Utah Geological Survey
a division of
Utah Department of Natural Resources
in cooperation with
U.S. Geological Survey

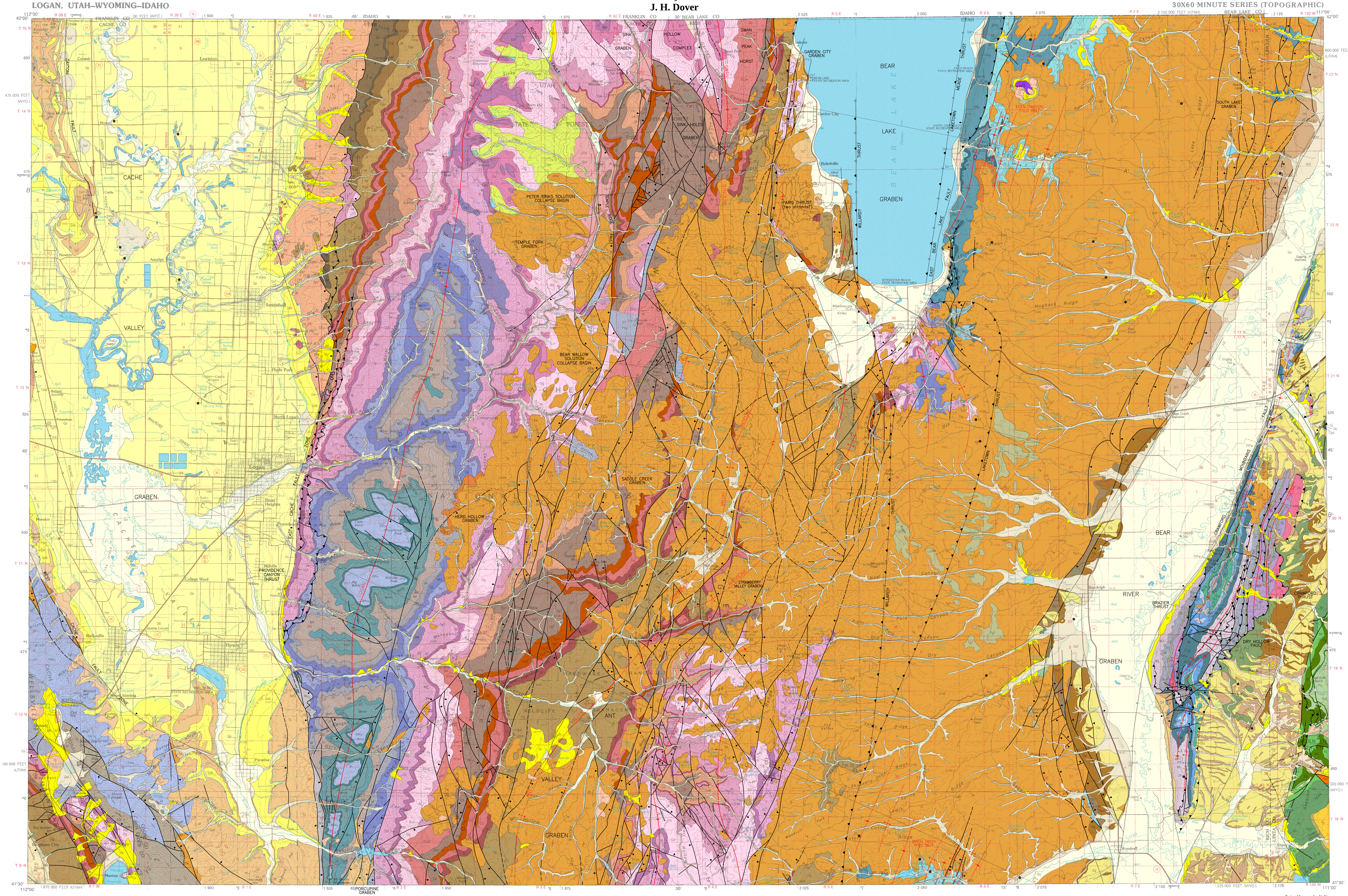
GEOLOGIC MAP OF THE LOGAN 30' x 60' QUADRANGLE, CACHE AND RICH COUNTIES, UTAH AND LINCOLN AND UINTA COUNTIES, WYOMING

by
J. H. Dover

Plate 1 of 3
UTAH GEOLOGICAL SURVEY 2007
Miscellaneous Publication MP06-8 DM
Digitized from U.S Geological Survey Miscellaneous Investigations Series Map I-2210 (1995)

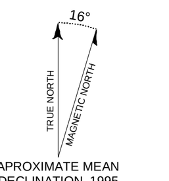
LOGAN, UTAH–WYOMING–IDAHO

30X60 MINUTE SERIES (TOPOGRAPHIC)



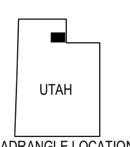
Base from U.S. Geological Survey, 1981
Projection: UTM Zone 12
Units: Meters
Datum: NAD 1927
Spheroid: Clarke 1866

This map is a cooperative project of the UGS and the U.S. Geological Survey (USGS) funded through the STATEMAP component of the National Cooperative Geologic Mapping Program, Agreement No. 05HQAG0084.



