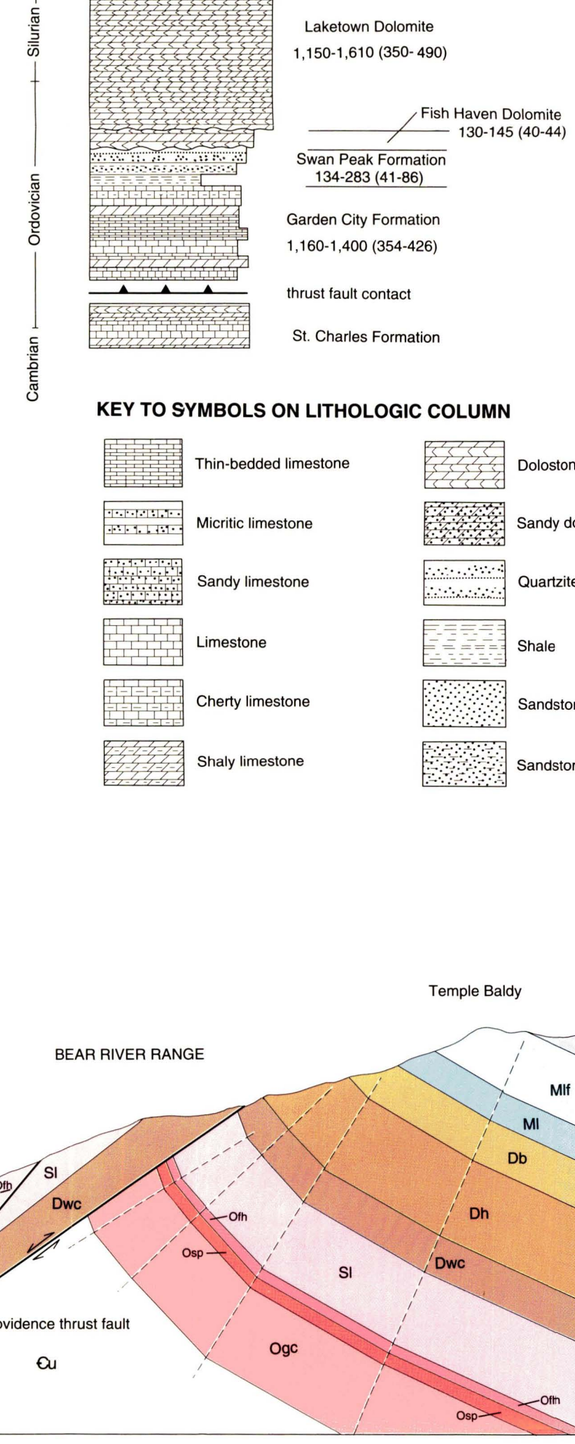
- Contact between units - *dashed where approximately located, dotted where concealed*
- Thrust fault - *teeth on upthrown plate, dashed where approximately located*
- Normal fault - *bar and ball on downthrown side, dashed where approximately located, dotted where concealed*
- Steeply dipping normal fault - *U on upthrown side, D on downthrown side (dip more steeply than faults with bar and ball)*
- Strike-slip fault - *arrows indicate relative motion*
- Reverse fault reactivated in a normal slip sense (on cross sections)
- EC-1 — Locations of trenches dug acros the East Cache fault
- 37 — Strike and dip of beds - *numbers indicate dip in degrees*
- 61 — Strike and dip of overturned beds
- Anticline axis
- Syncline axis
- x — Prospect
- A — A′ — Location of cross sections

CORRELATION OF MAP UNITS



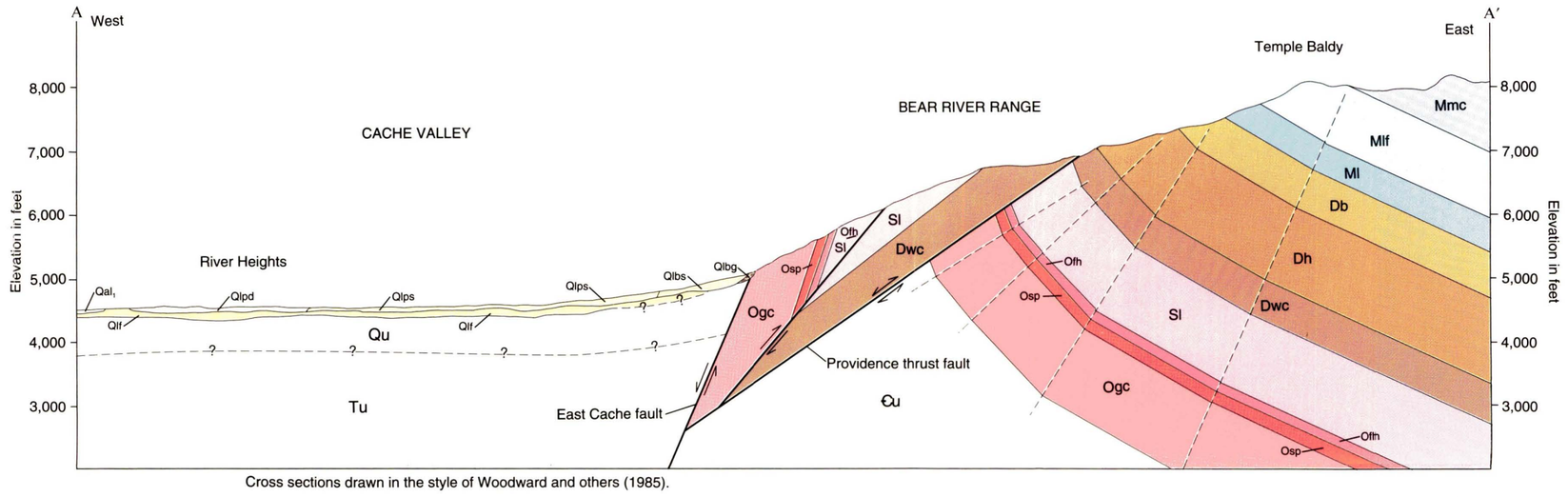
LITHOLOGIC COLUMN

Thicknesses in feet and in meters (in parentheses)



KEY TO SYMBOLS ON LITHOLOGIC COLUMN

- Thin-bedded limestone
- Micritic limestone
- Sandy limestone
- Limestone
- Cherty limestone
- Shaly limestone
- Dolostone
- Sandy dolostone
- Quartzite
- Shale
- Sandstone
- Sandstone interbedded with shale



Cross sections drawn in the style of Woodward and others (1985).