## CORRELATION OF MAP UNITS

[This correlation chart differs from most by displaying unit age by geographic area and lithologic type; the complex stratigraphic relations between individual map units are summarized in the description of volcanic units and figure 4. Volcanic units are grouped by geographic areas and, within each area, are further separated into columns, mafic units (for example, type a) to the left and felsic units (for example, type l) to the right. Vertical placement of map units reflect a combination of basalt stratigraphy, K-Ar ages (Condit and Shafiqullah, 1985), and polarity-chronostratigraphic units (Condit, 1984) as interpreted within the context of the polarity-chronologic sequence of Mankinen and Dalrymple (1979). Flows have been placed in geochronologic divisions (such as Quaternary, Quaternary and Tertiary, or Tertiary) as defined by the North American Commission on Stratigraphic Nomenclature (1983); unit designations (Q, QT, T) follow these geochronologic divisions. The Pleistocene-Pliocene boundary is placed in this report at 1.8 Ma (Bishop and others, 1978, p. 150); other authors (Aquirre and Pasini, 1985) place the boundary at 1.67 Ma. Because most map units are of Quaternary age, they have been further subdivided into 5 polarity-chronologic age groups that are shown by color on the polarity-chronologic column and on sheet 3; age group divisions are based on magnetopolarity reversals]

Qwg$_{3a}$ — **Map unit**—Box placed in center of time period during which unit was emplaced

Qek | Qel — **Map units occuring outside mapped area**—Interfinger with flows from within Ecks Mountain area

**Map unit for which there is magnetopolarity information**—See section on correlation for explanation of apparent discrepancies between magnetopolarity of unit and position in polarity-chronologic sequence

Qmh$_{3a}$ — **Negative magnetopolarity**

Qbg — **Positive magnetopolarity**

Qld$_{8}$ — **Transitional magnetopolarity**

Qmb$_{2,3,1}$ — **Map units having similar median age**

Qld$_{7}$, Qld$_{6}$, Qld$_{5}$ — **Map units whose probable times of emplacement overlap**

**Mean age (whole-rock K-Ar) and limits of precision within one-sigma standard deviation**

## DESCRIPTION OF SURFICIAL DEPOSITS

**Qal** — **Alluvium (Holocene and Pleistocene)**—Silt, sand, gravel, and boulders. Consists predominantly of cinders over most of area, except in stream valleys bounding volcanic areas

**QTc** — **Colluvium (Quaternary and upper Tertiary)**—Boulders and blocks of basalt primarily at the base of mesas

**QTl** — **Landslide and toreva blocks (Quaternary and upper Tertiary)**—Predominantly slump blocks of basalt

**QTg** — **Younger gravel (Quaternary and upper Tertiary)**—Bouldery gravel and coarse sand; light gray to pinkish gray and grayish red. Clasts are predominantly rounded to subrounded fragments of quartzite, sandstone, limestone, and chert derived from Proterozoic and Paleozoic formations. Sand grains are composed of feldspar, quartz, and chert. Locally cemented by calcite. Deposits questionably identified as unit QTg may actually be rim gravel (Tg)

## DESCRIPTION OF SEDIMENTARY UNITS

**Tg** — **Rim gravel (Oligocene?)**—Coarse sand and local boulder gravel; light greenish gray to white. Clasts are predominantly well rounded quartzite, chert, and limestone derived from Proterozoic and Paleozoic formations; clasts of diabase and granite in fresh exposures. Sand grains of feldspar, quartz, and chert. Locally well cemented by calcite. Surface commonly mantled by lag gravel. Probably correlative with rim gravel of Price (1950)

**Ku** — **Sedimentary rocks undivided (Upper Cretaceous)**—Sandstone, pale yellowish gray to yellowish brown and pale red, fine to coarse grained, feldspathic, crossbedded. Limestone, olive-gray to green, silty, discontinuous; contains pelecypods

**Tec** — **Chinle Formation (Upper Triassic)**—Mudstone and siltstone, brownish gray and grayish red purple, interbedded with lenticular beds of conglomeratic sandstone

**Tem** — **Moenkopi Formation (Middle? and Lower Triassic)**—Siltstone and sandstone, reddish brown to pale orange. Sandstone, poorly sorted, in lenticular and wedge-shaped beds showing medium-scale trough crossbedding

**Pk** — **Kaibab Limestone (Lower Permian)**—Limestone and sandstone. Limestone, light gray to yellowish gray and pale olive gray, commonly silty, dolomitic, and cherty, locally fossiliferous; beds 20 cm to 1 m thick. Sandstone, light yellowish gray to light yellowish brown, fine to very fine grained, thin bedded to massive, locally crossbedded

