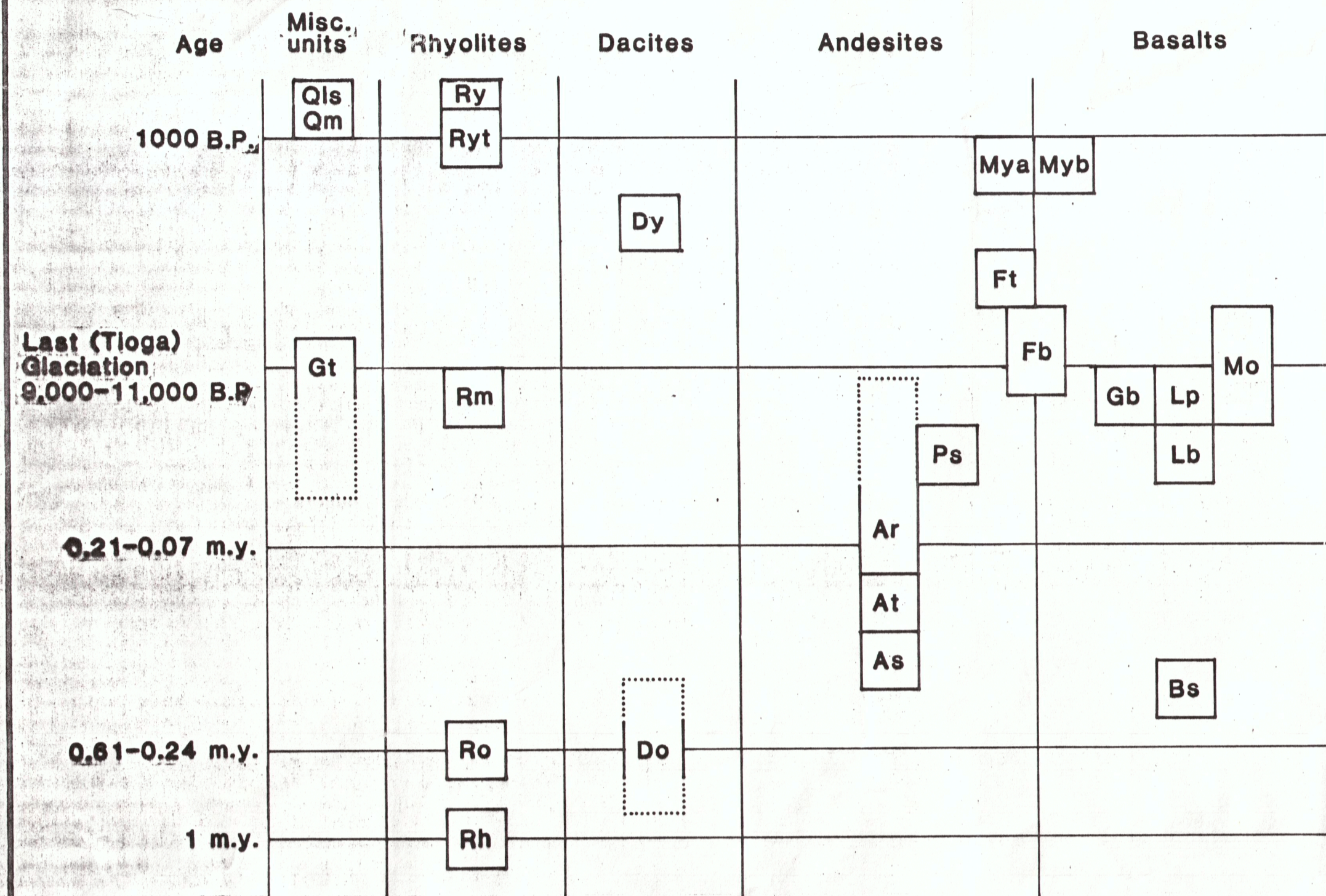