APROXIMATE MEAN DECLINATION, 1995

SCALE 1:100 000
CONTOUR INTERVAL 50 METERS



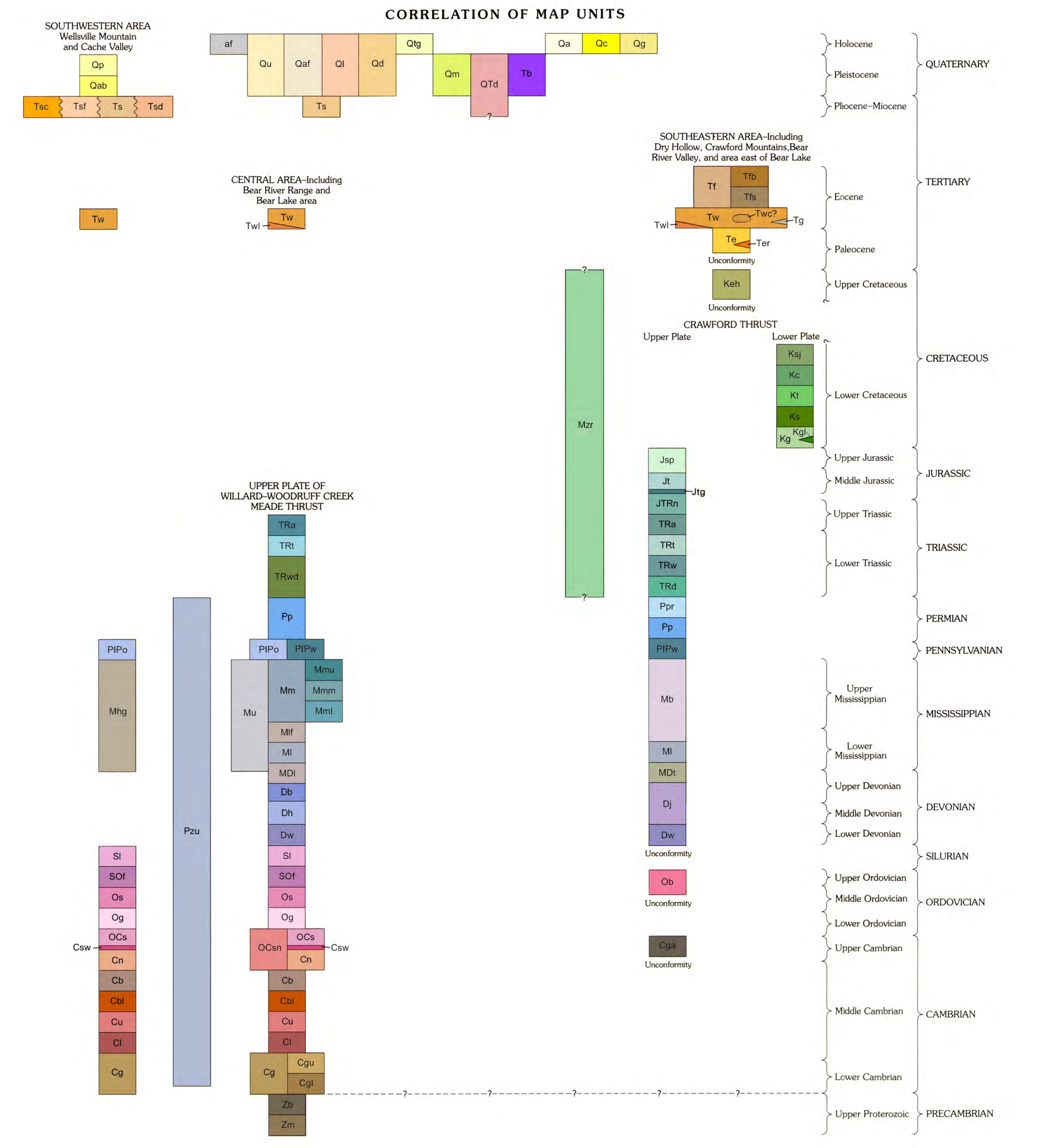
QUADRANGLE LOCATION

NOTE: Unit colors on this plate match colors on plate 2 and are not the same as colors on plate 3.

Project Manager: Jon K. King
GIS Data Preparation: Basia Matyjasik

UTAH GEOLOGICAL SURVEY 2006
Miscellaneous Publication MP06-8 DM
Geologic Map of the Logan 30'x60' Quadrangle, Cache and Rich Counties, Utah and Lincoln and Uinta Counties, Wyoming
By J. H. Dover
Digitized from U.S. Geological Survey Miscellaneous Investigations Series Map I-2210 (1995)

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

af **Artificial fill (Holocene)**—Includes unconsolidated materials used in highway and dam construction and waste rock produced by phosphate mining

Qa **Main-stream alluvium (Holocene)**—Unconsolidated, crudely stratified, clay- to boulder-size material deposited in channels and flood plains of major streams, including Bear, Little Bear, and Logan Rivers, and Blacksmith Fork; locally includes alluvial-fan and terrace deposits, colluvium, talus, or lake deposits. Contacts with side-stream alluvium (unit Qaf) are gradational and arbitrarily drawn in places. Thickness generally a few meters or less

Qc **Colluvium (Holocene)**—Unconsolidated and largely unstratified, mostly angular silt- to boulder-size debris along valley sides; includes talus cones. Thickness a few meters or less

Qg **Gravel (Holocene)**—Unconsolidated gravel veneer or pavement on erosional benches; derived as lag concentrate from erosion of nearby or underlying rock or from terrace gravel. May locally include terrace gravel along west side of Bear River. Thickness 1-2 m

Qtg **Terrace gravel (Holocene and Pleistocene)**—Unconsolidated boulder-, cobble-, and pebble-rich gravel and sand in bench about 2 m high; mapped only in northern part of Cache Valley

Qaf **Side-stream alluvium and fan deposits (Holocene and Pleistocene)**—Unconsolidated, crudely stratified, clay- to boulder-size material deposited in tributary stream channels and alluvial fans; commonly includes terrace deposits, colluvium, talus, or lake deposits. Gradational into main-stream alluvium and colluvium units. Thickness a few meters or less

