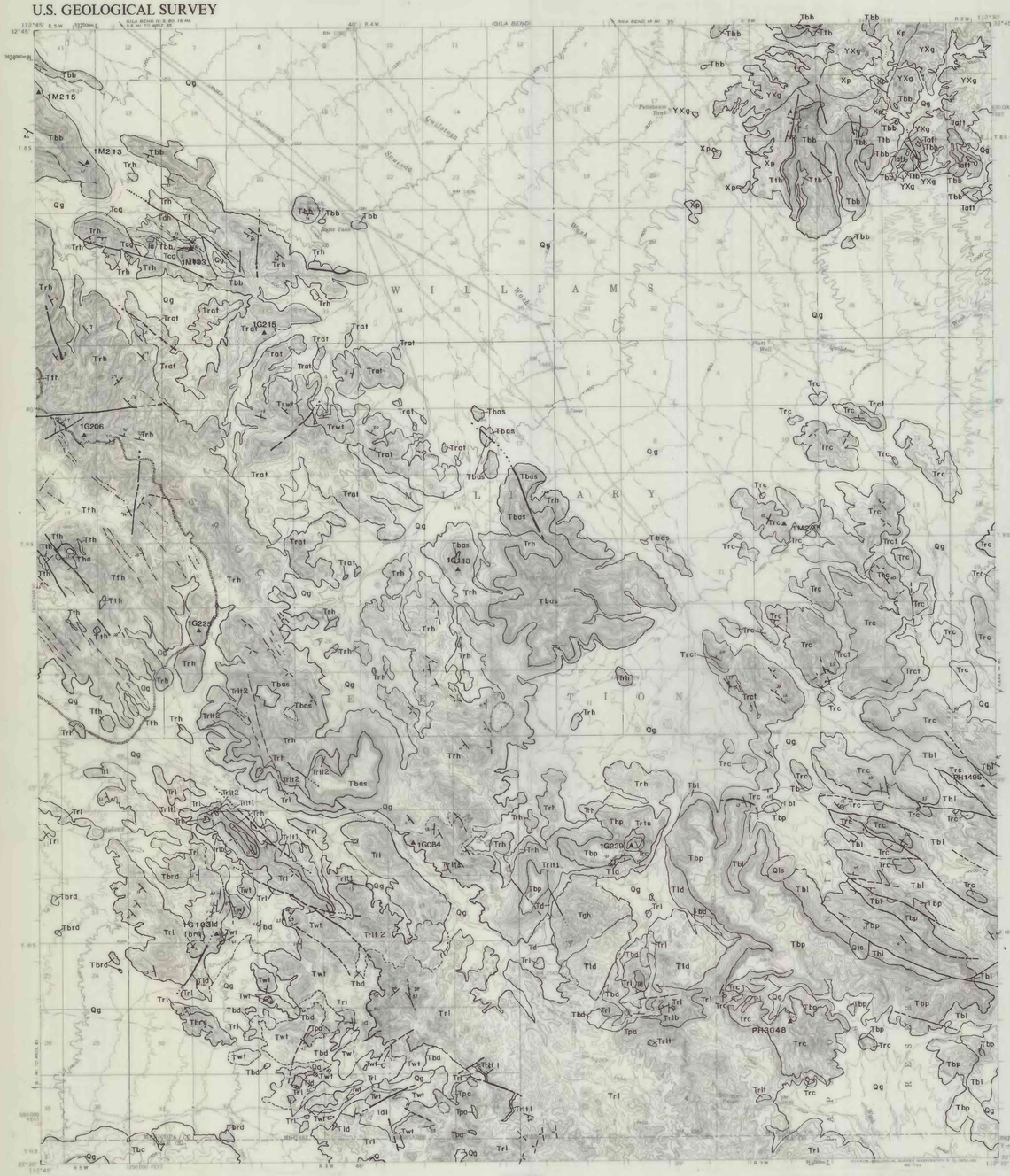
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT
85-138