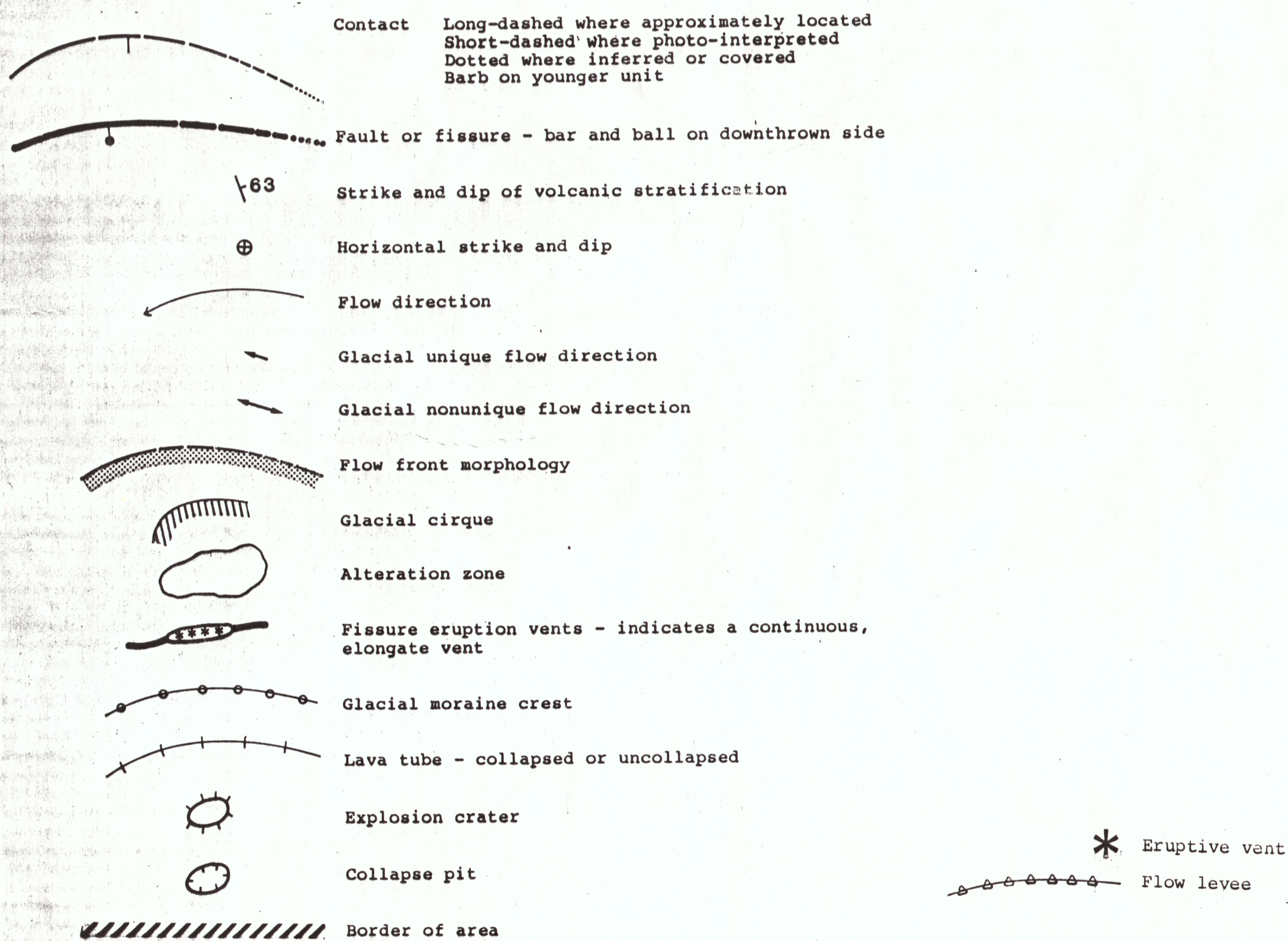


