Geochemistry and Petrology of Miocene Silicic Lavas in the Socorro-Magdalena area of New Mexico

by

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Once upon a time beneath a distant
kingdom by the sea, oceanic crust
was subducted ...
(James B. Gill, Orogenic Andesites
and Plate Tectonics)

This thesis is accepted on behalf of the faculty of the Institute by the following committee:

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ABSTRACT

The 18 to 7 m.y. old silicic volcanic rocks of the Socorro-Magdalena area are spatially, petrographically, geochemically, isotopically, and petrogenetically related. These lavas were erupted at four loosely defined volcanic centers within the Rio Grande rift-related Popotosa basin. The silicic rocks appear to be part of a bimodal suite consisting of mafic and silicic lavas. No rocks are present that contain between 55 and 67% SiO_2.

The silicic rocks have a phenocryst assemblage dominated by plagioclase, amphibole, and biotite with SiO_2 values between 67 and 73% (dacites to high-K rhyolites); the amount of biotite increases with increasing SiO_2. The dominant phenocryst assemblage for the silicic rocks containing greater than 73% SiO_2 consists of plagioclase, sanidine, quartz, and biotite. Major-element analyses generally show a smooth trend on oxide variation diagrams for all four volcanic centers. Trace-element analyses sometimes show a smooth trend on oxide variation diagrams for all four centers, and sometimes show slight, but significant, differences between each center. Rare-earth-element (REE) patterns generally display an overall REE enrichment, an additional enrichment of light REE relative to heavy REE, and an increasing Eu anomaly corresponding to increasing SiO_2 concentration.

These petrographic and geochemical characteristics are used in the Wright and Doherty (1970) fractional crystallization model to explain the petrogenetic origin of the high-K rhyolites and the high-K, high-SiO_2 rhyolites. Essentially, the model is used to calculate the major-element chemistry of the parent magma by adding the major-element chemistry of the phenocryst phases thought to have fractionally crystallized from the parent magma to the major-element chemistry of the residual liquid (the daughter magma) that remains after these phenocryst phases have fractionally crystallized. The major-element chemistries of the measured and calculated parents are then compared. The slight differences in some trace-element trends between each center suggest that there may be slight variations in the phenocryst phases that fractionally crystallized at each center.

The petrogenetic origin of the dacites is uncertain; however, Sr and Pb isotopic ratios suggest that they may have been derived from a partial melting of lower-crustal facies rocks or by fractional crystallization of a more mafic lava.

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PURPOSE OF STUDY

The purpose of this study was to characterize geochemically and petrogenetically the mid- to late-Miocene, Rio Grande rift-related silicic lavas in the Socorro-Magdalena area. Geochemical, isotopic, and petrographic data were used to evaluate the petrogenesis and evolution of the rocks.

Methods of Investigation

Using previously compiled geologic maps, the 18 to 7 m.y. old silicic volcanics of this study (Fig. 1) were separated into four volcanic centers based on the geographic location and grouping of vent areas. One hundred and fifty samples were systematically collected from these areas, prepared for chemical analyses (Appendix 2), and analyzed for major-element compositions using X-ray fluoresence. Fifty representative samples were then analyzed for 23 trace elements using XRF and INAA (Appendices 2, 4, 5). The analytical methods and tables of analytical errors compose Appendix 5. Visual petrographic descriptions were made on 50 representative samples (Appendix 3). Twelve thin sections were then point counted (approximately 2,000 points per thin section were counted; Table 2). Additionally, the vent area of Magdalena Peak was mapped in detail at a scale of 1:12,000 to aid in understanding and interpreting field relationships of a magmatic center (Appendix 1). [The preferred model has been compared to previously suggested models for older silicic rocks in the Datil-Mogollon volcanic field and to other late Cenozoic volcanic rocks in the Rio Grande rift.]

INTRODUCTION

The Rio Grande rift consists of a series of Tertiary extensional basins which extend as a linear feature from the upper Arkansas Valley of Colorado to the New Mexico-Mexico border (Chapin and Seager, 1975). The rift is characterized by extensional tectonism, abundant late Cenozoic volcanism, and high heat flow. Rifting began between 32 and 27 m.y. ago when a major north-trending zone of weakness that had developed during the late Paleozoic and Laramide orogenies was reactivated. This north-south break intersects a series of northeast-trending structural flaws (lineaments) of probable Precambrian ancestry. The rift right steps northward, progressively to the east, across these lineaments which in many cases have been the locus of more concentrated volcanism (Chapin, 1979).

In New Mexico, Tertiary volcanism began about 40 m.y. ago with calc-alkaline, andesitic eruptions related to subduction of the Farallon plate beneath the western coast of North America (Elston and Bornhorst, 1979). These calc-alkaline volcanics were predominantly intermediate to silicic in composition and have initial Sr isotopic ratios of 0.7056 to 0.7090 (Stinnett and Stueber, 1976). These authors interpreted such values to reflect a substantial percentage of crustal contamination within the magmas.