**Pc** — **Coconino Sandstone (Lower Permian)**—Sandstone, light yellowish gray to pale orange, fine to medium grained, well sorted quartz; moderately well cemented by quartz and iron oxides. Commonly in crossbeds 3–15 m thick

**Table 2.—*Representative major-element whole-rock analyses of volcanic rocks from the western part of the Springerville volcanic field.***

[Analyses by U.S. Geological Survey laboratory, Denver, Colorado, using wavelength-dispersive X-ray fluorescence techniques. In weight percent. FeTO$_3$, total iron as Fe$_2$O$_3$. LOI, lost on ignition (900° C); NA, not available]

| Sample No. | Map unit | SiO$_2$ | TiO$_2$ | Al$_2$O$_3$ | Fe$_2$O$_3$ | MnO | MgO | CaO | Na$_2$O | K$_2$O | P$_2$O$_5$ | LOI | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | Qwg$_1$ | 48.93 | 1.84 | 16.54 | 12.78 | 0.18 | 6.77 | 9.57 | 3.62 | 0.82 | 0.32 | NA | 101.36 |
| 16 | QTsf | 48.82 | 2.26 | 17.12 | 13.27 | .17 | 5.31 | 9.52 | 3.40 | .94 | .36 | NA | 101.18 |
| 19 | QTsf | 48.27 | 1.74 | 16.18 | 12.43 | .18 | 7.39 | 9.72 | 3.27 | .82 | .25 | NA | 100.24 |
| 25 | Qwg$_3$ | 49.72 | 1.51 | 16.38 | 11.91 | .18 | 7.67 | 9.60 | 3.07 | .65 | .23 | NA | 100.93 |
| 31 | Qbc$_1$ | 48.28 | 2.21 | 16.42 | 12.08 | .20 | 6.93 | 9.44 | 3.50 | 1.37 | .49 | NA | 100.91 |
| 35 | Qwg$_2$ | 49.10 | 1.55 | 16.42 | 12.29 | .18 | 8.23 | 9.51 | 3.06 | .53 | .22 | NA | 101.10 |
| 48 | Qec$_1$ | 45.15 | 2.74 | 17.26 | 12.97 | .22 | 6.74 | 10.43 | 3.98 | 1.22 | .64 | NA | 101.34 |
| 50 | Qld$_1$ | 45.34 | 2.56 | 15.65 | 13.20 | .20 | 9.49 | 9.45 | 2.95 | .94 | .45 | NA | 100.22 |
| 55 | Qmc$_5$ | 47.87 | 2.49 | 16.97 | 12.25 | .19 | 6.96 | 8.96 | 3.85 | 1.11 | .44 | NA | 101.10 |
| 56 | Qmb$_1$ | 47.02 | 1.73 | 14.63 | 12.59 | .19 | 10.59 | 8.98 | 3.06 | .82 | .35 | NA | 99.95 |
| 62 | Qmg | 50.06 | 1.68 | 16.63 | 11.81 | .18 | 6.84 | 8.40 | 3.81 | 1.20 | .47 | NA | 101.08 |
| 69 | Qnc | 48.60 | 2.13 | 16.04 | 11.84 | .19 | 7.67 | 9.09 | 3.40 | 1.14 | .39 | NA | 100.49 |
| 72 | Thb$_2$ | 50.53 | 1.85 | 15.56 | 10.82 | .17 | 7.87 | 8.07 | 3.74 | 1.59 | .39 | NA | 100.60 |
| 103 | Qmc$_5$ | 46.40 | 2.31 | 15.59 | 12.00 | .17 | 9.09 | 10.20 | 2.60 | .90 | .40 | <.001 | 99.67 |
| 105 | Qmc$_2$ | 45.50 | 2.26 | 15.10 | 12.10 | .17 | 10.10 | 9.92 | 2.20 | 1.42 | .58 | .12 | 99.34 |
| 107 | Qwg$_2$ | 47.70 | 2.38 | 16.40 | 11.90 | .17 | 7.86 | 9.99 | 3.19 | 1.32 | .47 | <.01 | 101.38 |
| 111 | Qmc$_4$ | 45.00 | 2.63 | 16.50 | 13.70 | .18 | 7.10 | 10.20 | 2.80 | .93 | .56 | <.001 | 99.57 |