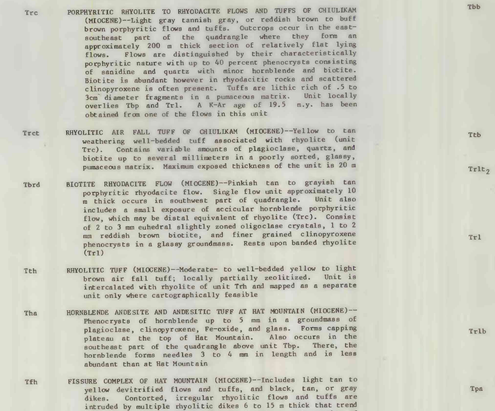


Base from U.S. Geological Survey
Hat Mtn., 1958

APPROXIMATE MEAN DECLINATION, 1985

SCALE 1:62 500

Geology mapped by F. Gray, R. J. Miller, and L. Soll, 1981-82;
D. W. Peterson, D. May and R. Leveque, 1978.



DESCRIPTION OF MAP UNITS

HAT MOUNTAIN

Qls LANDSLIDES (QUATERNARY)--Broken and disoriented rock masses and debris flows that generally occur where unconsolidated breccias and tuffaceous unit unlie basalt. Two small landslides in the SE corner of the quadrangle occur along RE facing cliffs; confined to a prominent plateau of basalt (Tbl and Tbp)

Qg GRAVEL (QUATERNARY)-- Unconsolidated to weakly connolidated gravel, sand, and minor silt. Very shallow dipping to flat lying, crudely stratified, moderately dissected unconsolidated sediments. Unit occurs in alluvial fans, in intermontane valleys, and in and along washes and arroyos; may include small scattered outcrops of older bedrock units

Tba BATAMOTE BASALTIC ANDESITE (MIOCENE)--Porphyritic, medium gray to black basaltic andesite with reddish subdivided flow margins. Phenocrysts make up about 5 to 15 percent of rock and consist of subhedral olivine 0.5 to 2.5 mm in diameter, partially or completely altered to iddingsite which appear as prominent subhedral reddish-brown minerals in hand specimen, minor euhedral to subhedral plagioclase, twinned clinopyroxene, and rare orthopyroxene. Individual flows are approximately 2 to 10 m thick and are usually separated by an oxidized basal flow breccia and vesicular glassy upper margin. Whole rock K-Ar ages of 14.4±0.7 m.y. (R. J. Miller, analyst) and 15.2± 1.2 m.y. (Eberly and Stanley, 1978) have been obtained on correlative units. Correlative with units described by Gilluly (1966) comprising Batamote volcano

Tbas BASALTIC ANDESITE OF SAUCEDA WASH (MIOCENE)--Dark gray to black vesicular flows with rubble margins. Flows form mesas in central Sauceda Mountains. Maximum thickness 23 m. Rocks consist of up to 40 percent phenocrysts of andesine to labradorite and minor clinopyroxene. From stratigraphic position flows of Tbas are interpreted as being equivalent to Batamote Andesite

Trc PORPHYRITIC RHYOLITE TO RHYODACITE FLOWS AND TUFFS OF CHULULKAM (MIOCENE)--Light gray tannish gray, or reddish brown to buff brown porphyritic flows and tuffs. Outcrops occur in the east-southeast part of the quadrangle where they form an approximately 200 m thick section of relatively flat lying flows. Flows are distinguished by their characteristically porphyritic nature with up to 40 percent phenocrysts consisting of sanidine and quartz with minor hornblende and biotite. Biotite is abundant however in rhyodacitic rocks and scattered clinopyroxene is often present. Tuffs are lithic rich of .5 to 3cm diameter fragments in a pumaceous matrix. Unit locally overlies Tbp and Trl. A K-Ar age of 19.5 m.y. has been obtained from one of the flows in this unit

