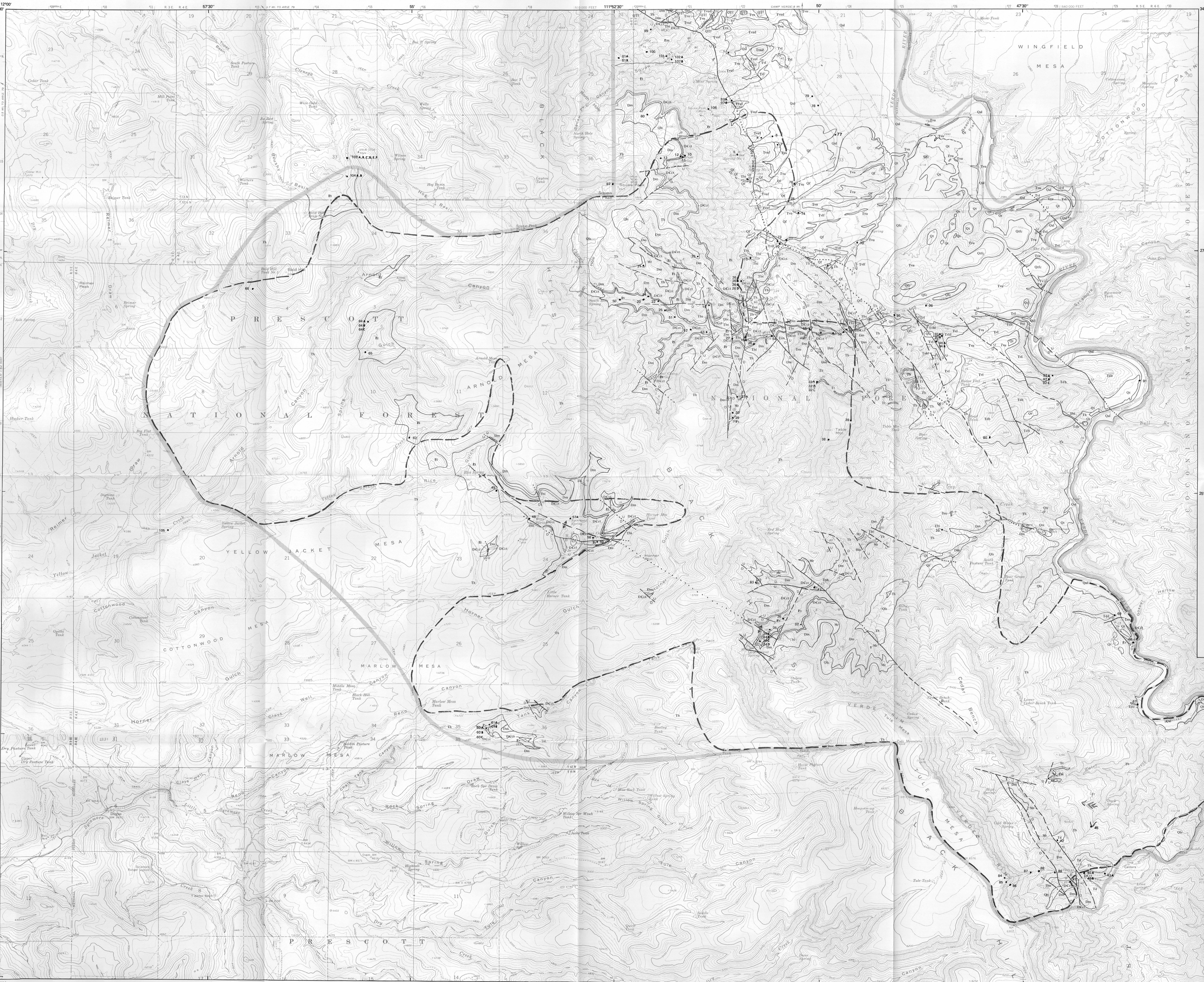
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1577-C

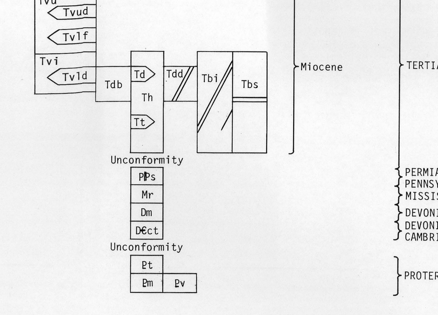



Base from U.S. Geological Survey Arnold Mesa, Dugas, Hackberry Mtn, Horner Mtn, Tule Mesa, Verde Hot Springs, 1967