| 112 | Qwd | 45.10 | 2.69 | 16.50 | 13.70 | .18 | 6.93 | 10.20 | 2.80 | .90 | .53 | <.001 | 99.55 |
| 116 | Qba | 45.00 | 2.19 | 16.60 | 11.40 | .18 | 7.16 | 11.40 | 2.80 | 1.15 | .65 | .88 | 98.54 |
| 118 | Qbb$_4$ | 45.80 | 1.75 | 13.90 | 12.60 | .18 | 12.50 | 9.54 | 2.40 | .76 | .40 | <.001 | 99.84 |
| 119 | Qsa$_1$ | 48.80 | 1.71 | 15.90 | 10.40 | .18 | 8.62 | 11.10 | 2.50 | 1.05 | .40 | <.001 | 100.66 |
| 122 | Qsb$_2$ | 45.70 | 2.70 | 16.20 | 12.80 | .19 | 6.51 | 9.74 | 3.20 | 1.46 | .70 | .14 | 99.20 |
| 124 | Qsc$_4$ | 45.50 | 2.80 | 15.80 | 12.60 | .19 | 8.20 | 9.31 | 2.80 | 1.45 | .58 | .11 | 99.23 |
| 128 | Qbg | 46.70 | 1.98 | 15.40 | 12.20 | .17 | 8.04 | 9.64 | 2.60 | 1.07 | .40 | .56 | 98.20 |
| 129 | Qbh | 50.50 | 2.26 | 17.60 | 11.40 | .17 | 3.50 | 5.85 | 4.40 | 2.39 | .82 | NA | 98.87 |
| 200 | Qbd$_2$ | 49.80 | 1.68 | 16.20 | 11.60 | .17 | 6.93 | 10.10 | 2.90 | .79 | .30 | .14 | 100.47 |
| 204 | Qbd$_2$ | 49.00 | 2.06 | 16.90 | 11.20 | .16 | 4.91 | 9.95 | 3.39 | 1.34 | .40 | .12 | 99.31 |
| 214 | Qbc$_2$ | 47.60 | 2.09 | 16.30 | 11.80 | .19 | 8.14 | 10.20 | 3.26 | 1.20 | .58 | <.01 | 101.35 |
| 216 | Qbb$_2$ | 46.10 | 1.56 | 11.80 | 13.10 | .17 | 17.60 | 7.99 | 2.16 | .67 | .26 | <.01 | 101.43 |
| 217 | Tbc$_2$ | 51.50 | 1.67 | 15.40 | 10.30 | .16 | 7.66 | 7.51 | 3.73 | 2.03 | .42 | .44 | 100.39 |
| 219 | Qbb$_3$ | 46.80 | 1.71 | 13.20 | 12.00 | .17 | 13.80 | 9.42 | 2.43 | 1.08 | .39 | .05 | 100.98 |
| 220 | Qlh$_2$ | 48.80 | 2.34 | 17.30 | 11.70 | .18 | 5.32 | 7.90 | 4.03 | 2.06 | .82 | .51 | 100.44 |
| 221 | Qlc$_3$ | 46.21 | 2.28 | 15.70 | 12.40 | .17 | 8.51 | 10.91 | 2.75 | .87 | .33 | <.01 | 100.12 |
| 222 | Qlh$_7$ | 48.70 | 2.34 | 17.30 | 11.70 | .18 | 5.45 | 7.98 | 4.15 | 2.05 | .80 | <.01 | 100.65 |
| 225 | Qbe | 46.00 | 2.88 | 16.30 | 12.70 | .18 | 7.75 | 10.01 | 3.37 | 1.40 | .56 | <.01 | 101.15 |
| 226 | Qme | 49.60 | 1.89 | 16.00 | 11.20 | .17 | 7.97 | 8.99 | 3.46 | 1.59 | .52 | <.01 | 101.39 |
| 229 | Qmb$_4$ | 45.50 | 2.23 | 13.70 | 13.10 | .17 | 13.30 | 9.74 | 2.35 | .84 | .36 | .32 | 101.30 |
| 230 | Qmh | 45.80 | 2.64 | 17.30 | 13.80 | .22 | 5.91 | 10.10 | 3.39 | 1.02 | .81 | <.01 | 100.99 |
| 232 | Tme | 47.90 | 2.27 | 16.00 | 13.30 | .18 | 7.60 | 7.93 | 4.06 | 1.94 | .74 | <.01 | 101.92 |
| 235 | Qbd$_1$ | 48.30 | 2.03 | 16.70 | 11.40 | .19 | 7.16 | 9.71 | 3.47 | 1.29 | .64 | <.01 | 100.89 |
| 236 | QTsf | 49.30 | 1.80 | 14.50 | 13.40 | .19 | 9.23 | 9.22 | 2.74 | .81 | .22 | .19 | 101.43 |