Trct RHYOLITIC AIR FALL TUFF OF CHULULKAM (MIOCENE)--Yellow to tan weathering well-bedded tuff associated with rhyolite (unit Trc). Contains variable amounts of plagioclase, quartz, and biotite up to several millimeters in a poorly sorted, glassy, pumaceous matrix. Maximum exposed thickness of the unit is 20 m

Tbrd BIOTITE RHYODACITE FLOW (MIOCENE)--Pinkish tan to grayish tan porphyritic rhyodacite flow. Single flow unit approximately 10 m thick occurs in southwest part of quadrangle. Unit also includes a small exposure of acciular hornblende porphyritic flow, which may be distal equivalent of rhyolite (Trc). Consist of 2 to 3 mm euhedral slightly zoned oligoclase crystals, 1 to 2 mm reddish brown biotite, and finer grained clinopyroxene phenocrysts in a glassy groundmass. Rests upon banded rhyolite (Trl)

Tfb RHYOLITIC TUFF (MIOCENE)--Moderate- to well-bedded yellow to light brown air fall tuff; locally partially zeolitized. Unit is intercalated with rhyolite of unit Tfh and mapped as a separate unit only where cartographically feasible

Tha HORNBLENDE ANDESITE AND ANDESITIC TUFF AT HAT MOUNTAIN (MIOCENE)--Phenocrysts of hornblende up to 5 mm in a groundmass of plagioclase, clinopyroxene, Fe-oxide, and glass. Forms capping plateau at the top of Hat Mountain. Also occurs in the southeast part of the quadrangle above unit Tbp. There, the hornblende forms needles 3 to 4 mm in length and is less abundant than at Hat Mountain

Tfh FISSURE COMPLEX OF HAT MOUNTAIN (MIOCENE)--Includes light tan to yellow devitrified flows and tuffs, and black, tan, or gray dikes. Contorted, irregular rhyolitic flows and tuffs are intruded by multiple rhyolitic dikes 6 to 15 m thick that trend to the northwest. Black, glassy vitrophyre mark margins of topographically high dikes. Zone of dike intrusion is approximately 6 km wide by 13 km long within the Hat Mountain 15' quadrangle; individual dikes in some places follow original fault structures. Dike area was probably the eruptive center for surrounding rhyolitic flows and pyroclastic material. Older dikes are presumably covered by younger flow and tuff sheets. A K/Ar age of 20.1 and 20.7 m.y. was obtained from upper flows in this unit

Trh RHYOLITE FLOWS OF HAT MOUNTAIN (MIOCENE)--Light yellowish tan, pinkish tan, or brownish gray banded, contorted rhyolite flows, flow breccias, domes, dikes, and tuffs occurring in northwestern Sauceda Mountains. Forms distinct cliffs dipping away from fissure area (Tfh). Pervasive yellow color of the rocks results from zeolitic alteration. Flows are sparsely porphyritic to aphanitic, usually finely banded, and certain rare feldspar; lesser amounts of biotite and augite form the mafic constituents in a felsicic groundmass of extremely fine grained quartz and feldspar. Unit is locally intercrouged with lower rhyolite (Trl) sequence. A least one area shows Trl onlapping this unit

Trl RHYOLITIC ASH FLOW COMPLEX (MIOCENE), INCLUDES:

Trat Tuffs and minor rhyolite flow rocks--Light grayish pink, light tan, or yellow buff brown fragmental tuffs and aphanitic flows. Exposed in northeastern Sauceda Mountains near Sauceda Wash. Thick partially welded ash fall tuffs are 80 m thick. Rocks consists of subangular volcanic fragments 0.5 to 1 cm in length which are predominantly pumice and glass shards in a moderate- to well-consolidated matrix. Matrix contain scattered broken feldspar and hornblende phenocrysts in a glassy medium. Unit is interlayered and contemporaneous with rhyolitic flows (Trh) erupted from a source area to the west

Trwt Upper rhyolite welded tuff member--Light buff brown to yellow colored, devitrified welded tuff and minor rhyolite flow. Rare scattered biotite occurs throughout. This section consists of high standing, cliff forming, multiple cooling units consisting of pumice and rhyolitic rock fragments which are flattened in the more welded section of unit

