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Composite Stratigraphic Section
of Tertiary Volcanic Rocks
in the Eldorado Mountains, Nevada

by

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COMPOSITE STRATIGRAPHIC SECTION OF TERTIARY VOLCANIC ROCKS
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In the course of geologic mapping during 1970 in the Eldorado Mountains, Clark Co., Nevada, a west-east stratigraphic section was measured across a well-exposed east-tilted succession of Tertiary volcanic rocks totaling about 4,000 m. All volumetrically significant unaltered to mildly altered strata were sampled and chemically analyzed. Covered or unexposed intervals in the stratigraphic succession were sampled at nearby localities where the stratigraphic position relative to the measured section was known or could be reasonably inferred, and the samples were analyzed chemically. Those chemical analyses, together with a few representing rocks collected at random localities and a few obtained from published reports, are tabulated and discussed in a separate report (Anderson, in press). The purpose of the present report is to provide a reference section from the Eldorado Mountains in which the chemically analyzed rocks are described and their stratigraphic position and isotopic age (where known) are indicated (table 1).

The plotting symbols included in table 1 are those used in the various illustrations in the report on the rock chemistry (Anderson, in press). They are included here only for the purpose of providing easy cross reference for those who wish to use the two reports jointly.

References cited

- Anderson, R. E., in press, Chemistry of Tertiary volcanic rocks in the Eldorado Mountains, Clark County, Nevada, and comparisons with rocks from some nearby areas: U.S. Geol. Survey Jour. Research
- Anderson, R. E., Longwell, C. R., Armstrong, R. L., and Marvin, R. F., 1972, Significance of K-Ar ages of Tertiary rocks from the Lake Mead region, Nevada-Arizona: Geol. Soc. America Bull., v. 83, p. 273-288.
- Longwell, C. R., 1963, Reconnaissance geology between Lake Mead and Davis Dam, Arizona-Nevada: U.S. Geol. Survey Prof. Paper 374-E, p. E1-E51.

Table 1.--Description of composite stratigraphic section of Tertiary volcanic rocks in the Eldorado Mountains, Nevada, showing the known and inferred stratigraphic position of chemically analyzed samples, their location, and, where known, their age (from Anderson and others, 1972).

[Petrographic data were supplied by F. M. Byers, Jr.; numbers in parentheses, following the word "porphyritic" are estimates of percentage of phenocrysts in the rock; numbers in parentheses, following mineral names are estimates of percentage of phenocryst assemblage; in general, the mineral percentages do not sum to 100 because plagioclase is omitted. Thickness is not given for sampled units that do not represent parts of the measured section or, because of large offsets, cannot be considered as part of the cumulative section.]