SCALE 1:24 000

Geology mapped in 1980

## CORRELATION OF MAP UNITS




## EXPLANATION OF MAP UNITS

- Qal — ALLUVIUM (HOLOCENE)--Silt, sand, and gravel
- Qls — LANDSLIDE DEPOSITS (PLEISTOCENE)
- Qtr — TRAVERTINE (PLEISTOCENE)
- Qtfc — MIXED TERRACE AND ALLVUIAL-FAN DEPOSITS (PLEISTOCENE)
- Qt — TERRACE DEPOSITS OF THE VERDE VALLEY (PLEISTOCENE)--Flat-surfaced deposits of well-rounded, well-sorted, resistant pebbles and cobbles
- Qf — ALLUVIAL-FAN DEPOSITS OF THE MOUNTAIN FRONT (PLEISTOCENE)--Poorly sorted gravel
- Qfc — ALLUVIAL-FAN DEPOSITS OF CHASM CREEK (PLEISTOCENE)--Poorly sorted gravel
- QTf — ALLUVIAL-FAN DEPOSITS OF SQUAW PEAK CANYON (PLEISTOCENE OR PLIOCENE)--Dissected gravel deposits

VERDE FORMATION

- Tvu — Upper member (Pliocene? and Miocene)--Conglomerate and sandstone
- Tvuf — Upper fanglomerate tongue (Miocene)--Poorly sorted, weakly indurated conglomerate composed of clasts of basalt and Paleozoic formations
- Tvud — Upper dacite (Miocene)--Small volcanic dome and related flows of fine-grained, light-gray dacite
- Tvlf — Lower fanglomerate tongue (Miocene)--Breccia to conglomerate composed of basaltic detritus
- Tvl — Lower member (Miocene)--Conglomerate and sandstone with interbedded olivine basalt flows
- Tvld — Lower dacite (Miocene)--Tongue of dacite-porphyry breccia
- Tdb — INTERBEDDED DACITE PORPHYRY AND BASALT (MIOCENE)--Dacite breccia and tuff with interbedded olivine basalt flows
- Td — DACITE PORPHYRY (MIOCENE)--Coarse dacite porphyry
- Tt — TUFF OF TABLE MOUNTAIN (MIOCENE)--Rhyolitic ash-flow tuff
- Th — HICKEY FORMATION (MIOCENE)--Basaltic lava flows and related pyroclastic deposits; minor andesite
- Tdd — DACITE DIKES (MIOCENE)
- Tbi — BASALT DIKES (MIOCENE)
- Tbs — BASALT SILL (MIOCENE)
- PPs — SUPAI GROUP (PERMIAN OR PENNSYLVANIAN)--Red siltstone
- Mr — REDWALL LIMESTONE (MISSISSIPPIAN)
- Dm — MARTIN FORMATION (DEVONIAN)--Dolomite, some limestone
- D€ct — CHINO VALLEY FORMATION AND TAPEATS SANDSTONE, UNDIFFERENTIATED (DEVONIAN AND CAMBRIAN)--Siltstone (Chino Valley Formation) and sandstone (Tapeats)
- Pt — TONALITE (PROTEROZOIC)
- Pm — METAMORPHIC ROCKS OF SQUAW PEAK CANYON (PROTEROZOIC)--Greenschist
- Pv — VOLCANIC ROCKS OF GAP CREEK (PROTEROZOIC)--Dacite, rhyolite, minor basalt and greenschist

CONTACT--Dotted where concealed

CONTACT--Separates adjacent compositionally or morphologically distinct gravel deposits within units Qf and Qt

FAULT--Dashed where approximately located or inferred, dotted where concealed. U, upthrown side; D, downthrown side

ANTICLINE--Dashed where approximately located, dotted where concealed

STRIKE AND DIP OF BEDS

18 Inclined

Horizontal

82 STRIKE AND DIP OF FOLIATION

SHAFT

TUNNEL

PROSPECT

QUARRY

APPROXIMATE BOUNDARY OF ROADLESS AREA

LIMIT OF GEOLOGIC MAPPING

102 ● GEOCHEMICAL SAMPLING LOCALITY AND NUMBER

## STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a geochemical survey of the Arnold Mesa Roadless Area (U.S. Forest Service number 03092) in the Prescott and Tonto National Forests, Yavapai County, Ariz. The Arnold Mesa Roadless Area was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

## INTRODUCTION

During 1980 the U.S. Geological Survey and the U.S. Bureau of Mines (USBM) conducted field investigations to evaluate the mineral resource potential of the Arnold Mesa area, Yavapai County, Ariz. Field studies included geologic mapping (Wolfe, 1983), aeromagnetic mapping (Davis and Wolfe, 1983), geochemical sampling (this report), and a survey of known mines and prospects (McColly and Korzeb, 1981).