Taft ASH FLOW TUFF (MIOCENE)--Pinkish to light brown, moderately to densely welded ash flows. Restricted to isolated ridge capping outcrops in NE corner of the quadrangle. Correlative tuff in the adjacent Estrella and Kaka quadrangle locally reaches 100 m in thickness. Where this unit occurs it is apparently the uppermost stratigraphic unit. Unit overlies porphyritic basalts (unit Tbb). Accidental phenocrysts include plagioclase, sparse biotite and clinopyroxene. Lithic fragments of porphyritic basalt are sparse and commonly size-graded within bedding. Flattened pumice lapilli occur throughout. Unit probably is a compound cooling unit. A K-Ar age of 20.7±.7 m.y. has been determined on biotite (R. J. Miller, unpublished data)

Tbp PORPHYRITIC BASALT IN SOUTHERN SAUCEDA MOUNTAINS (MIOCENE)--Fresh, light to medium gray to black, slightly vesicular porphyritic basalt. Forms deeply dissected mesas in the southeastern Sauceda Mountains and southern Sand Tank Mountains. Flows form cliffs to a thickness of 230 m. Rocks are hyalopilitic, coarsely porphyritic with subhedral 1 to 3 mm (diameter) phenocrysts of plagioclase (labradorite to andesine), with smaller crystals of orthopyroxene, clinopyroxene, and opaque oxides in a groundmass of intergranular feldspar, pyroxene, magnetite and oxide-rich glass. Olivine crystals that are partially altered to iddingsite occur as either discrete rounded grains 1 mm or less in diameter or as subhedral grains in glomeroporphyroclasts. Locally overlies lower rhyolite and basal dacite (Tbd) units. Overlain by porphyritic rhyolitic flows of Trc unit

Tcg CONGLOMERATE OF SAUCEDA MOUNTAINS (EARLY MIOCENE)--Reddish brown to gray conglomerate. Exposed only in fault bounded area in northwestern Sauceda Mountains. Conglomerate consists of rounded granitic and metamorphic clasts in a poorly sorted matrix. Unit locally has thin pyroclastic tuff lenses. Structurally underlies Trh unit, possibly unconformably

Ta ANDESITE OF NORTHWESTERN SAUCEDA MOUNTAINS (EARLY MIOCENE)--Dark pinkish gray porphyritic andesite. Flows are limited to fault bounded area in NW Sauceda Mountains where it occurs in a steeply dipping sequence. Slightly altered plagioclase in the dominant phenocryst phase in an aphanitic devitrified glassy groundmass

Twt WELDED TUFF (EARLY MIOCENE)--Purplish gray lithic rich ash flow tuff. Displays zoning on a large scale and occurs as several cooling units in southwestern part of Hat Mountain quadrangle. Contains angular mafic andesitic volcanic rock fragments throughout and locally fragments of banded rhyolite. Unwelded to partially welded portion of the tuff contains coarse unsorted andesitic rock fragments. More welded portions of unit contain flattened pumice and flow foliation is somewhat contorted. Matrix consists of moderately well sorted pyroclastic material in less welded varieties and grades into a dense glass-felsite in more welded portions; overlies basal dacitic andesite

Tdh DACITE (EARLY MIOCENE)--Dark pinkish gray dacite flows and flow breccia, exposed only in the northern Sauceda Mountains west of Black Butte. Contains phenocrysts of plagioclase, clinopyroxene and hornblende in an aphanitic groundmass

Tld DACITIC ANDESITE FLOWS AND OXIDIZED BRECCIA (EARLY MIOCENE AND (OR) LATE OLIGOCENE)--Purple to dark grayish tan colored porphyritic flows, reddish buff brown to tannish red colored oxidized aphanitic breccia flows. Consists of abundant plagioclase and rare hornblende phenocrysts in a glassy matrix. Flows are brecciated and altered to a clay and zeolite assemblage in the lower part of the section. Locally oxidation/alteration is abundant near contact with hypabyssal intrusive rock (Tgh); may be correlated with Tbd

