

LIST OF MAP UNITS
[Detailed descriptions of map units are in the accompanying pamphlet]

EXPLANATION

SURFICIAL DEPOSITS

af	Artificial fill and other land disturbances (Holocene)
0a	Young alluvium (Holocene)
0ct	Colluvium and talus (Holocene to Pleistocene)
0e	Eolian deposits (Holocene to Pleistocene)
0p	Playa deposits (Holocene to Pleistocene)
01a	Intermediate-age sidestream alluvium (upper to middle Pleistocene)
01m	Intermediate-age mainstream alluvium (upper to middle Pleistocene)
01s	Spring deposits (upper to middle Pleistocene)
0u	Undivided inactive alluvium (Pleistocene)
0T1	Landslide deposits (Pleistocene to Pliocene?)
01s	Spring deposits (Pleistocene to Pliocene?)
02k	Calcrete (middle to lower Pleistocene)
02a	Older sidestream alluvium (middle to lower Pleistocene)
02m	Older mainstream alluvium (middle to lower Pleistocene)
02r	Spring deposits (middle to lower Pleistocene)
0TK	Calcrete (lower Pleistocene to upper Pliocene)
0Ta	Sidestream alluvium (lower Pleistocene to upper Pliocene)
0Tm	Mainstream alluvium (lower Pleistocene to upper Pliocene)
T1a	Sidestream alluvium (upper Pliocene)
T2k	Calcrete deposits (lower Pliocene)
T2a	Sidestream alluvium (lower Pliocene)
T2m	Mainstream alluvium (lower Pliocene)
T2s	Deposits of Jumbo Pass (Pliocene?)
T2e	Eolian sandstone
Tl	Limestone, roundstone conglomerate and sandstone
Tg	Gravel (Pliocene to upper Miocene?)

BASIN-FILL DEPOSITS

Tm	Muddy Creek Formation (upper Miocene)
Tmm	Muddy Creek Formation, undivided
Tmf	Mainstream fluvial facies
Tmg	Fine-grained facies
Tmg	Gypsum facies
Tmt	Tuff bed
Tml	Limestone facies
Tmml	Marl and limestone facies
Tmc	Coarse-grained facies
Tmv	Lava flows interbedded with Muddy Creek deposits
Tmb	Breccia and landslide masses
Th	Hualapai Limestone (upper Miocene)
Tac	Rocks of Overton Arm (upper and middle Miocene)
Tac	Conglomerate facies
Tacp	Conglomerate facies, bearing Gold Butte Granite clasts
Tacv	Conglomerate facies, bearing limestone clasts
Tacv	Conglomerate facies, bearing volcanic clasts
Tas	Sandstone, siltstone and mudstone facies
Tasg	Gypsiferous facies
Taan	Manganiferous sandstone facies
Tasb	Breccia facies
Tasw	Rocks of the Grand Wash Trough (upper and middle Miocene)
Tasw	Sandstone and siltstone facies
Tasw	Conglomerate facies
Taswv	Conglomerate facies, bearing limestone clasts
Taswv	Conglomerate facies, bearing granitic and metamorphic clasts
Taswv	Limestone-clast breccia facies
Taswv	Proterozoic-clast breccia facies
Taswv	Red Sandstone unit (upper and middle Miocene)
Taswv	Red sandstone unit, undivided
Taswv	Coarse-grained facies
Taswv	Landslide masses
Taswv	Horse Spring Formation (?) rocks in Overton Arm (middle Miocene)
Taswv	Fine-grained facies
Taswv	Conglomerate facies

Thu	Horse Spring Formation (middle and lower Miocene and upper Oligocene)
Thu	Horse Spring Formation, undivided(middle and lower Miocene and upper Oligocene)
Thu	Lovell Wash Member, limestone and sandstone facies (middle Miocene)
Thu	Lovell Wash Member, interbedded basalt flows and vents (middle Miocene)
Thu	Bitter Ridge Limestone and Lovell Wash Members, undivided (middle Miocene)
Thu	Bitter Ridge Limestone and Lovell Wash Members, undivided, with intercalated dacite and basalt flows (middle Miocene)
Thu	Bitter Ridge Limestone Member (middle Miocene)
Thu	Bitter Ridge Limestone Member, breccia facies (middle Miocene)
Thu	Thumb Member (middle Miocene)
Thu	Thumb Member, fine-grained facies
Thu	Thumb Member, algal limestone facies
Thu	Thumb Member, gypsum facies
Thu	Thumb Member, conglomeratic rocks
Thu	Thumb Member, interbedded mafic volcanic rocks
Thu	Thumb Member, breccia and landslide masses
Thu	Rainbow Gardens Member (lower Miocene and upper Oligocene)

