U.S. DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

Preliminary geologic map of the Delta 2° quadrangle Tooele, Juab, Millard, and Utah Counties, Utah

by

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Open-File Report 87-185

1987

DESCRIPTION OF MAP UNITS

Qa ALLUVIUM (HOLOCENE AND PLEISTOCENE)--Larger accumulations of alluvium, colluvium, lacustrine deposits, and other unconsolidated debris in the bedrock areas

Qyb YOUNGER BASALT (HOLOCENE)--Pyroclastic deposits and lava flows of the Ice Springs volcanic field which retain many of their original depositional characteristics. Hoover (1974) indicates an age of 0.01-0.04 Ma

QTs VALLEY FILL DEPOSITS (HOLOCENE, PLEISTOCENE, AND PLIOCENE)--Undivided sedimentary deposits filling broad structural basins between the mountain ranges. Consists of fanglomerate, alluvium, eolian and lacustrine deposits, and volcanic tuffs. One tuffaceous deposit interlayered with the undivided Salt Lake Formation within the valley fill deposits is believed to correlate with the Huckleberry Ridge ash bed dated at 2.02 Ma (Izett and Wilcox, 1982)

Qob OLDER BASALT (PLEISTOCENE)--Large and small areas of tholeitic and olivine basalt ranging in age from 0.03-0.18 Ma at Pavant Butte (Hoover, 1974) to 0.31 Ma at Smelter Knoll (Turley and Nash, 1980)

Qpc PYROCLASTIC CONE (PLEISTOCENE)--Palagonite tuff and breccia cone forming Pavant Butte

Qba BASALTIC ANDESITE (PLEISTOCENE)--Dusky-gray, fine-grained flow rocks containing narrow plagioclase phenocrysts, orthopyroxene granules, and scattered quartz phenocrysts. Commonly the rock matrix is black glass. The age of the basaltic andesite at Fumarole Butte is reported by Galydardt and Rush (1981) to be 0.95 Ma, and by Peterson and Nash (1980) to be 0.88 Ma

Qb BASALT, UNDIVIDED (PLEISTOCENE)--Scattered patches of dark-gray to black, fine-grained, vesicular to dense lava containing small plagioclase laths and granules or small phenocrysts of pyroxene and olivine

Tsk RHYOLITE AT SMELTER KNOLL AND HONEYCOMB HILLS (PLIOCENE)--Mostly white to light-pinkish-gray, friable alkali rhyolite porphyry but also includes light to dark obsidian and white vitric tuff and breccia. Contains topaz in cavities and groundmass. Flows at Smelter Knoll have a K-Ar age of 3.4 Ma, and at Honeycomb Hills have a K-Ar age of 4.7 Ma (Turley and Nash, 1980) and are reported by these investigators to have similar chemical and mineralogic compositions

Tb BASALT AND BASALTIC ANDESITE, UNDIVIDED (PLIOCENE AND MIOCENE(?)--Scattered exposures of dusky-gray mafic rocks in central part of quadrangle. Basalt at Fumorole Butte has a K-Ar age of 6.0 Ma (Peterson and Nash, 1980) and basaltic andesite at Smelter Knoll has a K-Ar age of 6.1 Ma (W. P. Nash and F. H. Brown, cited in Best, McKee, and Damon, 1980)

Tri RHYOLITE INTRUSIONS (MIOCENE)--Plug-like bodies of contorted rhyolite porphyry associated with the alkali rhyolite flow rocks and domes in the Keg Mountains and elsewhere

Tib RHYOLITE INTRUSION BRECCIAS (MIOCENE)--Generally small intrusive bodies consisting of clasts of rhyolite and some older igenous rocks embedded in finer debris and rock flour derived from the same rock units

Ttm TOPAZ MOUNTAIN RHYOLITE (MIOCENE)--Chiefly flows of light-gray to red or white alkali rhyolite, but also includes black vitrophyre and massive to stratified tuff. Cavities in the rhyolite contain topaz, garnet, beryl, bixbyite, and pseudobrookite. Lindsey (1979, 1982) reports K-Ar ages of 6.1-6.8 Ma, averaging about 6.3 Ma in the Thomas Range, and 8 Ma in the Keg Mountains

Tc CONGLOMERATE AT FUMAROLE BUTTE (MIOCENE)--Reddish-brown heterogenous conglomerate underlying Tertiary basalt. Reported by Galyardt and Rush (1981) to contain clasts of Topaz Mountain rhyolite only in uppermost part

Tkm RHYOLITE OF KEG MOUNTAINS (MIOCENE)--Light- to medium-gray alkali rhyolite and contorted domal rocks locally containing lithophysae and geodes. Generally contains no topaz or other rare minerals. Zircon from flow rocks of this unit yielded (corrected) fission-track ages of 9.8 and 10.6 Ma (Lindsey, Naeser, and Shawe, 1975)

Tyi YOUNGER INTRUSIONS (MIOCENE)--Dikes, plugs, and stocks of porphyritic granitic rocks chiefly in the Sheeprock and East Tintic Mountains. One of the Sheeprock intrusions has been dated at 16.7 Ma (Armstrong, 1970), and the Silver Shield dike in the East Tintic Mountains at 17.9±0.5 Ma (Morris and Lovering, 1979)