Thickness in meters	Sample No. (plotting symbol)	Description and location of sample or description of stratigraphic interval between samples (age data given where available)
FORTIFICATION BASALT MEMBER OF MUDDY CREEK FORMATION		
60---	BC405--- (Z)	Finally porphyritic (40) olivine (30) augite (5, zoned and twinned) basalt with a finally crystalline matrix rich in opaque oxides, olivine, and pyroxene; from sequence of thin flows totaling about 60 m thick; whole-rock K-Ar age 4.9±0.4 m.y.; lat 35°56'39" N., long 114°39'25" W.
NO MAPPED CONTINUITY, STRATIGRAPHY NOT KNOWN.		
15---	2-93-3--	Porphyritic (15) augite (75) iron oxide (15, pseudomorphous after hornblende?) olivine (10) basalt with a matrix consisting of a mat of seriate plagioclase, olivine, iron oxide, pyroxene, minor calcite; from crystalline interior of lower of two exposed flows; whole-rock K-Ar age, 11.1±0.5 m.y.; 36°9'55" N., 114°46' W.
NO MAPPED CONTINUITY, STRATIGRAPHY NOT KNOWN.		
MOUNT DAVIS VOLCANICS		
137---	BC356--- (W)	Porphyritic (5) low-silica olivine (100) andesite with pilotaxitic plagioclase laths in intersertal dust-charged matrix; from top flow in 137-m sequence of mafic flows; lat 35°40'30" N., long 114°47' W.
	BC355--- (V)	Porphyritic (10) altered olivine (95, to iddingsite and chlorite-serpentine minerals) basalt with pilotaxitic groundmass containing about 10 percent carbonate-filled vesicles; from lower part of 137-m sequence of mafic flows; lat 35°49'30" N., long 114°47' W.
OFFSET OF SECTION ABOUT 5.5 km; assignment of stratigraphic position across offset highly uncertain owing to numerous faults and known onlap relationships.		
60---	BC411--- (U)	Several flows of mafic lavas, thickness estimated. Porphyritic (15) low-silica, olivine (30) basaltic andesite with seriate plagioclase in pilotaxitic groundmass that contains clinopyroxene, olivine, opaque oxides, and intersertal alkali feldspar; from several meters above base of 60-m sequence; whole-rock K-Ar age 13.2±0.4; lat 35°46'47" N., long 114°48'38" W.
	TP57--- (B)	Porphyritic (10) low-silica, olivine (20, relicts with iddingsite) iron oxide (5) basaltic andesite with seriate plagioclase crystals grading to pilotaxitic microlites in groundmass; from 1 m above base of 60-m sequence; lat 35°46'20" N., long 114°48'20" W.
75---	L207--- (S)	At least two flows of light-gray, mostly vitric, quartz-free rhyolite with tuffaceous gravel and conglomerate at base, thickness variable and estimated.
55---	TP52--- (R)	Dense, structureless, cliff-forming biotite dacite and andesite. Coarsely porphyritic (30) biotite (15) augite (10) opaque (3) orthopyroxene? (1) andesite from 1.5 m above base of 55-m sequence of flows; lat 35°46'10" N., long 114°48'25" W.
140---	-----	Dense, structureless, phenocryst-rich dark-gray dacite or rhyodacite, thickness estimated, probably more than one flow.
45---	TP47--- (Q)	Dense, structureless, biotite-bearing dacite or andesite with upper, slightly vesiculated zone and soft zeolitized top. Coarsely porphyritic (40) two-pyroxene biotite-andesite with andesine (70) biotite (10) augite (10) altered orthopyroxene (5) and iron oxide (5); lat 35°46'5" N., long 114°48'25" W.
5---	-----	Vitrophyric dacite or andesite.
10---	TP46--- (O)	Dark-gray andesite. Porphyritic (30) alkali andesite with phenocrysts of andesine (70), clinopyroxene (10), altered olivine (15), altered orthopyroxene (2), and opaque minerals (3) in a groundmass containing microlitic plagioclase, opaque granules, mafic crystallites, and minor intersertal alkali feldspar; lat 35°45'55" N., long 114°48'25" W.
115---	-----	Numerous thin flows of dark-gray andesite separated by thin, reddish-brown and yellowish-brown, soft vesiculated or flow-brecciated zones, thickness estimated; some flows contain sparse biotite or olivine.
SECTION OFFSET ABOUT 3 km across major fault, relative stratigraphic position of samples TP44 and TP41 is approximate, but TP46 overlies TP66 in a faulted but orderly succession.		
TP44---	(P)	Porphyritic (15) two-pyroxene biotite dacite with phenocrysts of andesine (70), biotite (20), augite (5), iron oxide (2), altered orthopyroxene (1), and hornblende (1) in a devitrified quartzofeldspathic groundmass; lat 35°46'30" N., long 114°50'10" W.
TP41---	(N)	Porphyritic (20) basaltic andesite with phenocrysts of andesine (50), clinopyroxene (30), and altered mafic minerals (20), including olivine and hornblende in subophitic groundmass containing alkali feldspar; lat 35°46'30" N., long 114°50'15" W.
SECTION OFFSET ACROSS MAJOR FAULT.		
110---	TP66--- (M)	Several flows of dark-gray andesite; part of same sequence as represented by sample TP46; thickness estimated, but locally the combined thickness of this and the interval represented by TP46 exceeds 300 m. Porphyritic (30) basaltic andesite with phenocrysts of labradorite (60), augite (20), olivine (20), and sparse altered orthopyroxene in subophitic groundmass of andesine, augite, opaque oxides, and interstitial alkali feldspar; lat 35°44'15" N., long 114°49' W.
NO MAPPED CONTINUITY, STRATIGRAPHY NOT KNOWN.		

MOUNT DAVIS VOLCANICS Continued

BC-409B-
(T) Porphyritic (10) olivine (100) basalt with pilotaxitic groundmass containing dust-charged intersertal alkali feldspar, from 50 m above base of sequence of mafic lavas that form Mount Davis Volcanics east of Colorado River in Arizona; stratigraphic position with respect to section in Eldorado Mountains area not certain; whole-rock K-Ar age 14.6 ± 0.3 m.y.; lat $35^{\circ}31'42''$ N., long $114^{\circ}37'30''$ W.