# CORRELATION OF MAP UNITS

# UNIT DESCRIPTIONS



## MAP SYMBOLS



**Qls Qm**  
**Ry**

Recent landslide and mudflow deposits.  
Young Rhyolitic Glass Flows. Coulee-type high-viscosity lava flows of black glass with extremely young flow morphology. Obsidians on the eastern side of Medicine Lake are aphyric while the flows to the west contain 2-5% plagioclase phenocrysts.

**Rt**

Young Rhyolitic Near-Source Agglutinated Pumiceous Tephra. Tephra rings of pumice surrounding the smaller glass flows; contain blocks up to 2 feet diameter of white angular pumice with local pink tuffaceous interblock groundmass. Locally the blocks have glazed exteriors and indicate an airfall origin; also locally, the stratified pumice ring deposit is welded to dense black glass. Heavy distal pumice concentration at Arnica Sink is included in Rt designation; overlain only by young rhyolitic glass flows; C-14 age on pumice tephra of Glass Mountain 1360 ± 240 yrs. B. P. (Chesterman, 1955).

**Mya Myb**

Young Modoc Basalt and Andesite. Youthful cone and flow morphology with little soil development and few trees growing on these dark gray to black craggy aa and, locally, pahoehoe flows; microcrystalline, locally diktytaxitic groundmass with 0-10% phenocrysts of plagioclase, olivine and clinopyroxene. The Paint Pot Crater flow and the Callahan flow are high-alumina basalt while the Burnt Lava flow is a basaltic-andesite (55.5% SiO<sub>2</sub>). C-14 date on the Callahan flow 1100 yrs. B. P. (Julie Donnelly-Nolan, person communication); C-14 dates on the Burnt Lava flow are 200 ± 200 yrs. B. P. (Luedke and Saith, 1981). However, the Burnt Lava flow is sprinkled with pumice airfall from Glass Mountain or Little Glass Mountain, as are all of the young Modoc flows, and is therefore > 1000 yrs. B. P.

**Dy**

Young Dacite Flows. Gray to brown waxy-luster glassy dacite lavas; dacite on the northeast of Mt. Hoffman is 30% porphyritic with phenocrysts of plagioclase > orthopyroxene(?); this body and the larger Hoffman Dacite to the southeast are very lithic-rich with numerous clasts of frothy to dense andesite, commonly associated with large vesicles; overlain only by Glass Mountain pumice airfall.

**Ft**

Fissure-Erupted Andesite Tephra. Burnt-chocolate-brown angular scoria block to lapilli andesite tephra and near-vent intertonguing glassy lavas; tephra contains frothy hair-like fibers of glass(?) Next to the fissure-vents the tephra has locally incorporated lithic blocks as large as 20 feet in diameter; overlies glacial till; overlain by pumice from Glass Mountain. At the north end of the large explosion crater southwest of Lyons Peak the glassy andesite flow and tephra can be seen frozen in the act of emerging from the fissure.

**Gt**

Glacial Till. Matrix supported unsorted boulder to sand deposit of varying lithologies; subrounded, locally striated clasts; matrix has a light purple color probably due to an abundance of incorporated cinder; forms local moraine-ridge topography; overlain by fissure-erupted andesitic tephra.

**Fb**

Fissure-Erupted Basalt or Andesite. Elongate fissure-vented black, weathered red-brown, scoria; consists of bomb and lapilli spatter; vents align with north to northeast-trending fractures; typically very fluid ejecta forms dripstone and slag-like bombs; 1-20% fine-grained phenocrysts of plagioclase > olivine + clinopyroxene(?); most fissure eruptives have extremely youthful morphology and lack soil cover; the fissure eruptive 1 mile southwest of Shotgun Peak is a bit older with a well-developed soil cover and lacks vent morphology.

**Rm**

Mount Hoffman Rhyolite. Crumbly black porphyritic vitric rhyolite flow 200-400 feet thick; retains most of its flow morphology but has been glaciated on its north flank. Foliated lava is locally flow-folded; 30% medium-grained phenocrysts of plagioclase > orthopyroxene(?); local spherulitic devitrification; overlies older Modoc Basalts and Rampart Andesites; overlain by a young Dacite flow.

**Mo**

Older Modoc Lavas. Well-preserved cinder cones and aa lavas of medium-gray diktytaxitic vesicular basalts; microcrystalline groundmass with 0-15% fine-grained phenocrysts of plagioclase = olivine + clinopyroxene; commonly glomeroporphyritic; overlies Rampart Andesites and are overlain by young Modoc Lavas and the Mt. Hoffman Rhyolite.

**Gb**

Grasshopper Hill Basalts. Scoriaceous red-brown to black strombolian spatter cones and minor flows of high-alumina basalt; aphanitic groundmass with 2-12% fine-grained phenocrysts of plagioclase > olivine + clinopyroxene. Small spatter agglutinate cone on the north side of Grasshopper Flat has a central collapse(?) crater.

**Lp**

Lyons Peak to Shotgun Peak Basalts and Basaltic Andesites. Primarily spatter and bomb strombolian cinder cones with local black crystal-poor glassy thin (< 50 feet) basalt to basaltic andesite flows; about 1-2% fine-grained phenocrysts of plagioclase > clinopyroxene + olivine; overlies Lake Basalt and, probably, the Black Mountain older Modoc cone.

**Lb**

Lake Basalt. Dense medium-gray massive lava flows up to 120 feet thick with red scoriaceous flow top (where not glacially removed) and platy-jointed base of porphyritic high-alumina basalt; 30-40% medium-grained phenocrysts of plagioclase > olivine + clinopyroxene. Overlies Rampart Andesite and is overlain by the Lyons Peak Basaltic Andesites; probably erupted from proto-Lyons Peak-Red Shale Butte edifice.