Tbd BASAL DACITIC ANDESITE (EARLY MIOCENE AND (OR) LATE OLIGOCENE)--Purplish gray, to reddish buff brown colored porphyritic volcanic flows and brecciated rock. May also have isolated occurrences of acicular hornblende rich flows. Crops out as low lying often pediment forming flows in Southern Hat Mountain quadrangle and extends southward into the adjacent quadrangle to the town of Kaka

Tbl LOWER BASALT IN SAUCEDA MOUNTAINS (MIOCENE)--Light gray to black basalt. Occurs interlayered with, but is more commonly below Tbp unit. Consists of hyalopilitic to hyalopilitic textured rock. Scattered phenocrysts of labradorite with much less abundant clinopyroxene, hypersthene, and magnetite phenocrysts occur in a groundmass of scattered plagioclase laths and glass. Thickness is unknown

Tbb BASALT OF BLACK BUTTE (MIOCENE)--Dark gray to black coarsely phenocrystic basalt flows and minor dikes. Crops out in apparent source area in northwest Sauceda Mountains where flows are crosscut by NW trending dikes. Flows are 2 to 10 m thick, show vesicular, brecciated margins and have a general dip of approximately 25° to the southwest. Exposed thickness of units is 300 ft (maximum). Rock consists of 0.7 to 2.0 cm plagioclase phenocrysts, scattered iddingsite pseudomorphs after olivine, and minor clinopyroxene in a groundmass of feldspar-pyroxene microlites with abundant oxide rich glass. Unit is conformably overlain by rhyolite flows and tuff. A K-Ar age of 19.1±1.6 m.y. from a plagioclase separate has been obtained on this unit. This probably represents a minimum age for this sequence. Unit is correlative with Tbp

Ttb TUFF OF BLACK BUTTE (MIOCENE)--Light colored, biotite-bearing, pumaceous tuff. Locally poorly sorted with minor water-worked horizon

$Trlt_2$ INTERLAYERED RHYOLITE FLOWS, TUFFS, AND DEBRIS FLOWS (MIOCENE)--Light gray, pinkish gray, or yellowish tan colored rhyolite flows and flow breccias interlayered with coarse boulder bearing debris flows, welded tuff, and unconsolidated air fall material that is partially zeolitized to a yellowish tan color. This is a maximum of 130 m thick just east of Midway wash in the southwest part of the quadrangle

Trl LOWER RHYOLITE (EARLY MIOCENE)--Light grayish tan to tannish yellow, banded, silicified, and contorted flows, flow breccias, and pyroclastic deposits. Flows are aphyric to scarce biotite-bearing units. Zeolite alteration ubiquitous. Forms irregular topography in southern quarter of quadrangle. Contains a number of deeply oxidized zones interpreted as possible vent areas and remnant plugs; brecciation and silicification is often an accompanying feature of these areas. Unit is overlain locally by Tbs, and Trc. Overlies Tld and Twt units in southern Hat Mountain quadrangle

Trlb MONOLITHIC RHYOLITE BRECCIA (EARLY MIOCENE)--Angular flow breccia composed of fragments of aphanitic rhyolite. Bedding is generally lacking; occurs as a mapable unit only in the SE portion of the quadrangle near Stinson Peak. May be related to local rhyolitic dome or vent area

Tpa PORPHYRITIC BASALTIC ANDESITE FLOWS AND FLOW BRECCIAS (EARLY MIOCENE AND (OR) LATE OLIGOCENE)--Black to reddish brown conspicuously porphyritic plagioclase-rich basaltic andesite flows. Phenocrysts include plagioclase (andesine to oligoclase), clinopyroxene, olivine, and magnetite. Abundance and size of plagioclase phenocrysts is highly variable with a maximum length of 1.5 cm. Outcrops occur in the southern part of the quadrangle beneath rhyolite and welded tuff of units Trl and Twt and in the north and east portion of the quadrangle as plateau forming flows capped by patches of rhyolite (Trc)