The Arnold Mesa Roadless Area comprises about 28,000 acres (11,300 hectares) in and along the flanks of the Black Hills south of Camp Verde, Ariz. The Black Hills form a northwest-trending drainage divide, between the Agua Fria drainage on the west and Verde River on the east, that extends through the roadless area. The crest and southwest flank of the divide within the study area are moderately dissected, gently rolling uplands. The northeast flank is steep terrain that forms the western wall of the Verde Valley. The northeast flank has a total relief within the study area of almost 4,000 ft (more than 1,200 m) and is deeply incised by the canyons of Gap and Chasm Creeks. Unpaved roads provide access to much of the perimeter of the Arnold Mesa Roadless Area, but the interior is accessible only by foot, horse, or helicopter.

## GEOLOGIC SETTING

The Arnold Mesa Roadless Area is within the transition zone between the Colorado Plateaus to the northeast and the Basin and Range province to the southwest. The transition zone is a belt about 70 mi (120 km) wide that extends diagonally from northwest to southeast across central Arizona and parallels the topographic margin of the plateaus. The zone is underlain by Precambrian rocks and gently dipping Paleozoic strata that are similar to Precambrian and Paleozoic rocks in the southern part of the Colorado Plateaus in the Grand Canyon.

Proterozoic rocks in the northern part of the study area, in the vicinity of Squaw Peak Canyon, include foliated mafic and, locally, intermediate metavolcanic rocks of greenschist facies that are intruded by a Proterozoic pluton composed mainly of tonalite. The tonalite is locally exposed in the northern and central parts of the area. In the southern part of the study area, Proterozoic rocks exposed along Gap Creek, in Chalk Tank Canyon, and locally along the Verde River are predominantly relatively unmetamorphosed dacite and rhyolite and subordinate mafic volcanic or volcaniclastic rocks.

Gently dipping Paleozoic dolomite and limeston and subordinate sandstone and siltstone rest unconformably on the Proterozoic rocks. These strata, Cambrian to Pennsylvanian or Permian in age, have an aggregate maximum thickness of 730-910 ft (220-280 m). However, in the western part of the map area, they pinch out locally between the Proterozoic tonalite and the late Tertiary Hickey Formation in the vicinity of Arnold Mesa and in the headwaters of Chasm Creek.

The transition zone in central Arizona, was the locus of voluminous eruptions of basaltic lava and pyroclastic deposits that rest on the eroded surface of the Paleozoic and Precambrian rocks. In the Black Hills, the basalts, included in the Hickey Formation, are late Miocene (McKee and Anderson, 1971); later volcanism continued to the north, culminating in numerous Quaternary eruptions on the southern Colorado Plateaus in the vicinity of Flagstaff.

A northwest-trending line of erosional windows exposing tonalite and Paleozoic strata beneath the Hickey basalt occurs in the northwestern part of the study area. Tonalite-basalt contacts dipping steeply to the southwest define a pre-Hickey slope that was overrun by southwestward-flowing lavas.

Silicic eruptions occurred at local centers. A prominent center, of late Miocene age, was immediately east of the Verde River in the general vicinity of Hackberry Mountain and Towel Peaks. Dacite breccias and ash-flow tuffs from this center are interbedded with basalts like those of the Hickey Formation. A smaller, somewhat younger center erupted dacite lava (Tvud) included within the Verde Formation at the north end of the map area near Squaw Peak Canyon.

Numerous high-angle faults, predominantly of northwest trend, exist from the general vicinity of the Black Hills north to the southern edge of the Colorado Plateaus. Much of the faulting is late Miocene to early Pleistocene; hence, faulting and volcanism in this part of the transition zone were in a general way related in time.

Northwest-trending linear basins of late Cenozoic age characterize the transition zone and suggest that extension and basin subsidence occurred here as well as in the Basin and Range province. The map area includes the southernmost part of one of these basins, the 30-mi (50-km)-long Verde basin, which contains more than 3,100 ft (950 m) (Nations, 1974) of late Cenozoic basin fill deposits of the Verde Formation.

The Verde basin and its sedimentary fill are bounded on the southwest by the Verde fault, which, in the northern part of the map area, is a conspicuous, single, steep, normal fault. Near Chasm Creek, however, the single fault splays southward into several high-angle faults that can be traced only a short distance southeast of Chasm Creek. Another fault system, similar to the Verde fault in trend and sense of movement, but offset en echelon from it, extends from the upper part of Gap Creek to the southern boundary of the roadless area.