PLIOCENE AND MIOCENE VOLCANIC AND PLUTONIC ROCKS

Tgb	Basalt flows and minor gravels of Grand Wash (lower Pliocene)
Tgbg	Interbedded mainstream gravels (lower Pliocene)
Tb	Fortification Hill basalt (upper Miocene)
Tb	Basaltic dikes (upper Miocene)
Td	Diorite (upper to middle Miocene?)
Td	Volcanic and sedimentary rocks of Callville Mesa (upper Miocene)
Tcm	Volcanic and sedimentary rocks of Callville Mesa, undivided
Tcm4	Volcanic and sedimentary rocks of Callville Mesa, unit 4
Tcm3	Volcanic and sedimentary rocks of Callville Mesa, unit 3
Tcm2	Volcanic and sedimentary rocks of Callville Mesa, unit 2
Tcm1	Volcanic and sedimentary rocks of Callville Mesa, unit 1
Tb	Basalt (upper Miocene)
Tbgb	Basalt of Gold Butte (upper Miocene)
Tdv	Volcanic and sedimentary rocks of Hamblin-Cleopatra volcano (upper and middle Miocene)
Tdv	Volcanic and sedimentary rocks of Hamblin Mountain, undivided
Tdvu	Volcanic and sedimentary rocks of Hamblin Mountain, upper unit
Tdvu	Volcanic and sedimentary rocks of Hamblin Mountain, middle unit
Tdvu	Volcanic and sedimentary rocks of Hamblin Mountain, lower unit
Tdv	Volcanic rocks of Cleopatra volcano
Ti	Intrusive sills and plugs (upper and middle Miocene)
Tbr	Volcanic rocks of Boulder Wash (middle Miocene)
Tbr	Rhyolitic flows
Tbrb	Rhyolitic flow breccias
Tbrd	Dacite flows
Tbrwb	Breccia carapace of dacite flows
Tbrwt	Tuffaceous facies of dacite rocks
Tbrv	Volcanic rocks of the River Mountains (middle Miocene)
Tbrv	Dacite flows and breccias
Tbrv	Basalt flows
Tbrv	Intrusive stock
Tbrv	Composite plutons
Tbrv	Volcanic flows and domes
Tbrv	Flows, breccias and volcanogenic sedimentary rocks
Tbrv	Volcanic rocks of Hoover Dam, undivided (middle Miocene)
Tbrv	Wilson Ridge pluton (middle Miocene)
Tbrv	Wilson Ridge pluton, Teakettle Pass suite
Tbrv	Wilson Ridge pluton, Horseshief Canyon diorite
Tbrv	Rhyolite intrusive of Lava Butte (middle Miocene)
Tbrv	Paint Pots pluton of Mills, 1994 (middle Miocene)
Tbrv	Tuff of Hoover Dam (middle Miocene)
Tbrv	Andesite breccia of Wilson Ridge (middle Miocene)
Tbrv	Boulder City pluton (middle Miocene)
Tbrv	Volcanic rocks near Temple Bar (middle Miocene)
Tbrv	Olivine basalt and basaltic andesite flows, breccias and mudflows
Tbrv	Volcanic sediments, breccias, mudflows and minor, thin ignimbrites
Tbrv	Rhyolite breccia and ignimbrite
Tbrv	Rhyolite ignimbrite
Tbrv	Rhyolite breccia
Tbrv	Pyroxene andesite flows and breccias
Tbrv	Andesite flows
Tbrv	Andesite breccias and lahars
Tbrv	Patsy Mine Volcanics (middle Miocene)