Tss SILVER SHIELD LATITE (MIOCENE)--Dark-gray, coarsely prophyritic flow rocks overlying volcanic tuffs and conglomerate in the East Tintic Mountains. Potassium feldspar from this unit has yielded an average K-Ar age of 17.1±5 Ma (Morris and Lovering 1979)

Tsp SPOR MOUNTAIN FORMATION (MIOCENE)--Flows, domes, plugs, and dikes of gray to red porphyritic rhyolite and alkali rhyolite overlying a basal zone consisting of tan vitric tuff and tuffaceous breccia. Flows contain topaz. This formation is the host rock for the extensive beryllium deposits in Thomas Range. Fission-track and K-Ar ages on sanidine and zircon from the porphyritic rhyolite member average 21.3±0.2 Ma (Lindsey, 1982)

Toi OLDER GRANITIC ROCKS (OLIGOCENE AND EOCENE)--Chiefly monzonite and quartz monzonite porphyry stocks, plugs, and large dikes. In areas where two or more plutons are present, the subscripts 1 (older), 2, and 3 (younger) are used. In the Deep Creek Range the Ibapah and related intrusions have been dated at 39 Ma (J. Wright, quoted in Rodgers, 1984); in the Keg Mountains the large dikes and plutons have been dated respectively at 31.6±1.7 and 36.6±1.6 Ma (Lindsey, 1982); in the southern Sheeprock Mountains the older plutons have a (corrected) K-Ar age of 38.8 Ma (Morris and Kopf, 1970); at Desert Mountain one deeply eroded pluton has a (corrected) K-Ar age of about 28.1 Ma (Armstrong, 1970); and in the East Tintic Mountains the stocks, plugs, and dikes emplaced during the three major volcanic episodes range in age from 34.9 to 31.5 Ma, with the youngest age having been determined on the large Silver City monzonite stock (Laughlin, Lovering, and Mauger, 1969; Morris and Lovering, 1979). In other mountain ranges the Toi unit includes scattered small plugs and dikes chiefly composed of monzonite porphyry

Tnr NEEDLES RANGE FORMATION (OLIGOCENE)--In Confusion Range many small scattered patches of pale red to pale purple, lightly to strongly welded, ash flow tuff locally containing flattened pumice lapilli and fragments of bleached carbonate rocks are identified as Needles Range Formation. The K-Ar age of 29.7±0.3 Ma reported by Armstrong (1970) is here corrected to 30.4 Ma

Trk TUFF OF RED KNOLLS (OLIGOCENE)--Gray to reddish-brown ash-flow tuff with abundant crystals of plagioclase, hornblende, and biotite in a welded matrix of devitrified shards and pumice. Two fission-track ages on this unit average 31.4 Ma (Lindsey, 1982)

Tlg LAGUNA SPRINGS VOLCANIC GROUP (OLIGOCENE)--Interlayered medium- to dark-gray,coarse-grained, porphyritic latite flow rocks and generally massive, vitric and lithic tuff and tuff breccia. The (corrected) K-Ar age has been determined to be approximately 33 Ma (Morris and Lovering, 1979)

Td DELL TUFF (OLIGOCENE)--Gray to pink rhyolitic ash-flow tuff containing abundant crystals of quartz, sanidine, biotite, and plagioclase in a poorly welded matrix of divitrified shards and pumice. Ten samples of sphene and zircon from this unit have an average fission-track age of 32.0 Ma (Lindsey, Naeser, and Shawe, 1975)

Tis SILLS IN EAST TINTIC MOUNTAINS (OLIGOCENE)--Extensive thick sill-like intrusions similar in petrography to the Sunrise Peak monzonite porphyry pluton and the Tintic Mountain Volcanic group of the same area

Ttg TINTIC MOUNTAIN VOLCANIC GROUP (OLIGOCENE)--Heterogeneous sequence of dark-brownish-gray, fine-grained latitic flow rocks, reddish-brown, densely welded ash-flow tuff, light to dark vitric and lithic tuff and tuff breccia, extensive agglomerate, and other volcanic and sedimentary units

Tsv SAGE VALLEY LIMESTONE MEMBER (OLIGOCENE)--Lenses of light-gray, thin-bedded, algal limestone locally present in upper agglomerate of Tintic Mountain Group. Some individual lenses are as much as 100 m thick.