Ql **Landslide deposits (Holocene or Pleistocene)**—Angular, poorly sorted soil, rock debris, and large slumped masses; materials locally derived. Many landslides labelled according to source rock unit and shown on map only by landslide scarp symbol

Qd **Dune deposits (Holocene or Pleistocene)**—Eolian sand and silt in dunes as high as 50 m; mapped only along southwest side of Crawford Mountains in Woodruff Narrows 7 1/2 minute quadrangle

Qm **Moraine (Pleistocene)**—Poorly sorted bouldery till of unknown age on east flank of northern Bear River Range; may include some outwash sand and gravel deposits

Qp **Provo Formation (Pleistocene)**—Unconsolidated, generally well-stratified and well-sorted gravel, sand, silt, and clay deposited by lacustrine and alluvial processes during Provo stage of Lake Bonneville. Thickness of 15–23 m reported by Williams (1962)

Qab **Alpine and Bonneville Formations (Pleistocene)**—Mainly unconsolidated, well-stratified, well-sorted lacustrine silt and clay containing alluvial sand and gravel near Lake Bonneville shoreline. Deposited during Alpine and Bonneville stages of Lake Bonneville. Thickness of 15–30 m reported by Williams (1962)

Qu **Surficial deposits, undivided (Quaternary)**—Gravel, sand, silt, and possibly other unconsolidated materials; mapped only in southwest corner of map area, but extend into Salt Lake Valley to the west

QTd **Diamictite (Quaternary and (or) upper Tertiary)**—Mostly unconsolidated conglomerate consisting of locally derived cobbles, boulders, and angular blocks as much as 1 m across in a poorly stratified and poorly sorted matrix of sand and gravel; thickness unknown. Mapped only in upper part of Logan River drainage

Tb **Basalt (Tertiary)**—Vesicular flow rocks containing olivine phenocrysts in a fine-grained matrix of plagioclase and pyroxene; mapped only east of Bear Lake at Black Mountain near north edge of map area

Ts **Salt Lake Formation (Pliocene and Miocene)**—White to pale-green or gray, poorly consolidated, tuffaceous to marly sand and silt and subordinate thin interbeds of volcanic ash and gravel; locally contains intermixed red mud, sand, and gravel thought to be reworked from adjacent exposures of the Wasatch Formation. Thickness of as much as "several thousand feet" reported by Williams (1964) may include some beds now mapped as the Fowkes Formation or Norwood Tuff. Pliocene to Miocene age based on fossil plants (Brown, 1949), ostracods, and mollusks (Yen, 1947; Adamson and others, 1955); K-Ar dates of 11.6±1.4 m.y. and 18.9±1.6 m.y. reported by Williams (1964); fission-track age on zircon of 7.9±2.0 m.y. (at 2 sigma level) reported by G.A. Izett (written commun., 1981). Mapped only in Cache Valley and Bear Lake areas; appears to be patchy and to occupy erosional depressions on Wasatch Formation in Bear Lake area

Tsd **Diamictite facies**—Moderately well consolidated diamictic conglomerate consisting mainly of locally derived, subangular quartzite, carbonate, and chert boulders and cobbles in a poorly stratified and poorly sorted matrix of tuffaceous to marly sand and gravel; thickness at least 315 m in Richmond quadrangle (Mendenhall, 1975). Mapped only along northeastern margin of Cache Valley

Tsf **Fanglomerate facies**—Unconsolidated deposit of cobbles, boulders, and angular blocks of Oquirrh(?) Formation (unit PIPo) as much as 0.5 m in diameter in a matrix of grit and sand; may include pre-Bonneville Pleistocene fanglomerate. Thickness unknown. Mapped only near Wellsville Mountains along southwestern margin of Cache Valley

Tsc **Collinston conglomerate facies**—Moderately well consolidated pebble- to boulder-conglomerate consisting of subrounded clasts of locally derived quartzite, limestone, chert, calcareous sandstone, conglomerate, and oolitic marl in a gastropod-bearing matrix of oolitic limestone and marly sand and gravel; some boulders 1-2 m in diameter. Thickness of 762 m near Collinston, 8 km west of map area (Williams, 1962). Only one small patch mapped at west-central edge of map area

Tf **Fowkes Formation (middle Eocene)**—Light-colored, moderately well consolidated tuffaceous sandstone and siltstone; thickness ranges from 90 to 180 m (Oriel and Tracey, 1970). Mapped only in Bear River Valley and Crawford Mountains area in southeastern part of map area

Tfb **Bulldog Hollow Member**—Pale-greenish-gray to white tuffaceous sandstone and siltstone containing scattered biotite and hornblende grains; K-Ar age on hornblende of 47.7±1.5 m.y. reported by Oriel and Tracey (1970). Thickness about 60 m

Tfs **Sillem Hollow Member**—Pale-pink and buff, slightly tuffaceous claystone, mudstone, and sandstone containing lenses of conglomerate and ostracodal limestone and marl; basal contact with Wasatch Formation is gradational. Thickness of 32-120 m reported by Oriel and Tracey (1970), but may be absent in places within quadrangle

Tw **Wasatch Formation (middle and lower Eocene)**—Red, pale-red, and reddish-buff, crudely stratified, poorly sorted grit, conglomerate, and siltstone; locally includes interbeds of lacustrine pisolitic limestone and marl. Some interbeds of conglomerate are gray and contain mainly well-rounded pebbles and cobbles of Paleozoic carbonate rocks. Characterized by abrupt facies changes and interfingering of lithic types. Maximum thickness is a few hundred meters in areas east of Bear Lake and west of Randolph, Utah