TUFF OF BRIDGE SPRING

15--- } TP64--- Rhyolitic ash-flow tuff.
Porphyritic (15) densely welded tuff with phenocrysts of sanidine (40), zoned plagioclase (40), biotite (15), and augite (5) and accessory iron oxide, sphene, and zircon; from center of 15-m unit; lat $35^{\circ}44'12''$ N., long $114^{\circ}49'3''$ W.; analysis BC397 (Anderson, in press) possibly equivalent.

210--- } TP62--- Rhyolitic ash-flow tuff with thick vapor-phase top, lithoidal interior, and weakly welded base; thickness estimated and variable.
Porphyritic (25) welded devitrified interior of 210-m unit; phenocrysts of sodic sanidine (35), plagioclase (45), biotite (10), and augite (10); lat $35^{\circ}44'11''$ N., long $114^{\circ}49'9''$ W., analyses BC346 and BC392 (Anderson, in press) possibly equivalent.

PATSY MINE VOLCANICS

450--- ----- Upper part of Patsy Mine Volcanics consists of dark pyroxene-olivine andesite similar to TP21, thickness estimated.

15--- ----- Crudely stratified yellow zeolitized lithic-rich tuff with 1 m of pumice-rich baked reddish-gray tuff at top.

60 } IP35 ----- Flow-layered dacite or rhyodacite (analysis available but rock is a weakly altered equivalent of TP35 and therefore is not reported).
(L) Coarsely porphyritic (15) dacite with phenocrysts of andesina (60) sanidine (5), altered olivine? (30), hornblende (1), sphene (1), and a trace of resorbed quartz in a pilotaxitic groundmass; from base of lavas; lat $35^{\circ}44'35''$ N., long $114^{\circ}50'40''$ W.

70--- ----- Pyroxene andesite lavas.

SECTION OFFSET.

L350--- L345 and L350 are specimens of glassy rhyolitic lavas collected by Longwell (1963) from strata that he mapped as Mount Davis Volcanics but which are now known to belong to the middle part of the Patsy Mine Volcanics, on the basis of unpublished mapping by the writer.

(*)
L345
(X)

L311 Phenocryst-free glassy rhyolite lava; specimen collected by Longwell (1963) from an interval equivalent to the crystal-poor rhyolite noted below, 1.6 km northwest of Tichatticup mine, Eldorado Mountains.
(K)

5--- ----- Crystal-poor rhyolite (analysis available but rock is highly silicified).

SECTION OFFSET ABOUT 3 km; correlation of crystal-poor rhyolite uncertain but if invalid it could only produce an error of about 100 m in stratigraphic position.

66--- ----- Very crystal poor vitrophyric rhyolite.

11--- ----- Crudely stratified yellowish-zeolitized lithic-rich tuff.

150--- } TP26--- Pyroxene-olivine basalt and (or) basaltic andesite lava.
(J) Corestone from weathered porphyritic (20) olivine (40) augite (50) basalt with subophitic groundmass containing interstitial dust-charged alkali feldspar between plagioclase, clinopyroxene, and iron oxide; lat $35^{\circ}45'45''$ N., long $114^{\circ}52'10''$ W.

15--- ----- Pyroxene-olivine basalt and (or) basaltic andesite lava.

53--- } TP25--- Flow-layered and brecciated rhyolite, partly vitric, grading to yellow zeolitized rhyolite in upper 8 m.
(I) Porphyritic (25) quartz-free biotite (15) augite (2) rhyolite lava with hyalopilitic groundmass containing about 10 percent lined or filled vesicles; lat $35^{\circ}45'50''$ N., long $114^{\circ}52'10''$ W.

6--- ----- Pink flow-layered rhyolite.

9--- ----- Black rhyolite vitrophyre.

116--- } TP23--- Massive devitrified rhyolite grades upward through flow-layered zone to zeolitized top.
(II) Coarsely porphyritic (20), quartz-free, moderately altered rhyolite with phenocrysts of plagioclase (50), sanidine (35), biotite (10), clinopyroxene (4), and sphene (1), in a partly devitrified quartzofeldspathic groundmass containing secondary quartz and calcite; K-Ar age, biotite 15.8 ± 0.6 m.y., sanidine 16.1 ± 0.6 m.y.; lat $35^{\circ}37'$ N., long $114^{\circ}52'13''$ W.

46--- ----- Massive devitrified rhyolite.