Tts TUNNEL SPRING TUFF (OLIGOCENE)--Minor exposures of white to light-gray, friable, crystal tuff; locally underlies Needles Range Formation

Tbp BRECCIA PIPES (OLIGOCENE)--Plug-shaped intrusions consisting of subrounded to angular small to very large blocks of sedimentary, igneous, and metamorphic rocks embedded in a matrix of smaller rock fragments, shattered phenocrysts of quartz and feldspar, shredded biotite, and rock flour. Most of the pipes are weakly pyritized or argillized

Teb ERUPTIVE BRECCIAS (OLIGOCENE)--Massive to crudely-layered rhyolitic tuff breccia containing abundant fragments, cobbles, and blocks of exotic rocks believed to have been erupted from the breccia pipes. Shredded biotite from this map unit yielded a (corrected) K-Ar age of 34.5 Ma (Morris and Kopf, 1970)

Tpf PACKARD AND FERNOW QUARTZ LATITES (OLIGOCENE)--Packard is dominantly light-pinkish- to purplish-gray, medium-grained quartz latite with air-fall tuff and vitrophyre beds at base and in upper part. Fernow Quartz Latite is identical in age and petrographic character but is a moderately-welded ash-flow tuff with vitrophyre and air-fall tuff beds at base and top. Biotite and sanidine from the Packard have yielded (corrected) K-Ar ages of 33.5 and 33.6 Ma respectively (Laughlin, Lovering, and Mauger, 1969)

Tls MEGABRECCIA OF NORTHERN DRUM MOUNTAINS (OLIGOCENE)--Massive landslide breccia which generally retains the original stratigraphy of Cambrian rocks but which locally contains highly broken and rotated clasts. Overlies the upper part of Joy Tuff

Tbr BRECCIAS OF THOMAS RANGE (OLIGOCENE)--Includes breccia at Spor Mountain of Lindsey (1979) and breccia at Wildhorse Spring of Lindsey (1979), both of which contain angular to subrounded clasts of sedimentary rocks. These units are interpreted to be Oligocene landslide deposits resulting from the collapse of the Thomas caldera

Tos UNNAMED SEDIMENTARY STRATA (OLIGOCENE)--Light-yellowish-gray, locally sandy, ostracode-rich, lacustrine beds which merge upward into air-fall tuffs that are equivalent in composition and K-Ar age to the Packard and Fernow Quartz Latites (see Evernden, Curtis, and James, 1964). These sedimentary strata were originally considered to be Green River Formation (Muessig, 1951)

Tjc VOLCANICS OF JUDD CREEK (OLIGOCENE)--Mostly scattered remnant patches of medium-gray to greenish-gray, medium-grained latite porphyry in or near the Simpson Mountains; most fully described by Thomas (1958)

Tcc VOLCANICS OF CHERRY CREEK (OLIGOCENE)--Medium-gray, medium-grained latite or andesite porphyry exposed in southern Sheeprock and southern West Tintic Mountains; most fully described by Groff (1959)

Ths SHOSHONITE OF HONEYCOMB HILLS OF HOGG (1972) (OLIGOCENE?)--Predominantly finely porphyritic to aphanitic, locally vesicular, mafic flow rocks with some quartz xenocrysts and scattered olivine granules. Hogg (1972) reports that these rocks contain an average of about 3.5 percent K_2O and have K_2O/Na_2O ratios of about 1.3. Map unit locally includes some adjacent exposures of banakite

Tnh LATITE OF NORTH HONEYCOMB RIDGE OF HOGG (1972) (OLIGOCENE?)--Dusky-gray to light-reddish-gray, sparsely porphyritic latite flow rocks containing phenocrysts of calcic andesine, and smaller quantities of orthopyroxene, clinopyroxene, and traces of hornblende. This unit generally underlies shoshonitic lavas in the same area

Tj JOY TUFF (EOCENE)--Moderately heterogenous sequence of gray to black rhyolitic ash-flow tuff and black vitrophyre, tan unwelded tuff, and gray-pink to red-brown rhyolitic ash-flow tuff containing abundant crystals of quartz, sanidine, plagioclase, and biotite in a moderately welded matrix of devitrified glass shards. Lindsey (1982) reports seven fission-track ages on minerals from this unit which average 38.0±0.7 Ma

Tld SHOSHONITE OF LITTLE DRUM MOUNTAINS OF LEEDOM (1974) (EOCENE)--A broadly layered sequence of flows, tuffs, and agglomerates composed of potassium-rich mafic lavas of the calc-alkaline shoshonite association. Leedom (1974) reports a (corrected) K-Ar whole-rock age on this unit of 38.2±0.4 Ma

Tml MT. LAIRD TUFF (EOCENE)--Pink rhyodacitic to quartz latitic ash-flow tuff containing abundant large euhedral crystals of white plagioclase, bronze biotite, hornblende, and pyroxene. Lindsey (1982) reports one fission-track age on this unit of 36.4±1.6 Ma but this age may be as much as 3 Ma too young

Tdr DRUM MOUNTAINS RHYODACITE (EOCENE)--Rusty-weathering black rhyodacite flows and breccias containing phenocrysts of calcic andesine and pyroxene in an aphanitic to glassy matrix. A single fission-track age from this unit is 41.8±2.3 Ma (Lindsey, 1982)

Tvn VOLCANIC NECK(?) (EOCENE)--Pipelike body of strongly pyritized volcanic breccia in north-central part of Keg Mountains. May be an eruptive center for part of Keg Springs andesite and latite of Erickson (1963)

Tks KEG SPRINGS ANDESITE AND LATITE OF ERICKSON (1963) (EOCENE)--Dull-olive-green to dark-brownish-gray andesite and latite flows and pyroclastic deposits. Zircon and apatite from two samples of this unit in the Keg Mountains yielded an average fission-track age of 39.4±0.7 Ma (Lindsey, 1982)