Twc **Conglomerate**—Consists of carbonate-cemented boulders of Paleozoic limestone as much as 0.7 m in diameter; assignment to the Wasatch Formation is tentative. Only one small area 6 km southwest of Randolph is mapped

Twl **Limestone**—Locally developed basal unit of pisolitic to oncolitic, gritty to pebbly limestone and marl; individual beds 1-3 m thick. Locally, unit as mapped is exaggerated in thickness or includes gray, limy conglomeratic facies of Wasatch Formation. Mapped in only two areas, one 3 km east of Logan Peak and the other 2 km east of Bear Lake

Tg **Green River Formation (lower Eocene)**—White to light-gray limestone and marly siltstone; forms discontinuous lenticular interbeds in Wasatch Formation (unit Tw). Thickness about 3 m or less, but mapped thickness locally exaggerated. Mapped mainly on west side of Bear River Valley west of Randolph, Utah

Evanston Formation (Paleocene and Upper Cretaceous)

Te **Main body (Paleocene)**—Gray carbonaceous claystone and siltstone containing tan sandstone interbeds; maximum thickness 200 m. Mapped only in southeastern corner of map area

Ter **Redbeds (Paleocene)**—Red claystone, siltstone, and sandstone; locally forms mappable interbeds within predominantly gray Evanston Formation strata. Thickness 20 m or less. Only two small localities mapped near southeastern corner of map area

Keh **Hams Fork Conglomerate Member (Upper Cretaceous)**—Poorly to moderately well consolidated cobble and boulder conglomerate in a gritty sandstone and siltstone matrix; contains quartzite, chert, and carbonate clasts as much as 0.3 m in diameter. Estimated thickness 20–30 m. Poorly exposed; mapped only in southeastern corner of map area

Mzr **Mesozoic(?) rocks, undivided**—Red-brown to reddish, calcareous(?) sandstone and conglomerate; more tightly folded than overlying Wasatch Formation strata. Thickness unknown. Only one small outcrop along Big Creek about 5 km southwest of Randolph, Utah, mapped

Ksj **Sage Junction Formation (Lower Cretaceous)**—Interbedded light-gray to tan siliceous siltstone, mudstone, and shale; tan sandstone; and variegated porcellanite. Thickness at least several hundred meters. Mapped only along Dry Hollow in southeastern part of map area

Kc **Cokeville Formation (Lower Cretaceous)**—Interbedded dark-gray, carbonaceous, shaly mudstone and siltstone, tan-weathering sandstone, and gray to tan limestone and coquina containing gastropod (*Pyrgulifera*) and pelecypod fauna. Thickness about 650 m. Mapped only along southeastern edge of map area

Kt **Thomas Fork Formation (Lower Cretaceous)**—Interbedded pale-red mudstone and gray, tan, or buff sandstone, which have poorly exposed zones mantled by gray or lavender limestone nodules. Thickness at least 100–200 m. Mapped only along southeastern edge of map area

Ks **Smiths Formation (Lower Cretaceous)**—Mainly tan to olive-brown quartz sandstone or quartzite and, locally, basal black carbonaceous shale. Thickness about 60 m. Mapped only along southeastern edge of map area

Kg **Gannett Group (Lower Cretaceous)**—Mainly orange-brown siltstone, sandstone, grit, pebble conglomerate, and two prominent interbeds of gray to lavender nodular limestone. Thickness at least 200 m. Mapped only along southeastern edge of map area

Kgl **Limestone interbeds**—Mapped locally

Jsp **Stump Formation (Upper and Middle Jurassic) and Preuss Redbeds (Middle Jurassic), undivided**—Greenish-gray glauconitic siltstone, sandstone, and limestone of the Stump Formation in the upper part; reddish-brown evaporite-bearing siltstone and sandstone of the Preuss Redbeds in the lower part. Thickness unknown. Mapped along South Eden Canyon, east of Bear Lake, and along Birch Creek near south-central edge of map area

Jt **Twin Creek Limestone (Middle Jurassic)**—Medium- to light-gray, thin- to medium-bedded limestone and argillaceous limestone and minor reddish-brown mudstone. At least 800–1,000 m thick where exposed east of Bear Lake; also exposed in northeast corner and at south-central edge of map area

Jtg **Gypsum Spring Member**—Basal unit of red-weathering limestone breccia, buff sandstone, and red silty mudstone. Forms prominent red-weathering zone at base of Twin Creek Limestone on east side of Bear Lake. Thickness 20 m or less

JTRn **Nugget Sandstone (Jurassic? and Triassic?)**—Grayish-orange, reddish-brown, tan, and white, typically manganese-stained, fine- to medium-grained, medium-bedded to massive, locally crossbedded, well-sorted quartz sandstone containing rounded to subrounded grains; forms prominent dark-brown blocky talus slopes. About 400 m thick where exposed on east side of Bear Lake; also exposed in northeast corner and at south-central edge of map area

TRa **Ankareh Redbeds (Upper and Lower Triassic)**—Bright-red, orange-red, and maroon, partly calcareous mudstone, siltstone, sandstone, and minor limestone interbeds. Thickness 500–600 m. Exposed east of Bear Lake and along Old Laketown Canyon

TRt **Thaynes Limestone (Lower Triassic)**—Greenish-gray calcareous siltstone and silty limestone in upper part; grayish-brown silty limestone and calcareous shale in lower part. Thickness about 600 m. Mapped in Old Laketown Canyon area, along Brazier Canyon in the Crawford Mountains, and near Woodruff, Utah

TRw **Woodside Redbeds (Lower Triassic)**—Reddish-orange to red-brown shale and siltstone containing minor sandstone and gray limestone interbeds. Estimated thickness 300 m or less in Crawford Mountains