**Ps**

Pumice Stone Mountain Andesites. Cones with highly subdued vent morphology of medium-gray to light-brown massive holocrystalline(?) lavas; 40-50% fine-grained phenocrysts of plagioclase > olivine + clinopyroxene; overlies Rampart Andesites on the north and has an unclear contact with Andesite Tuff on the south; overlain by Old Modoc flows.

**Ar**

Rampart Andesites. Flows of largely nonvesicular flow-laminated platy-jointed (parallel to flow laminations) crystal poor andesite with vesicular to scoriaceous flow tops and intraflow agglutinated scoria lenses; near source lavas are commonly altered to a red and purple stain of fine-grained hematite(?) with uncommon specularite found on crack surfaces; sources are typically spindle-bomb-laden strombolian cinder cones; aphanitic-stony, locally glassy groundmass with typically < 1% phenocrysts of plagioclase > olivine + clinopyroxene; overlies the Andesite Tuff and an Old Modoc flow just southwest of the Callahan flow; K-Ar dates of 0.21 ± 0.005 my (Mertzman, 1981) and 0.07 ± 0.04 my (Mertzman, 1977); probably at least 1000 feet thick on the north and south rims of the Medicine Lake basin.

**At**

Andesite Tuff. Ash-flow tuff with a maximum exposed thickness of 12 feet at the northern edge of the mapped area; eutaxitic texture varies from strongly-welded to punky-unwelded; gray, weathers red, poorly-sorted tuff with abundant dark-brown finely-vesiculated scoria lapilli and probably < 5% lithic fragments of basalts and andesites; groundmass with abundant phenocrysts, plagioclase > orthopyroxene(?). Overlies Shield Basalts and Andesites and is overlain by Rampart Andesites. Stratigraphic relationships tend to be very unclear as the ash-flow was primarily deposited in low-relief valley locations. Isopleth mapping on maximum lithic size indicates the Medicine Lake depression as the probable source with most of the flow emanating to the northwest.

**As**

Shield Andesite Flows. Typically subdued low flow fronts and blocky flow surfaces; flow-laminated, non-vesicular andesites; crystal-poor, commonly black vitric groundmass; 1-3% phenocrysts plagioclase > olivine + clinopyroxene; principally overlies Shield Basalts; overlain by a Shield-Basalt flow 2-1/2 miles north of Dock Well; also overlain by the Andesite Tuff and Older Modoc lavas.

**Bs**

Shield Basalts. Craggy aa flows with local schollendome structures; medium-gray microcrystalline groundmass, locally diktytaxitic and microvesicular, porphyritic basalts; 5-30% phenocrysts with medium to fine-grained plagioclase > olivine, commonly glomeroporphyritic. Overlies a Shield Andesite flow north of Dock Well but is more commonly overlain by Shield Andesites.

**Do**

Old Dacites. Black foliated porphyritic glassy dacite intrusive/extrusive bodies. Exposure SW of Schonchin Spring probably a narrow intrusive body cutting Shield Basalts; about 50% porphyritic with plagioclase orthopyroxene(?); overlain by Rampart Andesites. Exposure of Dock Well is probably a dome or intrusive neck with numerous internal roughly vertical dikes striking N50-70W of black banded obsidian cutting through rhyolite inclusions; about 10% plagioclase phenocrysts; overlain by Rampart Andesites.

**Ro**

Old Rhyolitic Obsidians. Large flow and domes with preserved flow-fronts at least 80 feet thick; primarily flow banded, devitrified (locally spherulitic on southeast side of the Callahan flow) banded aphyric obsidians; black and glassy in rare outcrops and float; overlain by Rampart Andesites; K-Ar dates on these units are 0.61 ± 0.03 my, 0.33 ± 0.04 my, 0.43 ± 0.04 my, 0.24 ± 0.03 my (Mertzman, 1982).

**Rh**

Hornblende Rhyolite Obsidian. Sparse outcrop of dense, black, glassy porphyritic lavas; contains about 15% plagioclase and about 1/2% hornblende. Exposure on the southeast side of Dock Well is completely devitrified; overlain by the Andesite Tuff; K-Ar age of the rhyolite at the summit of Red Cap Mountain 1.01 ± 0.05 my and 1.18 ± 0.06 my southeast of Dock Well (Mertzman, 1982).



# EXPLANATION TO ACCOMPANY GEOLOGIC MAP OF THE MEDICINE LAKE HIGHLAND, CALIFORNIA

BY BRIAN P. HAUSBACK  
SEPTEMBER 1983