Tv TERTIARY VOLCANIC ROCKS, UNDIFFERENTIATED--Small patches and limited exposures of extrusive rocks of unknown formational affiliation

Ts TERTIARY SEDIMENTARY ROCKS, UNDIFFERENTIATED--Large and small exposures of continental strata of various types. Extensive deposits in southern and central Canyon Range are parts of Pliocene and Miocene Oak City Formation of Campbell (1978) and Oligocene Fool Creek Conglomerate of Christiansen (1952); moderately extensive exposures in the southern House range are part of the Oligocene Skull Rock Pass Conglomerate of Hintze (1969); the red conglomerates and fresh-water limestones of the Cricket Mountains are probably Paleocene to Eocene in age according to Hintze (oral commun., 1987); many of the other deposits are of uncertain age and (or) formational affiliations and chiefly underlie Lower Tertiary volcanic rocks

Tgr GREEN RIVER FORMATION (EOCENE)--Light-yellowish-gray to red calcareous mudstone and claystone, thin- to medium-bedded siltstone, sandstone, and minor conglomerates, and thin-bedded carbonate rock. Exposed only in extreme southeastern corner of the map

Tf FLAGSTAFF LIMESTONE (PALEOCENE)--Creamy-white to blue-gray fossiliferous limestone and sandstone exposed in southeastern part of map area; locally a tongue of red-matrix cobble conglomerate is interlayered with this unit

TKc CANYON RANGE FORMATION OF STOLLE (1978) (PALEOCENE AND UPPER CRETACEOUS)--Red-weathering, poorly-sorted, pebble to cobble synorogenic conglomerate containing interlayered beds of red sandstone and shale and near the top abundant yellowish-orange to purplish-gray sandstone and sandy limestone. More or less restricted to the Canyon range but correlated with all or parts of the Flagstaff, North Horn, and Price River Formations

TKn NORTH HORN FORMATION (PALEOCENE AND UPPER CRETACEOUS)--Brick-red conglomerate, sandstone, siltstone, and some silty and sandy limestone, all of continental origin. Present only in southeastern part of map area

Kpr PRICE RIVER FORMATION (UPPER CRETACEOUS)--Red-weathering, poorly-sorted pebble, cobble, and boulder synorogenic conglomerate. Locally contains large blocks of limestone and quartzite. With the younger North Horn Formation and the older Indianola Group (not exposed in this quadrangle) forms the great wedge of coarse clastic, molasse-type sediments derived from the Sevier orogenic belt

Ji NOTCH PEAK INTRUSION (JURASSIC)--Pinkish- or reddish-gray to white, coarsely crystalline, quartz monzonite porphyry characterized by large phenocrysts of reddish-orange perthitic orthoclase enclosed in a medium- to fine-grained matrix of white oligoclase, gray quartz, and lustrous biotite. This pluton and its adjacent wall-rocks are cut by many aplite and pegmatite dikes. Armstrong (1973) reports an (uncorrected) K-Ar age of 143 Ma. This age predates the Sevier orogeny and, therefore, it is assumed that this pluton was cut by the Snake Range decollement and displaced east-southeastward about 60 km from its roots

Jd DIKES (JURASSIC)--Quartz monzonite porphyry dikes related to the Notch Peak pluton

JƦn NAVAJO SANDSTONE (JURASSIC AND TRIASSIC)--Tan, yellowish-gray to white, medium- to fine-grained, eolian crossbedded sandstone. Underlies Pavant thrust plate in southeastern part of map area

Ʀc CHINLE FORMATION (TRIASSIC)--In subsurface only. Chiefly red, maroon, chocolate, buff, and white mudstone, locally interlayered with similar colored sandstone. The basal Shinarump Member is red to brownish-red, fine- to medium-grained conglomerate

Ʀm MOENKOPI FORMATION (TRIASSIC)--In subsurface only. Mostly dark-red to chocolate-brown siltstone with two prominent light-bluish-gray limestone units that divide the formation into five members. Locally the upper part of the formation was removed by erosion prior to the deposition of the Chinle

Ʀt THAYNES FORMATION (TRIASSIC)--Chiefly yellowish-gray claystone and platy siltstone interlayered with thin and thick limestone beds throughout, and locally with some beds of sandstone. Generally equivalent to lower and middle part of Moenkopi Formation, but lowest part of Thaynes probably is older

Ppc PARK CITY GROUP (PERMIAN)--In western part of map area consists of Kaibab Limestone (base), Plympton Formation, and Gerster Limestone. In eastern part of map area, the Park City Group consists of Grandeur Formation (base), Meade Peak Phosphatic Shale, and Franson Formation

Pa ARCTURUS FORMATION (PERMIAN)--Mostly grayish-yellow, fine-grained, friable sandstone enclosing many scattered beds of limestone, limy dolomite, and locally gypsum. Brick-red colors common near top

Pdc DIAMOND CREEK SANDSTONE (PERMIAN)--Yellow, buff, and purplish-red, medium- to fine-grained, friable, cross-bedded sandstone; some gray dolomite beds occur near base and white chert lenses near top