## GEOCHEMISTRY

### Sampling and analytical techniques

A total of 128 samples was collected during the course of geologic mapping. Most are grab samples selected to represent the mapped geologic units as well as outcrops where mineralization was suspected. Twenty-seven are samples of unconsolidated sediment. Of these, 22 are samples of sandy sediment collected in active stream channels, and 5 represent sandy matrices of alluvial fan deposits. Because field evidence shows that mineralization is confined to the Precambrian rocks, the sediment samples were located so as to sample drainages in which Precambrian rocks are exposed. Table 1 groups the samples by geologic unit and provides explanatory notes about special geologic or sampling conditions.

All sediment samples were sieved, and the minus 80-mesh (<0.177-mm) fraction was analyzed for 30 elements by semiquantitative spectrographic analysis and for uranium and thorium by neutron activation analysis.

### Geochemical results

Table 2 shows geochemical values that are considered anomalous. Anomalous values are those that significantly exceed values for the same elements in relatively unaltered samples of the same rock unit or, in the case of sediment samples, values significantly greater than those of unaltered source rocks exposed upstream in the same drainage net. Mineralized tonalite and the chemical anomalies that result from it are present locally, particularly where the tonalite is cut by quartz veins that intrude it and the metamorphic rocks of Squaw Peak Canyon; anomalies are also present in some of the quartz veins, which are most abundant north of the roadless area. Enriched elements include manganese, silver, arsenic, boron, copper, molybdenum, antimony, lead, and zinc. Not all these elements are anomalously concentrated in any single sample.

The greatest enrichments are present outside of the roadless area in a mineralized quartz vein (sample 101) that intrudes the metamorphic rocks of Squaw Peak Canyon near the intrusive contact with the tonalite and in brecciated and mineralized tonalite adjacent to a quartz vein at the Chicken Wire gold mine (samples 103B-F). Samples showed lower levels of enrichment in the area of the Squaw Peak mine (samples 97A, 97B, 106), also outside of the roadless area. Roe (1976), in a survey of soil geochemistry in the vicinity of the Squaw Peak mine, reported maximum concentrations of approximately 0.8 percent for copper, 140 ppm for molybdenum, and 700 ppm for zinc. Roe interpreted the Squaw Peak mine deposit as a Laramide porphyry copper system. He noted that the primary economic minerals at the Squaw Peak mine are chalcopyrite and molybdenite, which occur associated with quartz veins and, in the host tonalite, as disseminated grains or masses related to mineralized fractures and veins. Secondary products derived from weathering of chalcopyrite include malachite, chrysocolla, azurite, and ankerite(?) (Roe, 1976).

Low levels of enrichment in silver, lead, boron, and zinc were found in a quarry about 2 mi (3.2 km) south of the Squaw Peak mine (samples 26A-D). The tonalite at the quarry is sheared and altered, but no quartz veins were seen. Apparently fractures, faults, or shears provided avenues for minor alteration and mineralization of the tonalite. Low levels of enrichment in silver, lead, and zinc (samples 71, 72, 76) were also found in sediment samples from gullies draining tonalite that is partly within the roadless area between the quarry and the Squaw Peak mine. This suggests that low-level mineralization occurs locally in the tonalite within the roadless area.

In summary, low-level geochemical anomalies related to enrichment in silver, lead, and zinc occur locally in the tonalite within the roadless area. However, conspicuous anomalies that also include copper and molybdenum and that have led to serious prospecting are known only outside of the roadless area beyond its northern boundary.

## REFERENCES

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McColly, R. A., and Korzeb, S. L., 1981, Mines and prospects map of the Arnold Mesa RARE II Further Planning Area, Yavapai County, Arizona: U.S. Bureau of Mines Open-File Report MLA 31-81, scale 1:24,000.

McKee, E. H., and Anderson, C. A., 1971, Age and chemistry of Tertiary volcanic rocks in north-central Arizona and relation of the rocks to the Colorado Plateaus: Geological Society of America Bulletin, v. 82, p. 2767-2782.

Nations, J. D., 1974, Paleontology, biostratigraphy, and paleoecology of the Verde Formation of late Cenozoic age, north-central Arizona, in Karlstrom, T. N. V., Swann, G. A., and Eastwood, R. L., eds., Geology of northern Arizona with notes on archeology and paleoclimate; Pt. II, Area studies and field guides: Geological Society of America Rocky Mountain Section, Guidebook 27, p. 611-629.

Roe, R. R., 1976, Geology of the Squaw Peak porphyry copper-molybdenum deposit, Yavapai County, Arizona: Tucson, University of Arizona M.S. thesis, 102 p.