| 237 | Tbl | 52.30 | 2.15 | 17.20 | 10.10 | .18 | 2.43 | 5.64 | 4.40 | 3.90 | 1.48 | .60 | 99.79 |
| 238 | Qnd | 49.60 | 2.06 | 16.50 | 12.20 | .18 | 6.83 | 8.49 | 3.55 | 1.41 | .48 | <.01 | 101.30 |
| 239 | Qbb$_3$ | 47.80 | 1.87 | 15.50 | 10.80 | .16 | 9.74 | 10.30 | 2.72 | 1.14 | .42 | .04 | 100.46 |
| 240 | Qbb$_1$ | 47.10 | 2.14 | 14.90 | 12.00 | .18 | 11.00 | 9.10 | 2.88 | 1.19 | .45 | .01 | 100.93 |
| 242 | Thc$_2$ | 46.60 | 2.57 | 16.50 | 13.30 | .18 | 7.56 | 10.20 | 3.10 | .89 | .42 | .20 | 101.33 |
| 243 | Qed$_2$ | 44.40 | 3.06 | 16.80 | 13.50 | .21 | 7.03 | 11.00 | 3.57 | 1.14 | .70 | .04 | 101.41 |
| 247 | Qbb$_1$ | 45.20 | 1.77 | 13.50 | 12.50 | .18 | 13.80 | 8.99 | 2.52 | .83 | .35 | <.01 | 99.65 |
| 254 | Thc$_1$ | 46.70 | 2.19 | 16.09 | 12.20 | .19 | 5.92 | 8.34 | 3.53 | 1.54 | 1.12 | 1.59 | 97.83 |
| 256 | Tnb$_2$ | 46.20 | 2.17 | 15.60 | 11.70 | .18 | 9.60 | 9.00 | 3.34 | 1.46 | .53 | .06 | 99.78 |
| 257 | Tng | 48.40 | 1.41 | 15.50 | 11.80 | .17 | 9.09 | 9.27 | 2.75 | .89 | .27 | .17 | 99.54 |
| 258 | Tnf$_2$ | 48.60 | 1.75 | 16.30 | 11.50 | .17 | 6.87 | 9.83 | 3.00 | 1.18 | .33 | .24 | 99.52 |
| 264 | Tnb$_1$ | 46.30 | 2.23 | 16.00 | 11.60 | .17 | 8.98 | 8.84 | 3.49 | 1.53 | .55 | <.01 | 99.69 |
| 300 | Tnb$_3$ | 47.50 | 2.11 | 15.00 | 12.00 | .18 | 10.10 | 9.09 | 2.98 | 1.08 | .38 | <.01 | 100.42 |
| 301 | Qnb$_2$ | 48.10 | 1.55 | 15.30 | 11.30 | .17 | 9.89 | 9.38 | 2.91 | .98 | .36 | <.01 | 99.94 |
| 302 | Tnc | 46.80 | 2.38 | 16.90 | 12.80 | .18 | 6.68 | 9.04 | 3.41 | 1.06 | .43 | <.01 | 99.68 |
| 304 | Thd | 46.00 | 2.35 | 14.90 | 12.60 | .18 | 8.37 | 11.10 | 2.69 | 1.00 | .41 | .26 | 99.88 |
| 305 | Qnb$_2$ | 48.51 | 1.52 | 15.30 | 11.40 | .17 | 9.62 | 9.09 | 2.77 | 1.04 | .35 | <.01 | 99.76 |
| 307 | Thc$_1$ | 46.20 | 2.75 | 16.00 | 13.10 | .17 | 6.38 | 9.66 | 3.10 | 1.11 | .51 | .71 | 98.97 |
| 309 | Thg$_1$ | 47.80 | 2.52 | 17.40 | 12.80 | .16 | 4.73 | 7.73 | 3.87 | 1.31 | .44 | .85 | 98.75 |
| 310 | Qnb$_1$ | 45.70 | 2.21 | 15.40 | 12.70 | .18 | 9.21 | 10.90 | 2.81 | .79 | .36 | <.01 | 100.26 |
| 311 | QTnb | 45.80 | 2.20 | 15.20 | 11.60 | .18 | 10.20 | 9.35 | 2.94 | 1.37 | .49 | .24 | 99.33 |
| 312 | QTnf | 48.70 | 1.37 | 15.80 | 11.70 | .17 | 8.65 | 9.50 | 2.87 | .89 | .26 | <.01 | 99.91 |
| 314 | Qng | 49.00 | 1.41 | 15.40 | 11.50 | .17 | 9.03 | 9.43 | 2.87 | .90 | .27 | <.01 | 99.98 |
| 315 | Thb$_1$ | 45.70 | 2.25 | 15.40 | 12.70 | .18 | 9.11 | 10.90 | 2.50 | .77 | .37 | .39 | 99.87 |
| 317 | Thc$_3$ | 47.50 | 2.01 | 15.60 | 11.90 | .18 | 8.45 | 9.26 | 3.32 | 1.38 | .55 | <.01 | 100.15 |