PIPo OQUIRRH GROUP (PERMIAN AND PENNSYLVANIAN)--Consists of West Canyon Limestone (base), Butterfield Peaks Formation, Bingham Mines Formation, and Furner Valley Limestone. The aggregate thickness of these formations in the southern East Tintic Mountains and Gilson Range exceeds 4,850 m

PIPMe ELY LIMESTONE (PERMIAN, PENNSYLVANIAN, AND MISSISSIPPIAN)--Predominantly medium-gray, coarse to fine-grained, well-bedded to platy, commonly cherty, fossiliferous limestone. In Confusion Range and adjacent areas ranges from 500 to 700 m in thickness

IPMm MANNING CANYON SHALE (PENNSYYLVANIAN AND MISSISSIPPIAN)--In subsurface only. Chiefly black to dark-brown shale interbedded with abundant limestone, medium-grained, partly conglomeratic sandstone and quartzite

Mc CHAINMAN SHALE (MISSISSIPPIAN)--Chiefly dark-gray shale and platy light-olive-gray siltstone. Locally contains scattered lenses of fine-grained sandstone and dark bituminous limestone

Mom OCHRE MOUNTAIN LIMESTONE (MISSISSIPPIAN)--Light bluish- to brownish-gray massive bedded fine-grained limestone; lower part contains many chert nodules. Thickness about 1,600 m

Mw WOODMAN FORMATION (MISSISSIPPIAN)--In Dugway Range, lower half is chiefly reddish-brown calcareous siltstone and upper half is largely light-gray silty limestone

Mgb GREAT BLUE FORMATION (MISSISSIPPIAN)--Complete sections consist of Topliff Limestone Member (base), Paymaster Limestone Member, Chiulos Shale and Quartzite Member, and Poker Knoll Limestone Member. The aggregate thickness of these members in the northern East Tintic Mountains is about 800 m

Mhd HUMBUG AND DESERET FORMATIONS, UNDIVIDED (MISSISSIPPIAN)--Humbug Formation is an interlayered sequence of light- and medium-blue-gray limestone and medium- to coarse-grained quartzitic sandstone. Deseret Limestone is predominantly blue-gray, medium- to thick-bedded, cherty limestone, with minor dark-brown quarzite and, at the base, black carbonaceous and phosphatic shale and siltstone

Mj JOANA LIMESTONE (MISSISSIPPIAN)--In Dugway Range, Joana Limestone is a uniform medium-gray limestone, cherty near the top

MDjp JOANA LIMESTONE AND PILOT SHALE, UNDIVIDED (MISSISSIPPIAN AND DEVONIAN)--Joana Limestone is massive light-brownish-gray, coarse-grained organic-detrital limestone. Pilot Shale is dark-brownish-gray to black, platy, calcareous siltstone and medium-gray, platy, dolomitic siltstone

MDgf GARDISON AND FITCHVILLE FORMATIONS, UNDIVIDED (MISSISSIPPIAN AND DEVONIAN)--Gardison Limestone is predominantly medium-blue-gray, medium-bedded, cherty, fossiliferous limestone. Fitchville Formation is a varied unit containing beds of light and dark dolomite, light- to medium-gray limestone with minor chert, and fine-grained quartzite

MDu MISSISSIPPIAN AND DEVONIAN STRATA, UNDIFFERENTED--In Dugway Range includes chiefly the Hanover Formation, which contains fossils of both Devonian and Mississippian ages, and minor parts of adjacent formations. In East Tintic Mountains includes structurally complex areas containing exposures of Gardison, Fitchville, Pinyon Peak, and Victoria Formations

Dcf COVE FORT SANDSTONE (DEVONIAN)--Buff to white, moderately indurated, medium-grained, vuggy-weathering sandstone and minor light-grayish-blue silty and sandy limestone

Dpv PINYON PEAK AND VICTORIA FORMATIONS, UNDIVIDED (DEVONIAN)--Pinyon Peak Limestone is chiefly light-blue-gray to dark-blue, fine-grained, thin-bedded to massive, silty limestone, with local sandstone lenses at base. Victoria Formation is interbedded medium-gray, medium-bedded dolomite and buff to brown, medium-grained to massive quartzite and quartzite breccia

Dg GUILMETTE FORMATION (DEVONIAN)--Medium- to dark-gray, medium- to thick-bedded, fine-grained to dense limestone and dolomite. Some horizons moderately fossiliferous; others cherty

Dsi SIMONSON FORMATION (DEVONIAN)--Interlayered light-gray, medium-gray, and dark-brownish-gray dolomite presenting a broadly striped appearance in outcrop. Moderately fossiliferuos.