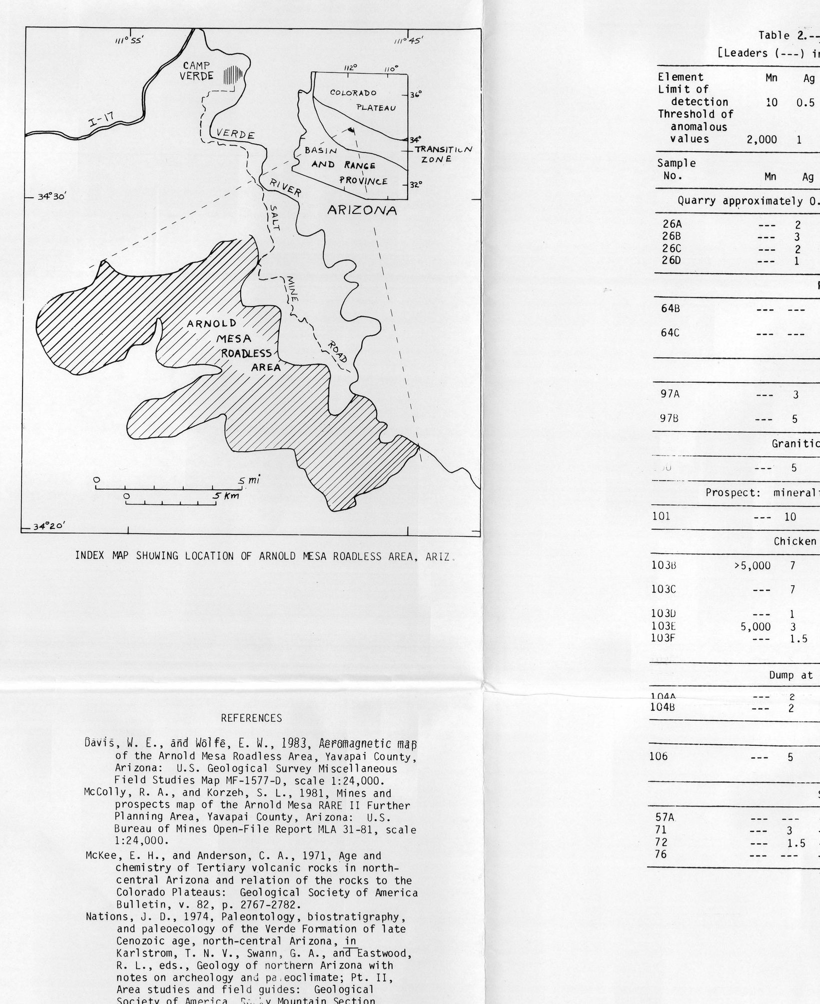
Wolfe, E. W., 1983, Geologic map of the Arnold Mesa Roadless Area, Yavapai County, Arizona: U.S. Geological Survey Miscellaneous Field Studies Map MF-1577-B, scale 1:24,000.

Wolfe, E. W., McColly, R. A., and Korzeb, S. L., 1983, Mineral resource potential map of the Arnold Mesa Roadless Area, Yavapai County, Arizona: U.S. Geological Survey Miscellaneous Field Studies MF-1577-A, scale 1:24,000.