Tf FANGLOMERATE IN SAUCEDA MOUTAINS (EARLY MIOCENE AND (OR) LATE OLIGOCENE)--Reddish brown weathering, well indurated fanglomerate; consists of angular to subrounded clasts in a poorly sorted silty matrix. Clasts are composed of granitic and metamorphic rocks; maximum clast size observed was 5 cm. Unit is exposed only in a small area near the north end of the Sauceda Moutains. An angular unconformity exists between this unit and overlying andesite unit (Ta?). Base of the unit was not exposed. Unit may be correlative with the Locomotive fanglomerate of Gilluly (1966)

Tgh HYPABYSSAL GRANITIC PLUTON (TERTIARY?)--Pinkish gray to light gray, holocrystalline, porphyritic intrusive rock; phenocrysts are white, 2 to 3.5 mm, subhedral, altered plagioclase crystals and smaller oxidized mafic minerals (probably hornblende) set in a fine grained, epidotized groundmass of hornblende, quartz, feldspar and scattered apatite. Unit exposed as rounded low lying hills in southern part of quadrangle. Contact of pluton appears slightly finer grained than main body; volcanics adjacent to contact are brecciated and oxidized rhyolite

YXg GRANITE (PRECAMBRIAN Y AND PRECAMBRIAN X UNDIVIDED)--Includes Oracle granite; light gray to light brown weathering, slightly to unfoliated coarse feldspar porphyritic, biotite, quartz monzogranite to syenogranite and granodiorite. May include subvolcanic quartz monzonite and hornblende diorite. Ubiquitously brecciated and cataclastized; conspicuous blue quartz and pink feldspar are characteristic. Also includes locally leucocratic to mesocratic, fine to medium grained epidote, biotite, and hornblende tonalite and quartz diorite. Intrudes Pinal/Schist (unit Xp)

Xp PINAL SCHIST (PRECAMBRIAN X)--Fine to medium grained biotite, and (or) chlorite muscovite, quartz-feldspathic schist, with generally a strong foliation coincident with lithologic layering and a penetrative lineation in the plane of foliation. Locally the rocks have been deformed by strike-slip or fracture cleavage surfaces which formed at high angles to lithologic layering. Quartz veins and pegmatite are ubiquitous. Locally forms pendants in leucocratic granites (unit YXg)

RECONNAISSANCE GEOLOGIC MAP OF THE HAT MOUNTAIN QUADRANGLE

RECONNAISSANCE GEOLGIC MAP OF THE HAT MOUNTAIN QUADRANGLE

MARICOPA COUNTY, SOUTHWEST ARIZONA

By

Floyd Gray, Robert J. Miller, and Lottie Soll

The Hat Mountain 15' quadrangle is located approximately 20 mi north-northeast of the town of Ajo, Arizona. The quadrangle lies within the geographic province of the Basin and Range of southwestern Arizona and is underlain by most of the Sauceda Mountains. The major portion of the quadrangle lies within the federal jurisdiction of Luke Air Force Range.

The exposed Tertiary section occupying most of the quadrangle consists of rhyolite flows and flow breccia with lesser amounts of pyroclastic deposits, basalt, and sparse intermediate rock types. The volcanic rocks of the Hat Mountain quadrangle form the north central part of the Ajo volcanic field, an approximately 4,500 mi^2 (7,242 km^2) tripartite extrusive center within the Ajo-Lukeville 2^0 sheets that is dominated by Miocene age units. K-Ar isotopic ages (Eberly and Stanley, 1978; Shafiqullah and others, 1980; Gray and Miller, 1984; Miller, unpub. data), indicate that volcanism in this region began as early as late Oligocene (.24 m.y.) and ceased by Middle Miocene time (14 m.y.). The range of isotopic ages obtained in the Hat Mountain quadrangle, however, are confined to approximately 2 m.y. (table 1); these ages reflect the age of the main pulse of volcanism in this part of the Ajo volcanic field.