TRd **Dinwoody Formation (Lower Triassic)**—Greenish-gray, thin-bedded calcareous siltstone and silty limestone. About 150 m thick in Crawford Mountains

TRwd **Woodside Redbeds and Dinwoody Formation, undivided (Lower Triassic)**—Estimated thickness 200–300 m in Old Laketown Canyon and 300–450 m in Crawford Mountains

Pzu **Paleozoic rocks, undivided**—Mapped in central and southwestern parts of map area; not examined in the field, but near and on trend with known Paleozoic rocks

Pp **Phosphoria Formation (Lower Permian)**—Gray, partly brownish-weathering, interbedded chert, cherty limestone and dolostone, phosphatic siltstone and limestone, and phosphorite; contains high-grade phosphate rock in places. Thickness 200–250 m. Mapped only in Old Laketown Canyon area and Crawford Mountains

Ppr **Rex Chert Member**—Upper part of Phosphoria Formation, consisting mainly of light-gray, thin-bedded chert, massive cherty limestone and dolostone, and minor phosphatic shale. Thickness 50 m or less in Crawford Mountains

PIPo **Oquirrh Formation (Lower Permian and Pennsylvanian)**—Gray to tan, fine- to medium-grained, thin- to thick-bedded sandstone, calcareous sandstone, sandy limestone, and cherty limestone. Thickness at least several hundred meters in Wellsville Mountains area. Mapped in mountains around south end of Cache Valley

PIPw **Wells Formation (Lower Permian and Upper and Middle Pennsylvanian)**—Mainly white to buff, fine-grained, well-sorted quartzite, quartz sandstone, and interbedded siltstone, sandy limestone, and dolostone. Thickness 200–400 m. Mapped only in Old Laketown Canyon area and Crawford Mountains

Mu **Mississippian rocks, undivided**—Includes rocks previously mapped as "Brazer Limestone, and as Brazier Limestone and Lodgepole Limestone undifferentiated" by Mullens and Izett (1963); mapped only along west edge of Bear River Range east of Paradise, Utah

Mb **Brazer Dolomite (Upper and Lower Mississippian)**—Gray to grayish-brown, thin- to thick-bedded, fine-grained cherty dolostone. Thickness of about 250 m reported by Sando and others (1959). Mapped only in Crawford Mountains

Mhg **Humbug Formation (Upper Mississippian), Deseret Limestone (Upper and Lower Mississippian), and Gardison Limestone (Lower Mississippian), undivided**—Tan, calcareous quartz sandstone of the Humbug Formation in the upper part; blue-gray cherty limestone of the Deseret and Gardison in middle and lower parts. Thickness about 600 m (Sorensen and Crittenden, 1976) near southwest corner of map area, in Mantua 7 1/2 minute quadrangle to the south

Mm **Monroe Canyon Limestone (Upper Mississippian)**—Mainly gray, fossiliferous limestone and minor interbeds of calcareous quartz sandstone and siltstone; subdivided in Bear River Range into upper, middle, and lower units (after Dutro and Sando, 1963). Thickness 85 m in Old Laketown Canyon (Sando and others, 1976, p. 473; Sandberg and Gutschick, 1978, p. 31)

Mmu **Upper cherty limestone unit**—Estimated thickness 60 m

Mmm **Middle medium-bedded limestone unit**—Estimated thickness 90–120 m

Mml **Lower massive limestone unit**—Cliff-forming unit. Estimated thickness 60–120 m

Mlf **Little Flat Formation (Upper and Lower Mississippian)**—Interbedded gray, tan, and reddish-tan calcareous siltstone and sandstone, sandy limestone, and nodular cherty limestone containing a few thin phosphatic interbeds; forms receding slopes between prominent cliff-forming limestone units. Estimated thickness 200–300 m in Bear River Range; thickness 244 m in Old Laketown Canyon (Sando and others, 1976, p. 473; Sandberg and Gutschick, 1978, p. 31)

Ml **Lodgepole Limestone (Lower Mississippian)**—Gray, cliff-forming, thin- to thick-bedded, partly cherty, fossiliferous limestone. Estimated thickness 200 m in Bear River Range; thickness 214 m in Old Laketown Canyon (Valenti, 1982)

MDl **Leatham Formation (Lower Mississippian? and Upper Devonian)**—Interbedded black sandstone, siltstone, mudstone, chert, and silty limestone. Thickness 0–25 m (Sandberg and Poole, 1977). Mapped in Bear River Range

MDt **Three Forks Formation (Lower Missi sippian? and Upper Devonian)**—Yellowish-gray, red-stained, fine-grained limestone and limestone breccia containing poorly exposed interbeds of red to tan siltstone and sandstone. Thickness about 87 m in Crawford Mountains (Ott, 1980)

Dj **Jefferson Dolomite (Upper Devonian)**—Dark-gray, medium-bedded to massive, resistant dolostone. Thickness about 110 m in southern Crawford Mountains (Chamberlain, 1980); estimated thickness 200–300 m in northeastern Crawford Mountains

Db **Beirdneau Formation (Upper Devonian)**—Interbedded tan, reddish-tan, and grayish-yellow sandstone, siltstone, sandy limestone, and dolomitic limestone; upper limestone beds equivalent to "Contact Ledge" of Williams (1948). Thickness 150–300 m

Dh **Hyrum Dolomite (Upper and Middle Devonian)**—Dark-gray, fine-grained, massive, cliff-forming dolostone containing minor gray limestone and olive-tan sandstone interbeds. Thickness 200–300 m

Dw **Water Canyon Formation (Lower Devonian)**—Mainly gray, very light-gray-weathering, thin-bedded, laminated sandy dolostone and mainly in upper part, containing interbeds of argillite, sandstone, and carbonate breccia. Thickness 76–185 m (Williams and Taylor, 1964)