TABLE 1.--GEOCHEMICAL DATA FOR SAMPLES FROM THE ARNOLD MESA AREA

| Sample No. | Fe | Mg | Ca | Ti | Mn | Ag | As | Au | B | Ba | Be | Bi | Cd | Co | Cr | Cu | La | Mo | Nb | Ni | Pb | Sb | Sc | Sn | Sr | V | W | Y | Zn | Zr | U | Th | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Semi-quantitative spectrographic analysis | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Neutron activation analysis | | |
| Lower limit of determination | .05 | .02 | .05 | .002 | 10 | .5 | 200 | 10 | 10 | 20 | 1 | 10 | 20 | 5 | 10 | 5 | 20 | 5 | 20 | 5 | 10 | 100 | 5 | 10 | 100 | 10 | 50 | 10 | 200 | 10 | | | |
| | Percent | | | | Parts per million | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sediment Samples (sieved to -80 mesh; < .177mm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 2 | 2 | 10 | .2 | 1000 | N | N | N | 20 | 200 | L | N | N | 30 | 300 | 50 | 20 | N | N | 70 | 20 | N | 15 | N | 200 | 100 | N | 20 | N | 50 | 0.91 | 4.0 | Matrix of upper fanglomerate tongue of the Verde Formation (TVuf) |
| 6 | 3 | 1 | 3 | .5 | 1000 | L | N | N | 50 | 500 | 1 | N | N | 20 | 50 | 100 | 30 | N | N | 20 | 50 | N | 15 | N | 300 | 100 | N | 20 | L | 150 | 2.76 | 8.59 | Modern stream sediment in alluvial fan deposits (Qal) |
| 41 | 5 | 2 | 2 | 1 | 1000 | N | N | N | 20 | 1000 | 1 | N | N | 30 | 500 | 100 | 50 | N | L | 100 | 30 | N | 20 | N | 500 | 150 | N | 30 | N | 150 | 2.12 | 10.6 | Unmapped modern stream sediment, panned in the field |
| 47 | 3 | 2 | 5 | .7 | 1000 | N | N | N | 20 | 500 | 1 | N | N | 30 | 1000 | 100 | 30 | N | L | 100 | 20 | N | 20 | N | 500 | 150 | N | 20 | N | 100 | 1.60 | 8.41 | Unmapped modern stream sediment, panned in the field |
| 50 | 5 | 2 | 2 | .7 | 1500 | N | N | N | 20 | 1000 | L | N | N | 30 | 70 | 150 | 30 | N | N | 30 | 50 | N | 30 | N | 300 | 200 | N | 50 | L | 200 | 4.00 | 22.2 | Unmapped modern stream sediment, panned in the field |
| 51 | 3 | 2 | 5 | .5 | 1000 | N | N | N | 15 | 300 | L | N | N | 30 | 300 | 70 | 20 | N | L | 70 | 30 | N | 20 | N | 700 | 150 | N | 20 | N | 100 | 1.62 | 9.0 | Unmapped modern stream sediment, panned in the field |
| 52 | 5 | 5 | 5 | 1 | 1500 | N | N | N | 20 | 500 | L | N | N | 50 | 1000 | 100 | 30 | N | L | 200 | 20 | N | 20 | N | 500 | 200 | N | 30 | N | 100 | 1.51 | 6.44 | Unmapped modern stream sediment, panned in the field |
| 53 | 3 | 2 | 5 | .5 | 1000 | N | N | N | 20 | 500 | L | N | N | 30 | 300 | 70 | 20 | N | L | 70 | 20 | N | 20 | N | 500 | 100 | N | 20 | N | 100 | 1.60 | 8.91 | Unmapped modern stream sediment, panned in the field |
| 54 | 5 | 2 | 5 | .7 | 1000 | N | N | N | 20 | 300 | L | N | N | 30 | 500 | 100 | 20 | N | L | 100 | 20 | N | 20 | N | 300 | 200 | N | 20 | N | 100 | 1.36 | 6.29 | Unmapped modern stream sediment, panned in the field |
| 55 | 5 | 3 | 5 | 1 | 1500 | N | N | N | 20 | 500 | L | N | N | 30 | 500 | 100 | 20 | N | L | 100 | 20 | N | 20 | N | 500 | 200 | N | 20 | N | 100 | 1.39 | 6.04 | Unmapped modern stream sediment, panned in the field |
| 56 | 7 | 2 | 7 | 1 | 1500 | N | N | N | 20 | 700 | L | N | N | 50 | 1000 | 100 | 20 | N | L | 200 | 15 | N | 30 | N | 700 | 200 | N | 20 | L | 100 | 1.35 | 6.74 | Unmapped modern stream sediment, panned in the field |
| 57A | 5 | 2 | 5 | .7 | 1500 | N | N | N | 30 | 500 | 1 | N | N | 50 | 500 | 150 | 50 | N | L | 100 | 30 | N | 50 | N | 500 | 200 | N | 30 | 200 | 100 | 1.70 | 7.79 | Unmapped modern stream sediment, panned in the field |
| 58 | 3 | 2 | 5 | .7 | 1000 | N | N | N | 20 | 700 | 1 | N | N | 30 | 500 | 100 | 50 | N | N | 100 | 30 | N | 20 | N | 700 | 150 | N | 20 | N | 100 | 1.83 | 8.00 | Unmapped modern stream sediment, panned in the field |