9--- ----- Black rhyolite vitrophyre.

11--- ----- Tuffaceous conglomerata.

5--- } TP21--- Augite-olivine andesite lava.
(H) Porphyritic (25) augite (40) olivine (10) andesite with groundmass of andesina-oligoclase microlites and minor clinopyroxene and iron oxide in brown dust-charged alkali feldspar; lat $35^{\circ}45'40''$ N., long $114^{\circ}51'45''$ W.

SECTION OFFSET ABOUT 1.8 km, with loss of at least 185 m of andesite lava section.

6--- } TP19--- Biotite-bearing pyroxene andesite.
(C) Finely porphyritic (20), biotite-bearing, weakly altered pyroxene andesite with phenocrysts of augite (55), altered orthopyroxene (5), and biotite (40) in an iron oxide-charged subophitic groundmass containing 10 percent amygdules; lat $35^{\circ}44'50''$ N., long $114^{\circ}51'35''$ W.

3--- ----- Biotite-bearing two-pyroxene andesite.

230--- ----- Numerous thin flows of dark pyroxene-olivine and andesite similar to TP21.

270--- } TP15 Several andesite flows ranging in thickness from 10 to 70 m separated by flow breccia of equal thickness.
(F) Finally porphyritic (20), weakly altered alkali andesite with phenocrysts of clinopyroxene (25) and biotite (5) in a dust-charged feldspathic groundmass containing about 10 percent amygdules; lat $35^{\circ}44'35''$ N., long $114^{\circ}51'55''$ W.

PATSY MINE VOLCANICS Continued

6---	-----	Amygdaloidal andesite.
61---	-----	Andesitic flow breccia with minor lava.
21---	{ TP14----- (E)	Pyroxene-olivine andesite lava.
		Porphyritic (25), lightly altered, two-pyroxene (clinopyroxene 50, altered orthopyroxene 10), olivine (20, iddingsite) andesite; lat 35°45'35" N., long 114°51'55" W.
12---	-----	Pyroxene-olivine andesite lava.
12---	-----	Andesitic flow breccia.
3---	-----	Dike.
18---	-----	Andesitic flow breccia.
6---	-----	Tuffaceous sedimentary rocks.
70---	-----	Andesitic flow breccia.
3---	-----	Volcanogenic sandstone.
134---	-----	Coarse andesitic (?) flow breccia.
21---	-----	Dense aphanitic lava.
26---	-----	Andesitic (?) flow breccia.
25---	{ TP12----- (D)	Massive andesite lava.
		Finely porphyritic (20), unusually fresh, two-pyroxene andesite with phenocrysts of augite (30) and orthopyroxene (5) in a microlitic groundmass; lat 35°44'25" N., long 114°55" W.
1,145---	-----	Mostly andesitic flow breccia with minor lava and dikes.
42---	{ TP8----- (B)	Andesite lava.
		Finely porphyritic (25), weakly altered, slightly alkalic basaltic andesite lava with phenocrysts of altered plagioclase (40), augite (30), hornblende (15), altered olivine (5), apatite (5), and iron oxide (5) in an altered pilotaxitic groundmass; lat 35°44'10" N., long 114°52'52" W.
1---	-----	Andesite lava.
207---	{ TP7----- (C)	Mostly coarse dacitic flow breccia.
		Very finely porphyritic, propylitized, alkalic andesite flow breccia; alkalis probably disturbed during alteration but original rock probably contained hornblende and biotite; lat 35°44'10" N., long 114°52'45" W.
98---	{ TP4----- (A)	Several flows of dark propylitized andesite(?); a chemical analysis is available but is spurious and not reported.
		Dense propylitized alkalic andesite lava; mafic phenocrysts totally replaced by secondary minerals but probably included hornblende and olivine; alkalis probably disturbed by alteration; lat 35°43'50" N., long 114°52'29" W.
69---	-----	Dark propylitized mafic lavas; a chemical analysis is available but is spurious and not reported.
15---	{ BCL68----- (E)	Highly altered rhyolitic ash-flow tuff, a chemical analysis is available from an exposure of relatively unaltered equivalent tuff to the east in Arizona; lat 35°46'25" N., long 114°36' W.
		Prevolcanic clastic rocks.
30---	-----	Prevolcanic clastic rocks.

FAULT, PROBABLY NO SECTION OMITTED.

UNCONFORMITY.
 PRECAMBRIAN CRYSTALLINE ROCKS.