Sl **Laketown Dolomite (Silurian)**—Medium- to light-gray, thick-bedded to massive, cliff-forming, medium-grained, sugary-textured dolostone. Estimated thickness 350–600 m

SOf **Fish Haven Dolomite (Lower Silurian and Upper Ordovician)**—Dark-gray, medium-bedded, medium-grained, bioclastic dolostone. Thickness 60–75 m

Ob **Bighorn Dolomite (Upper and Middle Ordovician)**—Light-gray, generally massive, sugary-textured dolostone and dolomitic limestone. Thickness 236 m of equivalent rocks in Crawford Mountains (Ott, 1980)

Os **Swan Peak Quartzite (Middle Ordovician)**—Mainly white to pale-reddish-tan, fine- to medium-grained, well-sorted, fucoidal quartzite or quartz sandstone having well-rounded grains; lower unit of black shale has thin quartzite and sandy limestone interbeds present locally. Thickness varies from 0 to 150 m (Oaks and others, 1977); unit thins southeastward across Bear River Range and is generally absent in southeast half of map area

Og **Garden City Formation (Middle and Lower Ordovician)**—Mainly gray, thin-bedded, slabby limestone and argillaceous limestone characterized by intraformational limestone conglomerate and breccia; upper 70 m typically dolomitic and cherty (shown by dotted line on map). Thickness 370–520 m (Ross, 1951)

OCs **St. Charles Formation (Lower Ordovician and Upper Cambrian)**—Gray to dark-gray, mottled, thin-bedded to massive, algal-mat dolostone, dolomitic limestone, and limestone in upper member; basal Worm Creek Quartzite Member mapped separately in most places. Estimated thickness 300–400 m

Csw **Worm Creek Quartzite Member(Upper Cambrian)**—Gray to tan, medium-bedded, fine- to medium-grained quartzite and quartz sandstone; poorly exposed in most places.Thickness 2–125 m (Williams, 1948)

OCn **St. Charles Formation (Lower Ordovician and Upper Cambrian) and Nounan Dolomite (Upper and Middle Cambrian), undivided**

Cga **Gallatin Limestone (Upper Cambrian)**—Gray and tan, mottled, thin- to thick-bedded limestone. Estimated thickness 200 m or less. Mapped only in one small klippe at east-central edge of map area

Cn **Nounan Dolomite (Upper and Middle Cambrian)**—Gray, thin-bedded to massive, fine- to medium-grained dolostone interbedded with subordinate limestone and white-weathering, laminated, fine-grained dolostone. Estimated thickness 200-400 m

Cb **Bloomington Formation (Middle Cambrian)**—Interbedded gray, thin-bedded limestone and olive-tan shale and siltstone. Minimum thickness 300 m; deformation and solution collapse complicate thickness estimates in places

Cbl **Blacksmith Dolomite (Middle Cambrian)**—Gray, cliff-forming, thick-bedded, fine-grained, locally oolitic dolostone and subordinate silty dolostone, dolomitic limestone, and limestone. Thickness 100–215 m (Williams, 1948)

Cu **Ute Formation (Middle Cambrian)**—Interbedded gray, thin-bedded, typically oolitic, silty limestone and limestone breccia and citrine shale. Thickness 200–300 m

Cl **Langston Dolomite (Middle Cambrian)**—Gray, medium- to thick-bedded dolostone characterized by brown-weathering rind; gray, thin-bedded limestone in upper part. Thickness 120 m

Brigham Group (Lower Cambrian and Late Proterozoic)—Terminology after Crittenden and others (1971)

Cg **Geertsen Canyon Quartzite (Lower Cambrian)**—Buff, white, and pale-pink, thick-bedded to massive, coarse-grained, locally crossbedded quartzite, arkose, grit, and conglomerate containing subrounded pebble- and cobble-size clasts of quartz, quartzite, and minor jasper; arkosic rocks in lower part contain broken crystals of pink and green microcline as long as 1 cm. Estimated total thickness at least 1,400 m in western Bear River Range at northern edge of map area

Cgu **Upper member**—Buff, white, and pink, thick- to massive-bedded, coarse-grained quartzite and pebble to cobble conglomerate; thickness about 950 m in High Creek area of western Bear River Range

Cgl **Lower member**—Buff, white, pink, and maroon, thick- to massive-bedded, coarse-grained quartzite and arkose having broken crystals of pink and green microcline as long as 1 cm, and conglomerate having subrounded granule- to pebble-size clasts of white to reddish-purple quartzite and jasper; thickness about 450 m in High Creek area of western Bear River Range

Zb **Browns Hole(?) Formation (Late Proterozoic)**—Bright-red-orange to maroon, hematitic to specularite-bearing siltstone and crossbedded quartzite containing arkosic and gritty to pebbly interbeds; forms prominent red-weathering marker horizon about 50 m thick that is tentatively assigned to the Browns Hole Formation. Also questionably assigned to the Browns Hole Formation are two thin basalt flows and intervening quartzite beds mapped by Galloway (1970) in Dry, Birch, and Smithfield Canyons in western Bear River Range; estimated thickness of the basalt-bearing section is 50 m

Zm **Mutual Formation (Late Proterozoic)**—Pale-red to pinkish-buff, crossbedded, coarse-grained to pebbly, locally feldspathic quartzite containing minor maroon argillite streaks and lenses. Estimated minimum thickness is 400 m in High Creek area of western Bear River Range

Rather than modifying all the supporting materials to this map, we (Utah Geological Survey) chose to append the correct index to geologic mapping from the open-file report (Dover, J.H., 1985, Geologic map and structure sections of the Logan 30' x 60' quadrangle, Utah and Wyoming 1985: U.S. Geological Survey Open-File Report 85-216, 31 p., 3 plates, scale 1:100000), several lithologic columns, with references, and an index to and list of newer geologic mapping in the quadrangle. See the file titled "Appendix. PDF" for the changes to the digital map and supporting materials.