Dse SEVY DOLOMITE (DEVONIAN)--Medium- to light gray, fine-grained to dense, grayish white-weathering dolomite containing scattered grains of clear quartz

Du DEVONIAN STRATA UNDIVIDED--In areas of limited exposure and structural complexity some of the Devonian strata are combined for cartographic convenience

Sl LAKETOWN DOLOMITE (SILURIAN)--Gray, dense to coarsely crystalline, medium- to thick-bedded dolomite containing one or more stromatolite horizons and some scattered chert nodules

DSOb BLUEBELL DOLOMITE (DEVONIAN, SILURIAN, AND ORDOVICIAN)--Mapped only in the East Tintic Mountains. A varied unit consisting of medium- to dark-gray, medium- to thick-bedded, medium- to coarse-grained, moderately fossiliferous, locally mottled and cherty dolomite, and light- to medium-gray, medium-bedded, fine-grained, faintly-laminated dolomite. Two prominent stromatolite beds make useful marker horizons. Middle part of this formation is equivalent to Laketown Dolomite

SOu SILURIAN AND ORDOVICIAN STRATA, UNDIFFERENTIATED--In areas of limited exposure and structural complexity, Silurian Laketown and Ordovician Fish Haven or Ely Springs Dolomites are not differentiated

Oes ELY SPRINGS DOLOMITE (ORDOVICIAN)--Dark gray, medium-bedded, commonly cherty dolomite with a few beds of lighter-gray laminated dolomite; unit is sparsely fossiliferous

Of FISH HAVEN DOLOMITE (ORDOVICIAN)--Light- to dark-gray, thin- to massive-bedded, medium- to coarse-grained, cherty dolomite, locally with a massive ledge-forming granular mottled dolomite horizon at top

Oew EUREKA QUARTZITE, CRYSTAL PEAK DOLOMITE, AND WATSON RANCH QUARTZITE (ORDOVICIAN)--Crystal Peak Dolomite, where present, divides this quartzite-rich sequence into three formations. Eureka Quartzite is light-colored, massive, fine-grained quartzite about 60 m thick; Crystal Peak Dolomite is medium- to dark-bluish-gray dolomite with quartzite interbeds and is about 50 m thick; Watson Ranch Quartzite is also light-colored, fine-grained quartzite but contains a few interbeds of siltstone and silty limestone

Oe EUREKA QUARTZITE (ORDOVICIAN)--In areas where the Crystal Peak Dolomite is not present, the buff colored Middle Ordovician quartzite is termed Eureka Quartzite

Op POGONIP GROUP (ORDOVICIAN)--Consists of House Limestone (base), Fillmore Formation, Wah Wah Limestone, Juab Limestone, Kanosh Shale and Lehman Formation. Where it is present, the Lehman Formation is bluish-gray, thin-bedded, fossiliferous, silty limestone with some beds and lenses of cross-laminated quartzite. Kanosh Shale is predominantly olive-gray, fissile, graptolite-bearing shale with a few beds of silty limestone and yellowish brown siltstone. The Juab, Wah Wah, Fillmore, and House Formations, forming the greater part of the Pogonip Group, are all predominantly bluish-gray silty limestone subdivided chiefly on the basis of general bedding thickness and the relative abundance of calcareous intraformational flat-pebble conglomerate, as well as the contained fossils

Oo OPOHONGA LIMESTONE (ORDOVICIAN)--Light bluish-gray, thin- to medium-bedded, fine-grained, silt-streaked limestone containing abundant flat-pebble conglomerate. On the basis of fossils, as well as its lithology, this unit, which is recognized only in the eastern part of the map area, is equivalent to the House Limestone and the greater part of the Fillmore Formation of the Pogonip Group of the western part of the map area

Ou — ORDOVICIAN STRATA, UNDIVIDED: In areas of limited exposure and structural complexity some of the Ordovician strata are combined for cartographic convenience

OꞒn — NOTCH PEAK FORMATION (ORDOVICIAN AND CAMBRIAN)--Upper one-third or so is medium-gray; massive stromatolitic limestone; lower two thirds or so is medium-gray, very-fine-grained, sparsely cherty limestone. Locally some considerable parts of the formation are dolomite

Ꞓa — AJAX DOLOMITE (CAMBRIAN)--Medium-gray, medium-bedded, medium- to coarse-grained abundantly cherty dolomite with a distinctive white-weathering dolomite marker bed about 50 m above base.

Ꞓhl — HICKS FORMATION AND LAMB DOLOMITE, UNDIVIDED (CAMBRIAN)--Hicks Formation (Nolan, 1935) is chiefly medium-gray, partly mottled, oolitic dolomite with minor sandy limestone. Shale in upper part is probably correlative with the Corset Spring Shale Member of Orr Formation. Lamb Dolomite is chiefly light- to medium-gray, medium- to thick-bedded dolomite mottled by patches of darker dolomite containing small white dolomite rods. Uppermost part of formation is thin bedded and somewhat argillaceous

Ꞓol — ORR FORMATION AND LAMB DOLOMITE, UNDIVIDED (CAMBRIAN)--Orr Formation consists of Big Horse Limestone Member (base), Candland Shale Member, Johns Wash Limestone Member, Corset Spring Shale Member, and Sneakover Limestone Member. Lamb Dolomite is mostly mottled and spangled gray dolomite as described above

Ꞓow — ORR FORMATION AND WEEKS LIMESTONE, UNDIVIDED (CAMBRIAN)--Orr Formation, where fully developed and exposed, consists of the five members listed above. Weeks Limestone is light- to medium-gray, uniformly thin-bedded, fine-grained limestone chiefly limited to the House Range