Previous literature about the area is limited to the generalized Arizona State Geologic map and guidebook (Wilson, 1962; 1969). These maps show the Sauceda Mountains as having regional synclinal structures and being Cretaceous in age. Our investigation, however, has shown that these apparent structures are due to draping of flow from different volcanic sources and superimposed Basin and Range tilting.

Locally the Tertiary volcanic section rests unconformably on Proterozoic granitic and metamorphic rocks that are exposed in the NE corner of the quadrangle. Scattered remnants of the earliest flow units within the Hat Mountain quadrangle may be consanguineous with Late Oligocene-Early Miocene units observed in scattered areas throughout the western portion of the Ajo volcanic field. Fanglomerate, conglomerate, and intercalated andesitic rocks occuring at the base of the Tertiary section may be correlative with the Ajo Volcanics-Locomotive Fanglomerate sequence exposed in the vicinity of Ajo, AZ (Gilluly, 1966). These areas generally crop out as fault controlled upturned blocks rotated along northwest trending fault structures.

The Sauceda Mountains are predominantly composed of rhyolite flows and minor associated pyroclastic rocks. Prior to eruption of the main rhyolite mass in the northwest part of the quadrangle, basaltic eruptions produced flows which locally accumulated to a thickness of 1,200 ft (400 m). K/Ar ages of 21.7 and 21.5 m.y. were obtained from biotite and hornblende, respectively, from correlative tuffs beneath the lowermost basalt sequence. A thick sequence of younger basalt flows (in the southern part of the quadrangle) accumulated following the silicic volcanism in the main part of the Sauceda Mountains. The last major silicic flow sequence yields a K/Ar age of 19.5 m.y.(see table 1, no. 1G239). The total duration of eruptive activity spans approximately 10 m.y. in the entire volcanic province. Table 2 shows typical range of chemical analyses from the Hat Mountain quadrangle.

An aeromagnetic map and magnetic rock properties for the Hat Mountain quadrangle are presented in plate 2 and table 3, respectively (Klein, 1981).

REFERENCES

Eberly, L. D., and Stanley, T. B., 1978, Cenozoic stratigraphy and geologic history of southwestern Arizona: Geological Society of America Bulletin, v. 89, p. 921-940.

Gray, Floyd, and Miller, R. J., 1984, New K-Ar age of volcanic rocks near Ajo, Pima, and Maricopa Counties, southwestern Arizona: Isochron/West, no. 41.

Gilluly, J., 1966, The Ajo mining district, Arizona: U.S. Geological Survey Professional Paper 209, 112 p.

Klein, D. P., 1983, Residual Aeromagnetic map of the Hat Mountain quadrangle, Arizona: U.S. Geological Survey Open-File Report 83-292.

Shafiqullah, M., Damon, P. E., Lynch, D. J., Reynolds, S. J., Rehrig, W. A., and Raymond, R. H., 1980, K-Ar geochronology and geologic history of southwestern Arizona and adjacent areas in Jenney, J. P., and Stone, Claudia, ed., Studies in western Arizona: Arizona Geological Society Digest Volume XII, Tucson, Arizona.

Wilson, E. D., Moore, R. T., and Cooper, J. R., 1969, Geologic map of Arizona: U.S. Geological Survey Map, 1:500,000.

Wilson, E. D., 1962, A resume of the geology of Arizona: Arizona Bureau of Mines, Bulletin 171, 140 p.