Unit colors on this plate match colors in digital GIS files and are not the same as colors on plate 3.

Contact—Dashed where approximately located; queried where location uncertain

Scratch contact

Marker bed in Garden City Formation (Og)

Gravity slide fault—present northeast of Logan on range front

High-angle or listric normal fault—Dashed where approximately located; dotted where concealed. Bar and ball on downthrown side. Arrow shows direction and amount of dip where known. Where listric, normal faults decrease in dip downward and merge with pre-existing normal faults

Thrust fault—Dotted where concealed; sawteeth on upper plate

Direction of movement of fault block—Shown in cross section only. Bolder arrow shows primary thrust sheet movement; thinner arrow shows normal fault movement. In combination, thinner arrow shows later listric normal fault movement

Fold—Showing crestline; dotted where concealed

Anticline

Syncline

Overturned anticline

Overturned syncline

Strike and dip of bedding

Inclined (25)

Vertical

Horizontal

Overturned (55)

Inclined—Estimated from aerial photographs or distant observations

Overturned—Estimated from aerial photographs or distant observations

Pluvial Lake Bonneville shoreline—Mapped only in Cache Valley

P **Provo level**

B **Bonneville level**

Scarp—Hachures point down dip

12 **Drill hole, keyed to Table 1**

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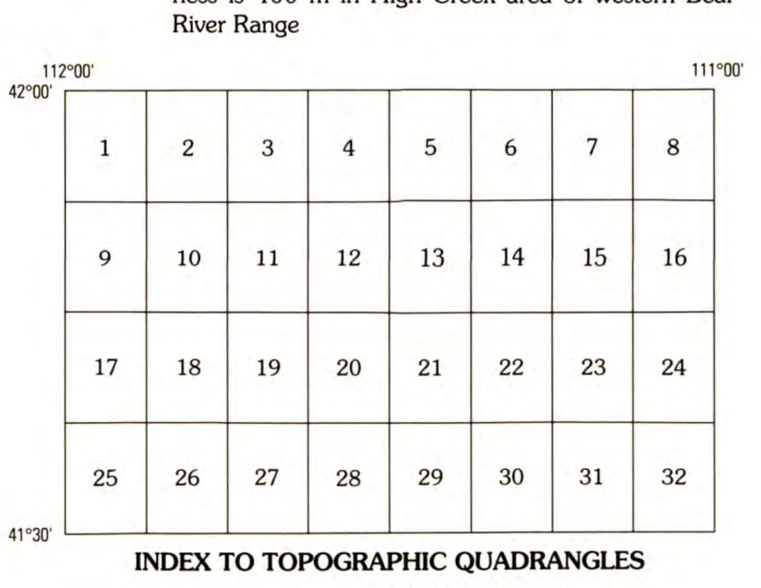
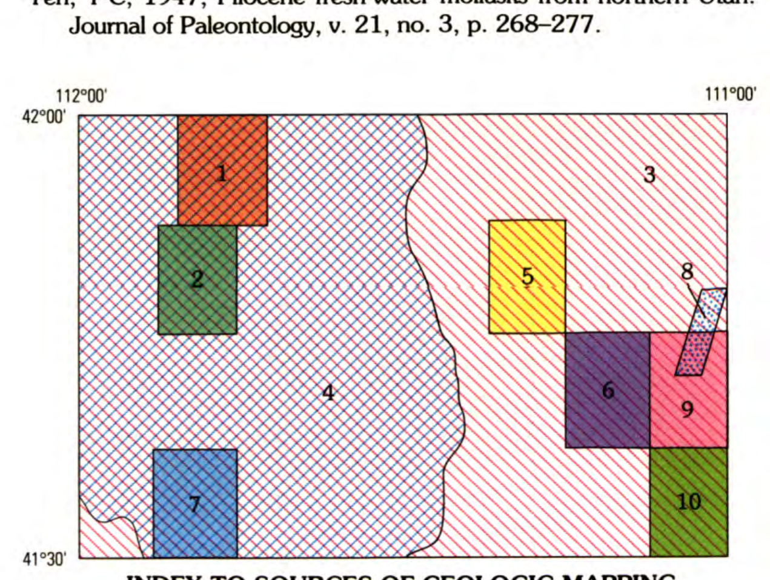


INDEX TO TOPOGRAPHIC QUADRANGLES

7 1/2 quadrangle (1:24,000-scale maps)

1 Trenton
2 Richmond
3 Naomi Peak
4 Tony Grove Creek
5 Garden City
6 Bear Lake South
7 Sheeppen Creek
8 South Lake
9 Newton
10 Smithfield
11 Mt. Elmer
12 Temple Peak
13 Meadowville
14 Laketown
15 Sage Creek
16 Leefe
17 Wellsville
18 Logan
19 Logan Peak
20 Boulder Mtn.
21 Red Spur Mtn.
22 Old Canyon
23 Randolph
24 Rex Peak
25 Mount Pisgah
26 Paradise
27 Porcupine Reservoir
28 Hardware Ranch
29 Curtis Ridge
30 Birch Creek Reservoir
31 Woodruff
32 Woodruff Narrows



INDEX TO SOURCES OF GEOLOGIC MAPPING

1 Mendenhall, 1975
2 Galloway, 1970
3 Williams, 1948; Hintze, 1980
4 Williams, 1958
5 Valenti, 1982
6 Richardson, 1941; Sando and others, 1959
7 Mullens and Izett, 1963
8 Gere, 1955
9 Chamberlain, 1980
10 Ott, 1980