| 321 | Twj | 46.30 | 2.65 | 14.20 | 11.90 | .16 | 8.24 | 8.06 | 2.79 | 1.64 | .53 | 2.91 | 96.49 |
| 324 | Qhe | 45.90 | 2.00 | 15.10 | 11.60 | .17 | 11.00 | 9.15 | 3.02 | 1.21 | .47 | <.01 | 99.62 |
| 325 | Qhe | 46.00 | 2.38 | 17.70 | 11.90 | .20 | 5.93 | 10.20 | 3.31 | 1.16 | .67 | .29 | 99.43 |
| 326 | Tha$_1$ | 45.20 | 2.13 | 15.20 | 11.90 | .17 | 11.00 | 9.91 | 2.44 | 1.04 | .43 | .57 | 99.43 |
| 407 | Qhb$_2$ | 48.80 | 2.13 | 16.90 | 12.40 | .19 | 6.32 | 7.88 | 3.57 | 1.52 | .54 | .23 | 100.24 |
| 409 | Qha$_1$ | 45.90 | 2.35 | 15.60 | 11.70 | .17 | 9.63 | 10.40 | 2.83 | 1.25 | .46 | .04 | 100.29 |
| 414 | Qla$_3$ | 43.50 | 2.56 | 16.07 | 12.80 | .20 | 8.96 | 12.40 | 2.58 | .82 | .64 | <.01 | 100.51 |
| 420 | Qld$_9$ | 46.40 | 2.34 | 16.10 | 12.10 | .18 | 7.61 | 9.80 | 3.37 | 1.49 | .65 | <.01 | 100.04 |
| 422 | Qhc$_7$ | 46.20 | 2.40 | 16.10 | 12.70 | .18 | 8.14 | 10.60 | 2.78 | .95 | .38 | .30 | 100.44 |
| 424 | Qlg$_1$ | 47.00 | 2.39 | 16.80 | 11.90 | .18 | 6.69 | 9.00 | 3.45 | 1.73 | .69 | .34 | 99.83 |
| 425 | Qla$_2$ | 45.80 | 2.12 | 15.60 | 11.90 | .18 | 8.91 | 11.60 | 2.81 | 1.08 | .47 | <.01 | 100.47 |
| 426 | Qlh$_5$ | 47.60 | 2.32 | 17.20 | 11.70 | .18 | 5.78 | 8.26 | 3.78 | 1.95 | .75 | .45 | 99.52 |
| 430 | Qlh$_3$ | 47.10 | 2.26 | 16.30 | 12.10 | .18 | 7.39 | 10.00 | 3.23 | 1.26 | .52 | <.01 | 100.33 |
| 431 | Qnb$_6$ | 45.50 | 2.16 | 14.10 | 12.90 | .18 | 12.20 | 9.45 | 2.78 | .94 | .38 | <.01 | 100.57 |
| 436 | Qej | 52.30 | 1.68 | 17.80 | 9.95 | .17 | 3.68 | 6.19 | 4.56 | 2.62 | .79 | .05 | 99.74 |
| 439 | Qei | 50.70 | 1.75 | 17.70 | 10.30 | .18 | 5.03 | 8.23 | 3.65 | 1.72 | .63 | <.01 | 99.90 |
| 444 | Qeg | 46.00 | 2.87 | 16.80 | 13.00 | .19 | 6.39 | 9.15 | 3.50 | 1.33 | .49 | .25 | 99.72 |
| 445 | Qed$_4$ | 47.20 | 2.06 | 18.50 | 11.70 | .19 | 6.03 | 9.09 | 3.69 | 1.03 | .65 | <.01 | 100.14 |
| 454 | Qma$_2$ | 45.80 | 2.54 | 15.40 | 12.40 | .17 | 9.18 | 9.22 | 3.07 | 1.38 | .53 | .06 | 99.69 |
| 460 | Qec$_3$ | 47.50 | 1.77 | 14.50 | 12.40 | .18 | 9.48 | 9.39 | 2.80 | .85 | .32 | .76 | 99.20 |
| 461 | Qwh$_1$ | 46.60 | 2.48 | 17.20 | 12.90 | .22 | 5.03 | 9.24 | 3.51 | 1.33 | .83 | <.01 | 99.32 |
| 488 | QTwc | 44.20 | 2.46 | 15.80 | 12.60 | .20 | 8.86 | 10.50 | 2.11 | 1.10 | .73 | .96 | 98.56 |
| 504 | Qec$_5$ | 46.90 | 2.73 | 16.00 | 12.70 | .18 | 6.55 | 9.22 | 3.26 | 1.29 | .51 | .14 | 99.33 |
| 505 | Qlc$_6$ | 46.30 | 2.40 | 16.20 | 12.10 | .18 | 7.78 | 9.88 | 2.80 | 1.12 | .51 | .54 | 99.26 |