| 59 | 5 | 5 | 5 | >1 | 1500 | N | N | N | 20 | 500 | L | N | N | 50 | 2000 | 100 | 30 | N | L | 300 | 20 | N | 50 | N | 500 | 200 | N | 50 | L | 150 | 2.09 | 8.95 | Unmapped modern stream sediment, panned in the field |
| 62 | 5 | 1.5 | 1.5 | .7 | 1000 | N | N | N | 20 | 700 | 1 | N | N | 30 | 200 | 150 | 20 | N | N | 50 | 50 | N | 50 | N | 200 | 200 | N | 20 | L | 150 | 2.09 | 8.95 | Unmapped modern stream sediment, panned in the field |
| 65 | 5 | 2 | 5 | >1 | 1500 | N | N | N | 20 | 500 | L | N | N | 50 | 500 | 100 | 30 | N | L | 100 | 30 | N | 20 | N | 300 | 300 | N | 30 | N | 150 | 1.84 | 7.71 | Unmapped modern stream sediment |
| 70 | 2 | 2 | 7 | .5 | 1000 | N | N | N | 30 | 500 | L | N | N | 20 | 500 | 70 | L | N | N | 70 | 50 | N | 15 | N | 500 | 150 | N | 20 | N | 100 | 1.72 | 7.27 | Unmapped modern stream sediment |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 102A | 5 | 5 | 5 | .5 | 2000 | N | N | N | 70 | 300 | N | N | N | 50 | 100 | 20 | L | N | N | 20 | 70 | N | 30 | N | 300 | 200 | N | 20 | N | 20 | 0.33 | [illegible] | [illegible] |
| 102B | 5 | 3 | 5 | .5 | 2000 | N | N | N | 70 | 200 | N | N | N | 50 | 300 | 7 | N | N | N | 30 | 100 | N | 30 | N | 200 | 200 | N | 15 | N | 10 | 0.30 | [illegible] | [illegible] |
| Volcanic Rocks of Gap Creek (Pv) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 34A | 3 | .05 | .5 | .007 | 100 | N | N | N | 10 | 100 | L | N | N | 5 | 30 | 15 | N | N | N | 5 | L | N | N | N | 150 | 20 | N | L | N | N | 1.12 | [illegible] | [illegible] |
| 34B | 2 | .5 | 1 | .15 | 500 | N | N | N | 50 | 150 | L | N | N | 10 | 100 | 50 | L | N | N | 5 | 10 | N | 15 | N | 100 | 50 | N | 20 | N | 100 | 1.96 | [illegible] | [illegible] |
| 34C | 1.5 | .2 | .2 | .2 | 100 | N | N | N | 150 | 200 | 1 | N | N | L | 30 | 30 | L | N | N | 5 | 15 | N | 15 | N | N | 50 | N | 50 | N | 100 | 1.55 | [illegible] | [illegible] |
| 34D | 2 | 1 | .7 | .2 | 500 | N | N | N | 50 | 300 | 1.5 | N | N | 7 | 20 | 5 | 20 | N | N | 7 | 20 | N | 15 | N | 100 | 50 | N | 50 | N | 100 | 2.01 | [illegible] | [illegible] |
| 35 | 1.5 | .1 | .7 | .2 | 500 | N | N | N | 10 | 100 | 1 | N | N | N | 50 | 15 | N | N | N | 5 | 30 | N | 15 | N | N | L | N | 30 | N | 100 | 1.79 | [illegible] | [illegible] |
| 36 | 5 | 1.5 | 2 | .5 | 1500 | N | N | N | 50 | 500 | L | N | N | 30 | 100 | 20 | L | N | N | 10 | 20 | N | 20 | N | 200 | 200 | N | 20 | 200 | 30 | 1.05 | [illegible] | [illegible] |
| 37 | 2 | .7 | 2 | .2 | 1000 | .5 | N | N | 30 | 500 | L | N | N | 10 | 30 | 20 | N | N | N | 7 | 20 | N | 20 | N | 200 | 70 | N | 50 | N | 100 | 2.57 | [illegible] | [illegible] |
| 60A | 3 | .7 | 1 | .5 | 1000 | N | N | N | 100 | 1000 | 1 | N | N | 10 | 20 | 50 | L | N | N | 7 | 50 | N | 15 | N | 200 | 50 | N | 50 | L | 100 | 2.32 | 3.7 | Welded tuff |
| 60B | 2 | .1 | .7 | .1 | 500 | N | N | N | 20 | 700 | L | N | N | L | N | N | L | N | N | L | 10 | N | 10 | N | 100 | L | N | 30 | N | 100 | 2.39. | 4.0 | Fine-grained tuff |
| 60C | 5 | 3 | 5 | .5 | 1500 | N | N | N | 100 | 500 | L | N | N | 30 | 100 | 150 | L | N | N | 20 | 70 | N | 20 | N | 500 | 200 | N | 30 | N | 30 | 0.86 | 4.0 | Greenschist |
| 61A | 2 | .7 | .7 | .2 | 700 | N | N | N | 20 | 200 | 1 | N | N | 7 | 20 | 15 | L | N | N | 5 | 20 | N | 15 | N | 200 | 50 | N | 50 | L | 100 | 1.70 | 3.6 | Dacitic breccia |
| 61B | 1.5 | .2. | .2 | .1 | 500 | N | N | N | 10 | 300 | 1 | N | N | 5 | 50 | 15 | N | N | N | 7 | 100 | N | 15 | N | 1000 | 20 | N | 50 | N | 100 | 2.02 | 3.6 | Dacite lava |
| 68 | 3 | 1 | 2 | .5 | 1000 | N | N | N | 100 | 300 | L | N | N | 20 | 10 | 200 | L | N | N | 10 | 30 | N | 20 | N | 200 | 200 | N | 30 | N | 50 | 1.39 | 3.9 | Andesite or feldspathic basalt |