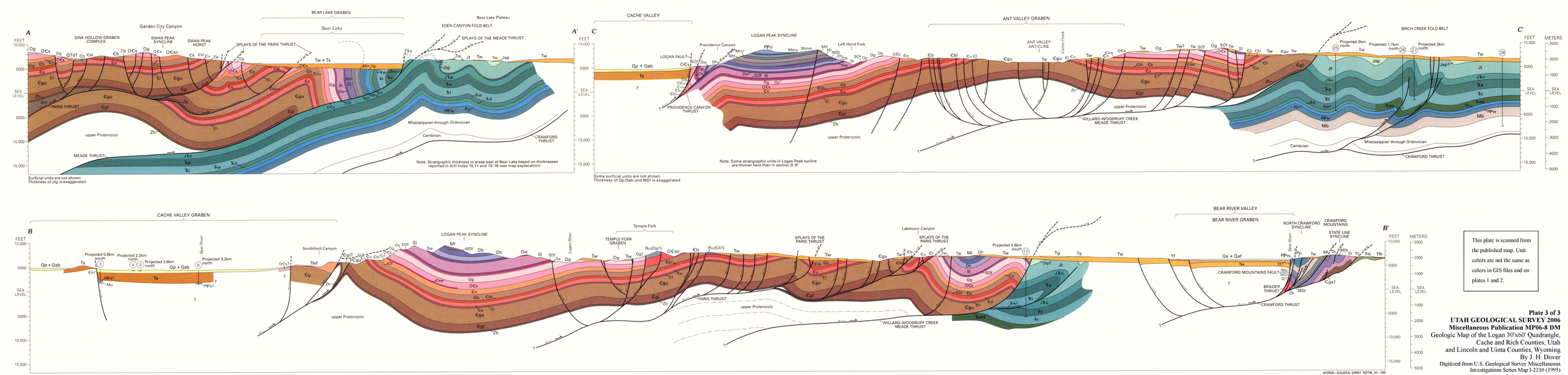
CONVERSION FACTORS

Multiply	By	To obtain
inches (in)	2.54	centimeters (cm)
feet (ft)	0.3048	meters (m)
miles (mi)	1.609	kilometers (km)

Table 1. ***Drill holes for which subsurface geologic information is available***[1]

Map no.	Section, township, range	Company	Name	Total depth (in feet)
1	22, 14 N., 1 W.	Drilco Investment	1 Lower	1,677
2	19, 14 N., 1 E.	Delta Petroleum	1 Steven Szot	8,930
3	10, 13 N., 1 W.	Karmis Oil and Gas	1 C.A. Brown	5,200
4	14, 13 N., 1 W.	Lynn Erickson	2 Fee	200
5	14, 13 N., 1 W.	Lynn Erickson	5 Fee	136
6	19, 13 N., 1 E.	Utah-Idaho Exploration	1 Ed Gossner	5,500
7	17, 12 N., 1 E.	Amoco	1 Lynn Reese	8,159
8	2, 14 N., 6 E.	American Quasar	2-41 Eden State	15,710
9	12, 14 N., 6 E.	American Quasar	12-1 Eden State	10,218
10	14, 14 N., 7 E.	American Quasar	14-44 Nebeker	12,164
11	14, 14 N., 7 E.	American Quasar	14-44 South Rabbit Creek Nebeker	11,725
12	3, 22 N., 120 W.	Houston Oil and Minerals	14-3 Federal	9,000
13	15, 13 N., 6 E.	Marathon Oil	1-15 S Eden Canyon	18,000
14	17, 13 N., 7 E.	American Quasar	17-1 Hogback Ridge	10,732
15	20, 13 N., 7 E.	American Quasar	20-1 Hogback Ridge	10,910
16	28, 13 N., 7 E.	American Quasar	28-1 Hogback Ridge	12,200
17	21, 12 N., 6 E.	Marathon Oil	1-21 Otter Creek	12,299
[2]18	28, 12 N., 6 E.	Marathon Oil	1-28 Otter Creek	12,500
19	31, 11 N., 7 E.	American Quasar	1 Hoffman	15,400
20	10, 10 N., 6 E.	Marathon Oil	1-10 Hawk Springs	16,909
21	8, 10 N., 8 E.	Marathon Oil	1-8 Mud Springs	9,026
22	20, 10 N., 8 E.	Christmann and Associates	1-20 LL&E-Federal	18,054
23	29, 19 N., 120 W.	Getty Oil	29-15 Narrows South	9,216
24	35, 10 N., 7 E.	Marathon Oil	1-35 S Crawford Mtn	3,269
25	10, 9 N., 5 E.	Marathon Oil	1-10 Thousand Dollar	11,981
26	18, 9 N., 6 E.	American Quasar	18-1 Federal	10,948
27	19, 9 N., 6 E.	American Quasar	19-1 Chournos	9,214
28	23, 9 N., 6 E.	American Quasar	23-1 Putnam	14,183

[1]Data compiled from Petroleum Information Corporation index cards through 1982
[2]From Valenti (1982)



This plate is scanned from the published map. Unit colors are not the same as colors in GIS files and on plates 1 and 2.

Plate 3 of 3
UTAH GEOLOGICAL SURVEY 2006
Miscellaneous Publication MP06-8 DM

Geologic Map of the Logan 30'x60' Quadrangle, Cache and Rich Counties, Utah and Lincoln and Uinta Counties, Wyoming

By J. H. Dover

Digitized from U.S. Geological Survey Miscellaneous Investigations Series Map I-2210 (1995)