CONTACT--Dashed where approximately located

FAULT--Dashed where approximately located; dotted where inferred

STRIKE AND DIP OF BEDS

Inclined

Approximate strike and dip direction inferred from aerial photograph

Inclined overturned bed

STRIKE AND DIP OF FOLIATION

Inclined

1G225▲ SAMPLE LOCALITY

APPROXIMATE BOUNDARY OF RHYOLITIC ERUPTIVE CENTERS

Table 1.--Potassium-argon age dates

Sample no.	Latitude	Longitude	Material	Rock type	K_2O	$^{40}Ar_{rad}$ $x10^{-10}$ mole/gm	Percent ^{40}Ar atm	Apparent age (m.y.)
1M 225	32°38'23"	112°33'17"	Biotite	Rhyolite	8.74	2.313	39	19.7±0.6
1M 183	32°42'08"	112°42'32"	Biotite	Rhyodacite	8.14	2.555	46	21.7±0.7
1G 206	32°39'35"	112°44'19"	Biotite	Rhyolite	8.51	2.556	58	20.7±0.6
1G 239	32°34'09"	112°35'45"	Biotite	Rhyolite	8.78	2.474	29	19.5±0.6
1M 215b	32°44'03"	112°45'00"	Plagioclase	Basaltic andesite	0.405	0.112	59	19.1±0.8

Constants used: $\lambda_E + \lambda_E' = 0.581 \times 10^{-10} yr^{-1}$; $\lambda_E = 4.962 \times 10^{-10} yr^{-1}$; $^{40}K/KTotal = 1.167 \times 10^{-4}$

Table 2.--Chemical analyses of rocks within the Hat Mountain quadrangle

Sample no.	PH 3048	PH 1495	IM 213	IG 113	IG 84	IM 225	IG 215	IG 103
SiO_2	67.7	58.7	49.6	59.1	73.8	73.1	71.7	62.4
Al_2O_3	14.3	15.7	19.4	16.4	12.7	13.0	12.2	15.5
$FeTO_3$	2.57	7.30	9.39	6.15	1.14	1.07	1.14	5.21
MgO	0.83	1.83	3.26	2.38	0.31	0.30	0.24	1.56
CaO	2.18	4.91	10.3	5.25	0.88	0.87	2.92	3.67
Na_2O	3.40	3.66	3.34	3.66	3.37	3.31	3.12	3.97
K_2O	4.34	3.72	1.26	3.43	5.05	5.53	5.03	3.42
TiO_2	0.44	1.57	1.53	1.0	0.21	0.17	0.19	1.06
P_2O_5	0.16	0.58	0.40	0.55	0.06	0.11	<0.05	0.35
MnO	0.06	0.13	0.14	0.11	0.04	0.04	0.62	0.09
LOI	2.61	1.67	1.13	0.57	0.94	0.89	1.88	1.21
Total	98.59	99.77	99.75	98.60	98.50	98.39	99.09	98.44
Normative minerals								
Q	26.227	12.703	2.926	12.535	33.191	31.185	30.389	17.627
C	0.435	-	-	-	0.237	0.256	-	-
OR	26.013	22.033	7.313	20.557	30.296	33.213	30.179	20.530
AB	29.181	31.041	27.446	31.410	28.950	28.467	26.805	34.125
AN	9.909	15.459	33.798	18.448	4.034	3.656	4.497	14.600
WO	-	0.079	4.516	0.513	-	-	3.878	-
EN	2.097	4.568	8.227	6.012	0.784	0.759	0.607	3.947
HM	2.607	7.317	9.271	6.237	1.157	2.088	1.157	5.293
IL	0.130	0.279	0.240	0.239	0.087	0.087	0.043	0.196
TN	-	3.501	3.312	2.180	-	-	0.417	1.108
HU	0.378	-	-	-	0.167	0.127	-	0.522
AP	0.384	1.377	0.969	1.321	0.144	0.265	0.120	0.842
Total	97.362	98.358	98.077	99.452	99.049	99.102	98.094	98.790

SCALE 1:62 500

1 0 1 2 3 MILES

1 0 1 2 3 KILOMETERS

ARIZONA

AREA OF MAP

This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

RECONNAISSANCE GEOLOGIC MAP AND AEROMAGNETIC MAP OF THE HAT MOUNTAIN QUADRANGLE, MARICOPA COUNTY, ARIZONA

by

Floyd Gray, Robert J. Miller, and Lottie Soll

1985