N = Not detected; L = Detected but below limit of determination
Semi-quantitative spectographic analyses by D. E. Detra
Neutron activation analyses (U, Th) by H. T. Millard, Jr., F. Luman, and B. Keaton




INDEX MAP SHOWING LOCATION OF ARNOLD MESA ROADLESS AREA, ARIZ.

Table 2.--Anomalous geochemical values (ppm) in the Arnold Mesa area

[Leaders (---) indicate concentrations below anomalous values]

| Element | Mn | Ag | As | B | Cu | Mo | Pb | Sb | Zn | |
|---|---|---|---|---|---|---|---|---|---|---|
| Limit of detection | 10 | 0.5 | 200 | 10 | 5 | 5 | 10 | 100 | 200 | |
| Threshold of anomalous values | 2,000 | 1 | 200 | 100 | 200 | 100 | 200 | 100 | 200 | |

| Sample No. | Mn | Ag | As | B | Cu | Mo | Pb | Sb | Zn | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| Quarry approximately 0.7 mi (1.1 km) north of Chasm Creek near east boundary of roadless area | | | | | | | | | | |
| 26A | --- | 2 | --- | --- | --- | --- | --- | --- | --- | Oxidized tonalite. |
| 26B | --- | 3 | --- | --- | --- | --- | --- | --- | --- | Sheared tonalite. |
| 26C | --- | 2 | --- | 100 | --- | --- | 300 | --- | 200 | Do. |
| 26D | --- | 1 | --- | 100 | --- | --- | --- | --- | 300 | Do. |
| Prospect in NE1/4SW1/4 sec. 3, T. 12 N., R. 4 E. | | | | | | | | | | |
| 64B | --- | --- | --- | 200 | --- | --- | --- | --- | --- | Altered tonalite adjacent to quartz vein. |
| 64C | --- | --- | --- | --- | 300 | --- | --- | --- | --- | One in.-wide epidote-quartz vein. |
| Dump at Mine Spring (Squaw Peak mine) | | | | | | | | | | |
| 97A | --- | 3 | --- | --- | 3,000 | 100 | --- | --- | --- | Altered, mineralized tonalite. |
| 97B | --- | 5 | --- | --- | 5,000 | 150 | --- | --- | --- | Mineralized tonalite. |
| Granitic dike intruding metamorphic rocks of Squaw Peak Canyon | | | | | | | | | | |
| [illegible] | --- | 5 | --- | --- | --- | --- | --- | --- | --- | |
| Prospect: mineralized quartz vein intruding metamorphic rocks of Squaw Peak Canyon | | | | | | | | | | |
| 101 | --- | 10 | --- | --- | >20,000 | >2,000 | 1,000 | --- | 500 | |
| Chicken Wire gold mine, NW1/4SE1/4 sec. 33, T. 13 N., R. 4 E. | | | | | | | | | | |
| 103B | >5,000 | 7 | --- | 200 | 20,000 | --- | --- | 100 | 700 | Altered, mineralized tonalite. |
| 103C | --- | 7 | 300 | 100 | 7,000 | --- | 1,500 | --- | 1,000 | Brecciated and mineralized tonalite. |
| 103D | --- | 1 | --- | --- | 1,000 | --- | --- | --- | --- | Quartz vein. |
| 103E | 5,000 | 3 | 200 | 200 | 1,000 | --- | 300 | --- | 1,000 | Altered tonalite. |
| 103F | --- | 1.5 | 300 | 300 | 1,000 | --- | --- | --- | --- | Altered, mineralized tonalite. |
| Dump at abandoned shaft, NW1/4SE1/4 sec. 33, T. 13 N., R. 4 E. | | | | | | | | | | |
| 104A | --- | 2 | --- | --- | --- | --- | --- | --- | --- | Quartz vein fragment. |
| 104B | --- | 2 | 200 | 100 | 200 | --- | --- | --- | --- | Altered tonalite fragment. |
| Dump at Squaw Peak mine | | | | | | | | | | |
| 106 | --- | 5 | --- | --- | 500 | --- | --- | --- | --- | Altered mineralized tonalite. |
| Sediment samples from washes draining tonalite | | | | | | | | | | |
| 57A | --- | --- | --- | --- | --- | --- | --- | --- | 200 | Panned in field. |
| 71 | --- | 3 | --- | --- | --- | --- | 200 | --- | 500 | |
| 72 | --- | 1.5 | --- | --- | --- | --- | --- | --- | --- | |
| 76 | --- | --- | --- | --- | --- | --- | --- | --- | 200 | |

# GEOCHEMICAL MAP OF THE ARNOLD MESA ROADLESS AREA, YAVAPAI COUNTY, ARIZONA

By
Edward W. Wolfe
1983

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