## DESCRIPTION OF PLEISTOCENE TO UPPER MIOCENE VOLCANIC UNITS

[All volcanic units are massive, light to dark gray, and have fine-grained groundmass unless noted in remarks column. Volcanic units are distinguished largely by phenocryst type (shown in second order-spanners) and size. Polarity: NM, normal; R, reversed; T, transitional. Rock type: AOB, alkali olivine basalt, H, hawaiite; benmorite. Cinder-cone degradation follows usage of Wood (1980). UAKA number is K-Ar age-dated sample from Condit and Shafiqullah (1985). Leaders (----) indicate no information, no overlying unit, or underlying unit unknown]

| | Characteristics of deposit (flow surface, covering material, degree of flow dissection; thickness of flow) or degradation state of isolated cinder cone | Phenocryst size (mm) | Sample No. | Overlying unit(s) | Underlying unit(s) | Range in age or K-Ar age (Ma) | Polarity | Rock type | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| **IN OR NEAR ALL AREAS** | | | | | | | | | |
| **Diktytaxitic basalt** | | | | | | | | | |
| QTsf — **Composite flow of Show Low Creek** | Smooth; alluvial covered; edge 2–10 m thick. Probable vents composed of spatter and locally welded cinders. | 0.5–1.5 | 16<br>19<br>236 | See remarks. | See remarks. | 1.62±0.08 to 2.00±0.11 | R | H<br>AOB<br>AOB | Composed of at least 2 flow sheets separated by soil zone. Probable sources are vents 1235A, 9336A, and 9336B. Diktytaxitic groundmass; locally plagioclase phenocrysts. Underlies all volcanic units except units Thc$_2$, Twj, and Twh(?); overlies all sedimentary units. K-Ar ages on upper and lower sheets (UAKA 73-80, 73-137, 75-52a, 74-136, 80-133, 82-185). Sixteen paleomagnetic sites from both sheets have reversed polarity. |
| **SHOW LOW CREEK AREA** | | | | | | | | | |
| **Olivine-pyroxene basalt** | | | | | | | | | |
| Qsa$_2$ — **Flow and cinders of vent 12358** | Moderately smooth; alluvial covered; partly dissected. | 0.3–0.5 | 454 | --- | QTsf | 1.30–1.60 | --- | AOB | Black pyroxene rarely as large as 20 mm. |
| Qsa$_1$ — **Flow and cinders of vent 0331** | Alluvial covered; edge 2–4 m thick | 0.5–1.0 | 119 | --- | Qsb$_2$<br>QTsf | 1.32–1.74 | NM | AOB | Green pyroxene. |
| **Picritic basalt** | | | | | | | | | |
| Qsb$_2$ — **Composite(?) flow and cinders of vent 0224 (Flat Knoll).** | Smooth to moderately rough; alluvial covered; partly dissected; edge 1–10 m thick. | 0.3–0.5 | 122 | Qsa$_1$<br>Qsc$_5$ | QTsf | 1.53–1.60 | NM | AOB | Variable lithology. Cinder cone contains local accumulations of spatter. |
| Qsb$_1$ — **Flow of Scott Reservoir** | Smooth; thick alluvial covered; locally dissected; edge 1–6 m thick. | 0.5–1.0 | 56 | Qsd | Qbg | 1.60–1.80 | NM | AOB | Local columnar joints about 30 cm in diameter where dissected. |
| **Olivine basalt** | | | | | | | | | |
| Qsc$_5$ — **Flow of Timber Mesa and cinders of vent 9306 (Porter Mountain).** | Smooth; alluvial covered; edge 3–30 m thick; cinders black to locally red. | 0.3–1.0 | 55<br>103 | Qsa$_1$ | Qsc$_4$<br>Qsb$_2$<br>Qsb$_1$<br>Qsc$_2$<br>Qsg<br>QTsf | 1.53±0.21 | NM | H<br>AOB | Ranges from microporphyritic to phyric. Chemically transitional from alkali olivine basalt to hawaiite. Magneto-stratigraphic relations suggest may belong to an unrecognized subchron. UAKA 80-131. |
| Qsc$_4$ — **Composite flow and cinders of vent 0333 and vents 9304B and 9304A (Twin Knolls).** | Smooth; alluvial covered; edge 1–3 m thick; locally dissected. | 0.3–0.5 | 124 | Qsa$_1$<br>Qsc$_5$ | QTsf | 1.74–1.74 | --- | AOB | Cinder cone contains local accumulations of spatter. |