Ꞓop — OPEX FORMATION (CAMBRIAN)--Predominantly light blue-gray, thin-bedded, somewhat argillaceous limestone, with one or more minor shale units

Ꞓuu — UPPER CAMBRIAN STRATA UNDIFFERENTIATED--In areas of narrow outcrops and structural complexity, as in the East Tintic Mountains, the Upper Cambrian Formations are not separately shown

Ꞓty — TRIPPE LIMESTONE ANDD YOUNG PEAK DOLOMITE, UNDIVIDED (CAMBRIAN)--Trippe Limestone is interlayered medium- to dark-gray, mottled dolomitic limestone and conspicuous beds of light-gray laminated dolomitic boundstone. The Young Peak Dolomite is medium- to thick-bedded, dark-gray dolomite spangled with many short white dolomite rods. Along strike the dolomite of the Young Peak commonly becomes medium-gray limestone, locally mottled with patches of dolomite

Єf FANDANGLE LIMESTONE (CAMBRIAN)--In Dugway Range, chiefly medium-blue-gray, massive, mottled and spangled limestone, or locally dolomite, with interbeds of laminated light-gray limy boundstone in upper part

Єtp TRIPPE LIMESTONE AND PIERSON COVE FORMATION, UNDIVIDED (CAMBRIAN)--Trippe Limestone is alternating medium-gray, mottled dolomitic limestone and light-gray to creamy-white, laminated boundstone as described above. Pierson Cove Formation is a varied unit consisting predominantly of dark-gray, mottled, limy or dolomitic mudstone, with interbeds of medium-gray limestone spangled with white dolomite rods, and some conspicuous beds of yellowish-gray laminated boundstone scattered throughout the formation

Єm MARJUM FORMATION (CAMBRIAN)--Largely medium- to dark-gray more or less thin-bedded, arenaceous limestone in House Range, becoming more limy and less shaly north, east, and south from Marjum Pass. Contains a complete succession of upper Middle Cambrian trilobites

Єcb COLE CANYON AND BLUEBIRD DOLOMITES (CAMBRIAN)--Cole Canyon Dolomite is an interlayered sequence of dusky gray, coarse-grained commonly sppangled dolomite, and creamy white, laminated boundstone in medium to thick beds or massive units. Bluebird dolomite is all dusky gray, thick-bedded to massive, coarse-grained dolomite spangled with short, white dolomite rods

Єar ABERCROMBIE FORMATION (CAMBRIAN)--A thick varied unit consisting pre-dominantly of thin-bedded argillaceous limestone with a number of interlayered units of shale, somewhat more massive beds of limestone, and some light-gray boundstone

Єts TRAILER LIMESTONE AND SHADSCALE FORMATION (CAMBRIAN)--Trailer Limestone of Dugway Range consists of generally massive to thin-bedded, fine-grained, blue-gray, limestone and shaly limestone. Shadscale Formation of same area is predominantly blue-gray, fine-grained limestone interlayered with gray-green shale and near base, with dark-gray dolomite and gray-green siltstone

Єwh HOWELL LIMESTONE, CHISHOLM FORMATION, DOME LIMESTONE, WHIRLWIND FORMATION, SWASEY LIMESTONE, AND WHEELER SHALE, UNDIVIDED (CAMBRIAN)--Howell is mostly light- and dark-gray limestone with some minor shale beds. Chisholm is interlayered thin bedded limestone, olive-green shale, and siltstone. Dome is massive, cliff forming medium- to dark-gray limestone. Whirlwind is mostly interlayered olive-green shale and thin beds of blue-gray limestone. Swasey is largely medium-gray limestone with some lighter and darker limestone beds. Wheeler ranges from platy fossiliferus limy shale and mudstone to more massive light-gray, fine-grained limestone

Ꞓht HERKIMER LIMESTONE, DAGMAR DOLOMITE, AND TEUTONIC LIMESTONE (CAMBRIAN)--Herkimer Limestone is chiefly blue-gray, medium-beedded, argillaceous limestone with one or more thin horizons of olive-green shale. Dagmar Dolomite is a massive unit of white-weathering, medium-gray, laminated, dolomitic boundstone. Teutonic Limestone is medium-blue-gray, medium-bedded, locally oolitic and pisolitic limestone

Ꞓo OPHIR FORMATION (CAMBRIAN)--Varied formation consisting mostly of olive-green fissile shale with one to five or more thick and thin beds of blue-gray limestone near middle and beds of dark-reddish-brown quartzitic sandstone near base

Ꞓp PIOCHE FORMATION (CAMBRIAN)--Lower part is chiefly dark-brown phyllitic quartzite and interlayered green shale or siltstone. Upper part--Tatow Member--is interlayered olive-green shale and medium-blue-gray limestone and minor calcareous sandstone

Ꞓt TINTIC QUARTZITE (CAMBRIAN)--Thick unit of predominantly tan or buff, medium-bedded, medium-grained, locally crossbedded quartzite with some layers of quartz-pebble conglomerate near base and some beds of olive-green sandy argillite near top. Locally contains a chloritized basalt flow unit in lower half