MESOZOIC AND PALEOZOIC ROCKS

Kmg	Muscovite granite at Walker Wash (Upper Cretaceous)
Kfb	Foreland basin deposits
Kbs	Baseline Sandstone (Upper? to Lower Cretaceous)
Kbo	Overton Conglomerate Member (Upper? to Lower Cretaceous)
Kbr	Red sandstone member (Upper? to Lower Cretaceous)
Kbw	White sandstone member (Lower Cretaceous)
Kbc	Conglomerate (Lower Cretaceous)
Kar	Willow Tank Formation (Lower Cretaceous)
PMb	Formations exposed in upper plate of Dry Lake thrust
PMb	Bird Spring Formation (Lower Permian to Upper Mississippian)
Mm	Monte Cristo Group (Upper and Lower Mississippian)
MDsp	Crystal Pass Limestone (Lower Mississippian and Upper Devonian)
Dg	Güilmette Limestone (Upper and Middle Devonian)
Des	Ely Springs Dolomite (Upper Ordovician)
De	Eureka Quartzite (Middle Ordovician)
DEp	Pogonip Formation (Middle Ordovician to Upper Cambrian)
PKt	Formations exposed in upper plate of Muddy Mountain thrust
PKt	Kaibab and Toroweap Formations, undivided (Lower Permian)
Pp	Permian red beds, undivided (Lower Permian)
Pp	Pakoon Limestone (Lower Permian)
PMb	Bird Spring Formation (Lower Permian to Upper Mississippian)
Mm	Monte Cristo Group (Upper and Lower Mississippian)
MDs	Sultan Limestone (Mississippian and Devonian)
Op	Pogonip Formation (Lower Ordovician)
Cn	Nopah Formation (Upper Cambrian)
Csk	Bonanza King Formation (Upper and Middle Cambrian)
Ja	Autochthonous rocks exposed below Muddy Mountain and Dry Lake thrusts
Ja	Aztec Sandstone (Lower Jurassic)
Jmk	Moenvae and Kayenta Formations, undivided (Lower Jurassic)
Tc	Chinle Formation (Upper Triassic)
Ts	Moenkopi Formation (Middle? and Lower Triassic)
PKt	Kaibab and Toroweap Formations, undivided (Lower Permian)
Psa	Hermit Formation and Esplanade Sandstone, undivided (Lower Permian)
PMsp	Pakoon Limestone and Callville Formation, undivided (Lower Permian to Upper Mississippian)
Mr	Redwall Limestone (Upper and Lower Mississippian)
Dib	Temple Butte Formation (Upper and Middle Devonian)
Cu	Cambrian rocks, undifferentiated (Cambrian)
Cn	Nopah Formation (Upper Cambrian)
Cn	Muav Formation (Middle Cambrian)
Cs	Tapeats Sandstone and Bright Angel Shale, undivided (Middle and Lower Cambrian)

PROTEROZOIC ROCKS

Yd	Diorite and gabbro (Middle Proterozoic)
Yg	Gold Butte Granite (Middle Proterozoic)
YXb	Granite of Burro Spring (Middle to Early Proterozoic)
Xu	Metamorphic and plutonic rocks, undivided (Early Proterozoic)
Xg	Leucogranite and pegmatite gneiss (Early Proterozoic)
Xgb	Leucogranite and pegmatite gneiss, brecciated (Early Proterozoic)
Xwe	Granite of Lime Wash, equigranular phase (Early Proterozoic)
Xwp	Granite of Lime Wash, porphyritic phase (Early Proterozoic)
Xgw	Porphyritic granite of Whitney Ridge (Early Proterozoic)
Xhg	Hornblende granite gneiss (Early Proterozoic)
Xum	Mafic and ultramafic metamorphic rocks, undivided (Early Proterozoic)
Xg	Granitic gneiss (Early Proterozoic)
Xqs	Quartz syenite gneiss (Early Proterozoic)
Xqd	Quartz diorite gneiss (Early Proterozoic)
Xc	Charmokite gneiss (Early Proterozoic)
Xcb	Charmokite gneiss, brecciated (Early Proterozoic)
Xgn	Garnet gneiss (Early Proterozoic)
Xgp	Partly retrograded garnet gneiss (Early Proterozoic)
Xgr	Completely retrograded garnet gneiss (Early Proterozoic)
Xgc	Chloritic brecciated gneiss (Early Proterozoic)

-----	Contact—Dashed where approximately located, dotted where concealed
-----	Strike and dip of bedding
15	Inclined
+	Vertical
22	Overturned
⊖	Horizontal
-----	Igneous foliation
10	Inclined
-----	Strike and dip of metamorphic foliation
35	Inclined
+	Vertical
-----	Joint
60	Inclined
-----	Vertical
-----	Fault—Long dash where approximately located, short dash where inferred, dotted where concealed, queried where doubtful
-----	Normal—Bar and ball on downthrown side
-----	Strike-slip—Arrows show relative direction of lateral offset
-----	Low-angle normal—Slip surface less than 45 degree dip, hachures on upper plate
-----	Thrust Solid sawteeth on upper plate
-----	Reverse—Open sawteeth on upper plate; fault dips steeper than 50 degrees
-----	Black mylonite and cataclasis zone
-----	Dike
-----	Anticline—Showing axis and direction of plunge; dashed where inferred, dotted where concealed
-----	Syncline—Showing axis and direction of plunge; dashed where inferred, dotted where concealed
-----	Monocline—Showing axis; dotted where concealed. Arrow indicates dip direction of steep limb

PRELIMINARY GEOLOGIC MAP OF THE LAKE MEAD 30' x 60' QUADRANGLE, CLARK COUNTY, NEVADA AND MOHAVE COUNTY, ARIZONA

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2007