| Qsc$_3$ — **Cinders of vent 0321 (Woolhouse Mountain)** | Cone moderately degraded | --- | --- | --- | --- | 1.40–1.80 | --- | --- | |
| Qsc$_2$ — **Cinders of vent 9307 (Plume Mountain)** | -----do | --- | 105 | Qsc$_5$ | --- | 1.57–1.93 | --- | AOB | Summit crater contains local accumulations of spatter. |
| Qsc$_1$ — **Minor flow of Frost Tank** | Moderately rough; edge 1–2 m thick | --- | --- | Qsc$_5$ | --- | 1.65–1.85 | --- | --- | |
| QTsc — **Cinders of vent 0319 (Second Knoll)** | Cone degraded; local spatter | --- | --- | --- | --- | 1.60–2.00 | --- | --- | Cinder pit dissects north side of cone. |
| **Sparse olivine basalt** | | | | | | | | | |
| Qsd — **Flow of Jaques Spring** | Moderately smooth; thin alluvial cover; edge 0.5–4 m thick. | 0.3–0.5 | 112 | Qsg$_2$<br>Qsb$_3$ | Qsb$_1$ | 1.63–167 | R | AOB | Pahoehoe lava toes preserved at distal end of flow. |
| **Olivine-feldspathic basalt** | | | | | | | | | |
| Qsg$_2$ — **Flow and cinders of vent 9305** | Slightly rough; thin alluvial cover; edge 1–3 m thick. | 0.5–1.0 | 107 | --- | Qsd | 1.74±0.15<br>1.40 | --- | AOB | Black clinopyroxene. Age suggested by stratigraphic and paleomagnetic constraints (UAKA 80-132). |
| Qsg$_1$ — **Flow and spatter of vent 2136 (Shumway Butte).** | Smooth; alluvial covered; edge 2–4 m thick---- | 0.5–1.0 | 6 | --- | QTsf | 1.50–1.90 | --- | H | Diktytaxitic groundmass. Vent contains local accumulations of spatter and minor cinder. |
| QTsg — **Flow northeast of Schoems Crossing** | Smooth; alluvial covered; edge 2–6 m thick---- | 0.5–1.0 | --- | --- | Tec | 1.60–2.00 | --- | --- | Diktytaxitic groundmass. Caps mesa; flow contains locally occurring columnar joints. |
| **WHITE LAKES BASIN AREA** | | | | | | | | | |
| **Picritic basalt** | | | | | | | | | |
| Qwb$_3$ — **Cinders and minor flow of vent 1336 (Ortega Mountain).** | Cone moderately degraded | --- | --- | --- | --- | 1.30–1.70 | --- | --- | Local welded spatter on cinder cone. |
| Qwb$_2$ — **Cinders of vent 1327** | -----do | --- | --- | --- | --- | 1.30–1.70 | --- | --- | Do. |
| Qwb$_1$ — **Cinders of vent 1302** | -----do | --- | --- | --- | --- | 1.30–1.70 | --- | --- | |
| **Olivine basalt** | | | | | | | | | |
| Qwc$_4$ — **Cinders of vents 0410A and 0410B (Dobbins Knoll).** | Cones moderately degraded | --- | --- | --- | --- | 1.00–1.80 | --- | --- | Local spatter and welded spatter on cinder cone. |
| Qwc$_3$ — **Flow and cinders of vent 1428** | Slightly rough; alluvial covered | 0.5–1.0 | 460 | --- | Qwg$_2$ | 1.30–1.70 | --- | AOB | Local occurrences of spatter. |
| Qwc$_2$ — **Flow and cinders of vent 0414** | Slightly rough; partly dissected | 0.3–0.5 | --- | --- | --- | 1.30–1.90 | --- | AOB | Local occurrences of spatter and welded cinders. |
| Qwc$_1$ — **Cinders of vent 0408** | Cone degraded | --- | --- | --- | --- | 1.45–2.05 | --- | --- | |
| QTwc — **Cinders of vent 0402** | Cone moderately degraded | --- | 488 | --- | --- | 1.60–2.00 | --- | AOB | Cinder pit on north side contains cumulate xenoliths. Local occurrences of welded spatter. |
| **Sparse olivine basalt** | | | | | | | | | |
| Qwd — **Cinders of vent 1301** | Cone moderately degraded | --- | --- | --- | --- | 1.30–2.10 | --- | --- | |
| **Olivine-feldspathic basalt** | | | | | | | | | |
| Qwg$_4$ — **Minor flow west of vent 0410B (Dobbins Knoll).** | Moderately rough | 0.5–1.0 | --- | --- | --- | 0.30–1.50 | --- | --- | |
| Qwg$_3$ — **Flow of Point of the Mountain and cinders of vent 1414 (Sides Knoll).** | Smooth; alluvial covered; edge 1–5 m thick---- | 0.5–1.0 | 25 | --- | Qwg$_2$<br>QTsf(?)<br>Ku | 1.05–1.85 | R | AOB | Diktytaxitic groundmass. Local columnar joints. Mesa-capping flow displays topographic reversal. |