Ꞓbc BUSBY QUARTZITE AND CABIN SHALE, UNDIVIDED (CAMBRIAN)--Busby quartzite is a varied unit containing beds of grayish-brown quartzite, thin-bedded quartzitic sandstone, gray-green sandy shale and some argillite. Cabin shale is predominantly olive-green, locally limy, laminated shale

Ꞓpm PROSPECT MOUNTAIN QUARTZITE (CAMBRIAN)--Buff to pinkish-gray, medium-bedded, medium-grained, locally crossbedded and conglomeratic quartzite. In some areas contains a chloritized basalt flow unit in lower half

Ꞓu CAMBRIAN STRATA UNDIVIDED--Small exposures of Cambrian carbonate rocks of unknown formational assignment

Ᵽu PALEOZOIC STRATA, UNDIFFERENTIATED--In areas of strong hydrothermal alteration, limited outcroups, and (or) structural complexity, some individual formational or map units are not separately shown but are combined for cartographic convenience

Zmc MCCOY CREEK SEQUENCE (PRECAMBRIAN)--Thick sequence of seven units in Deep Creek Range, predominantly composed of gray-green phyllitic shale and siltstone and thick units of buff, tan and brown quartzite. The lowestmost shaly units also contain a few thin beds of limestone. This sequence is probably correlative with the Mutual and Inkom Formations

Zmi MUTUAL AND INKOM FORMATIONS (PRECAMBRIAN)--Mutual Formation is chiefly dark- to light-purplish-red, pink, or buff, coarse grained, pebble-streaked, medium-bedded quartzite. Inkom Formation is mostly dark-purplish-red phyllitic argillite with rare thin beds of green and purple micaceous quartzite and siltstone

Zc CADDY CANYON QUARTZITE (PRECAMBRIAN)--Predominantly buff, light-pink or white, medium-bedded, fine- to medium-grained, pebble streaked quartzite. May or may not be equivalent to similar quartzites in upper part of Trout Creek Sequence

Zk KELLEY CANYON FORMATION (PRECAMBRIAN)--Uniform sequence of olive-green to tan shale and siltstone enclosing some minor beds of tan and buff sandstone and quartzite. May correlate with lower half of upper part of Trout Creek Sequence

Zd DUTCH PEAK FORMATION (PRECAMBRIAN)--Heterogenerous unit containing dark gray laminated argillite (base), maroon grit, brown conglomerate, thin and thick horizons of olive-green to black diamictite, olive-green greywacke, light-gray quartzite, and reddish-brown to black argillite. The highly distinctive diamictite horizons contain cobbles and boulders of quartzite, granite, pegmatite, gneiss and carbonate rocks commonly embedded in fine-grained, laminated phyllitic argillite; the clasts are believed to be ice-rafted glacial drop-stones

Zo OTTS CANYON FORMATION (PRECAMBRIAN)--Thick unit of varied lithology which includes dark-gray laminated slate (base), dark-green to brown diamictite, and brown, tan and buff quartzite, with minor beds of greywacke, siltstone, argillite, and shale. Diabase sills occur at top of formation; base is not exposed

TROUT CREEK SEQUENCE (PRECAMBRIAN)

Ztu Upper part--Upper half is mostly light-brown, medium-grained, slightly feldspathic, locally conglomeratic quartzite with some minor beds and lenses of pelitic schist. Lower half is mostly pelitic schist with many thin interbeds of micaceous quartzite.

Ztd Diamictite unit--Predominantly phyllitic siltstone, micaceous quartzite and conglomerate with several indefinite horizons of schistose diamictite containing cobbles of quartzite, granite, gneiss, schist, and marble. Diamictite unit shown on map is divided into two parts by a medial bed of brown micaceous quartzite.

Ytl Lower part--Chiefly black, amphibolite-facies pelitic schist with minor beds of micaceous quartzite and white dolomite marble

Ysm SIMPSON MOUNTAINS SEQUENCE (PRECAMBRIAN)--Approximately 6,000 m of Precambrian strata that appear to be older than the Dutch Peak Formation. Consists of a number of distinctive, mapable units of gray-green phyllitic shale and argillite,, buff, tan, brown, and red quartzite, and quartz-pebble conglomerate. The upper part of this sequence may correlate with the lower part of the Trout Creek Sequence and the lower laminated slate unit of the Otts Canyon Formation

Yu PRECAMBRIAN STRATA, UNDIFFERENTIATED--Isolated exposures of Precambrian Y-age rocks not specifically identified as to formational affiliation

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STRUCTURE SYMBOLS

CONTACT--Dashed where approximately located

HIGH-ANGLE FAULT--Dotted where concealed; groups of three dots where inferred and concealed; bar and ball on downthrown side

STRIKE-SLIP FAULT--Dotted where concealed; arrows indicate relative displacement

THRUST FAULT--Dotted where concealed; sawteeth on side of upper plate

30 STRIKE AND DIP OF BEDS

15 STRIKE AND DIP OF COMPACTION FOLIATION IN WELDED TUFFS

NOTE: A printed list of commonly used geologic map symbols is available on request from the U.S. Geological Survey.

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