| Qwg$_2$ — **Composite flow of Sides Lake and cinders of vents 1420, 1422, and 1427.** | Smooth; alluvial covered | 0.5–1.0 | 35 | Qwb$_4$<br>Qwc$_3$ | Qwb$_1$(?)<br>QTsf(?)<br>Ku | 1.40–1.95 | --- | AOB | Locally glomeroporphyritic in diktytaxitic groundmass. Vent composed of welded spatter and flow. |
| Qwg$_1$ — **Composite(?) flow and cinders of vent 0405** | -----do | 0.3–0.5 | --- | --- | QTsf(?) | 1.54–1.94 | --- | --- | Vent contains local occurrences of welded spatter. |
| Twg — **Flow and cinders of vent 1312** | Smooth; partly dissected | 0.3–0.5 | --- | QTsf | --- | 1.70–2.12 | --- | --- | |
| **Aphyric basalt** | | | | | | | | | |
| Qwh$_5$ — **Flow east of vent 0402** | Smooth; alluvial covered; dissected; edge 2–4 m thick. | --- | --- | --- | Qwb$_5$(?)<br>Ku | 0.80–1.40 | --- | --- | |
| Qwh$_5$ — **Flow southeast of vent 0402** | Smooth; alluvial covered | --- | --- | --- | QTg | 0.80–1.40 | --- | --- | |
| Qwh$_4$ — **Flow and cinders of vent 1421** | -----do | --- | --- | --- | Qwg$_2$ | 1.00–1.60 | --- | --- | Local occurrences of welded spatter on cinder cone. |
| Qwh$_3$ — **Minor flow east of vent 0402** | ----------do---------- | --- | --- | --- | QTg | 1.35–1.85 | --- | --- | Caps mesa. |
| Qwh$_2$ — **Minor flow east of vent 0402** | ----------do---------- | --- | --- | --- | QTg | 1.35–1.85 | --- | --- | Underlying unit may be rim gravel (Tg). Caps mesa. |
| Qwh$_1$ — **Flow and cinders of vent 1429** | Moderately smooth; alluvial covered; partly dissected. | --- | 461 | Qwg$_2$(?) | --- | 1.60–1.90 | --- | AOB | Local occurrences of welded spatter on cinder cone. |
| Twh — **Flow southwest of Martinez Lake** | Smooth; alluvial covered; edge 1–4 m thick---- | --- | --- | QTsf(?) | --- | 1.80–2.10 | --- | --- | |
| **Quartz basalt** | | | | | | | | | |
| Twj — **Flow of Mesa Redonda** | Partly covered by younger gravel (QTg)------- | 0.5–0.5 | 321 | QTg | Ku | 8.70–9.70 | --- | H | Caps Mesa Redonda. Contains local accumulations of spatter, cinder, and columnar joints. K-Ar whole-rock age 9.2±3 Ma (R.J. Miller, oral commun., 1988). |
| **MORGAN MOUNTAIN AREA** | | | | | | | | | |
| **Picritic basalt** | | | | | | | | | |
| Qmb$_6$ — **Composite flow of Hog Spring and cinders of vents 9416A, 9416B, 9417A, and 9417B.** | Smooth to irregular; alluvial covered; edge 1–4 m thick. | 0.5–1.0 | 431 | Qme | Qmh<br>Qlh$_3$<br>Qmg<br>Qmh$_3$<br>Qmb$_5$<br>Qmb$_3$<br>QTsf<br>Tme | 0.73–1.49 | R | AOB | Cinder cones contain welded spatter. Contains multiple flow fronts. |
| Qmb$_5$ — **Flow of Elk Springs Draw** | Smooth to slightly irregular; edge 1–6 m thick. | --- | --- | Qmc$_4$<br>Qlh$_3$ | Qbb$_4$ | 1.00–1.67 | R | --- | |
| Qmb$_4$ — **Flow of Bourdon Windmill** | Smooth to irregular; alluvial covered; edge 1–4 m thick. | 0.5–2.0 | 229 | Qmh<br>Qmg | Qmd$_3$<br>Qmb$_3$<br>Qmd$_2$<br>QTsf | 1.30–1.80 | R | AOB | Variable lithology; locally olivine phenocrysts as large as 5 mm. |
| Qmb$_3$ — **Cinders and spatter of vent 9325 (Sponseller Mountain).** | Cone degraded | --- | --- | --- | --- | 1.40–1.80 | --- | --- | Cinder cone contains welded spatter. |
| Qmb$_2$ — **Composite minor flow and cinders of vents 9408B, 9408C, 9417C, and 9409C.** | Cinder cones moderately degraded | --- | --- | --- | Qmb$_4$<br>Qlh$_3$ | 1.40–1.80 | --- | --- | Cinder cones contain local occurrences of welded spatter. |
| Qmb$_1$ — **Cinders and spatter of vent 1225 (Cooley Knoll).** | Cinder cone degraded | --- | --- | --- | --- | 1.20–2.00 | --- | --- | Cinder cone contains welded spatter. |
| **Olivine basalt** | | | | | | | | | |
| Qmc$