About 32 m.y. ago extensional (normal) faulting began in the southern area of the Rio Grande rift (Chapin, 1979). This extension was accompanied by a transition from the earlier calc-alkaline, subduction-related volcanism to bimodal rhyolite and basaltic-andesite volcanism (Lipman and others, 1972; Elston and Bornhorst, 1979; Chapin, 1979). Initial Sr 87/Sr 86 ratios of 0.7039 to 0.7093 for basaltic andesites (Stinnett and Stueber, 1976) and of more than 0.7100 for rhyolites (Bikerman, 1976) suggest that some of the basaltic lavas have undergone considerable crustal contamination and that the rhyolites are almost certainly derived from crustal sources (Leeman, 1982). This episode of bimodal volcanism lasted from about 30 to 20 m.y. ago (Elston and Bornhorst, 1979; Leeman, 1982).

Following a volcanic lull from about 24 to 18 m.y. ago, a second period of extension occurred which resulted in the eruption of bimodal basaltic and truly rhyolitic lavas. Volcanic piles formed in the Socorro area and in the Jemez Mountains where major northeast-trending lineaments intersect the Rio Grande rift (Chapin and Seager, 1975). The basaltic lavas are variable in composition and both tholeiitic and alkalic varieties have been described (Lipman, 1969; Aoki and Kudo, 1976; Baldridge, 1979; Warren and others, 1979). Tholeiitic basalts predominate in the northern portion of the rift (Lipman, 1969; Baldridge, 1979), whereas south of Socorro alkalic basalts predominate (Renault, 1970; Kudo and others, 1971; Baldridge, 1979).

Within the central portion of the Rio Grande rift, between Santa Fe and Socorro, both alkalic and tholeiitic basalts were erupted (Aoki and Kudo, 1976; Baldridge, 1979). In comparison to the earlier (30 to 20 m.y.) bimodal volcanic association, the younger bimodal suites have less volume, and they have lower initial Sr 87/Sr 86 ratios (basalt, 0.7034 to 0.7051; rhyolite, 0.7048 to 0.7070; Chapin, 1979). Basaltic volcanism accelerated about 5 m.y. ago primarily where the rift transects northeast-trending lineaments (Chapin and Seager, 1975). At present, geophysical evidence has defined a magma body at mid-crustal depths (18 to 22 km) in the vicinity of Socorro (Sanford and others, 1977; Ward and others, 1981).

Rhyolitic volcanism, younger than 20 m.y., has occurred in only a few places in the Rio Grande rift: the Taos plateau (Lipman and Mehnert, 1979; Dungan and others, 1983), the Jemez volcanic field (Smith and others, 1970; Dungan and others, 1983), and the Socorro area (Chapin and others, 1978; Chamberlin, 1980). The late-Tertiary (<10 m.y. old) silicic volcanics of the Taos Plateau volcanic field range from dacites to high-SiO_2 rhyolites (Lipman and Mehnert, 1979; Dungan and others, 1983). Here, the dacites are locally underlain by andesites (Dungan and others, 1983).

The Jemez Lineament has been a locus for volcanism, predominantly basaltic volcanism, from about 13 m.y. ago to less than 1 m.y. ago (Luedke and Smith, 1978; Gardner, 1983). A bimodal basaltic-rhyolitic suite was erupted about 13 m.y. ago at the intersection of the Jemez Lineament and the Rio Grande rift (Gardner, 1983). Rhyolitic and dacitic volcanism has occurred repeatedly at this intersection since about 10 m.y. ago (Luedke and Smith, 1978). Age determinations for the dacitic volcanism cluster between 6.5 and 3.5 m.y. ago (Luedke and Smith, 1978). About 1.4 and 1.1 m.y. ago, the Otowi and Tshirege rhyolitic ash-flow units of the Bandelier Tuff were erupted, resulting in the formation of the Toledo and Valles calderas respectively (Smith, 1979). Each of these rhyolitic ash-flow tuffs represent the inverted sequence of the large (approximately 3,000 km^3), compositionally zoned, upper-crustal level (<15 km deep), Bandelier magma chamber. The magmas that erupted as these ash-flow tuffs are suggested to have formed by fractionation of a dacitic magma (Smith, 1979).

Associated with the Toledo and Valles calderas are numerous ring-fracture domes and a resurgent dome, all of rhyolitic or dacitic composition. Smith suggests that the composition of these domes generally reflects the state of the Bandelier magma chamber after the eruption of the Otowi and Tshirege ash-flow tuffs. However, he also suggests that one group of dacitic domes, located at the intersection of the Toledo and Valles calderas, may represent magma that rose from a deeper level and outside of the Bandelier magma chamber.

In the Socorro area, the intersection of the Morenci lineament and the Rio Grande rift was the locus of sporadic silicic volcanism from about 18 to 7 m.y. ago; eruptions were most numerous between 14 and 10 m.y. ago. When compared to the volcanism that produced the Valles and Toledo calderas, the 18 to 7 m.y. old silicic volcanics of the Socorro area appear to have been erupted from numerous, smaller-volume, dacite to high-SiO_2 rhyolite magma chambers, and they usually formed lava domes. These Socorro area rhyolites are also more clearly part of a bimodal basaltic-rhyolitic volcanic suite (Chapin and Seager, 1975).

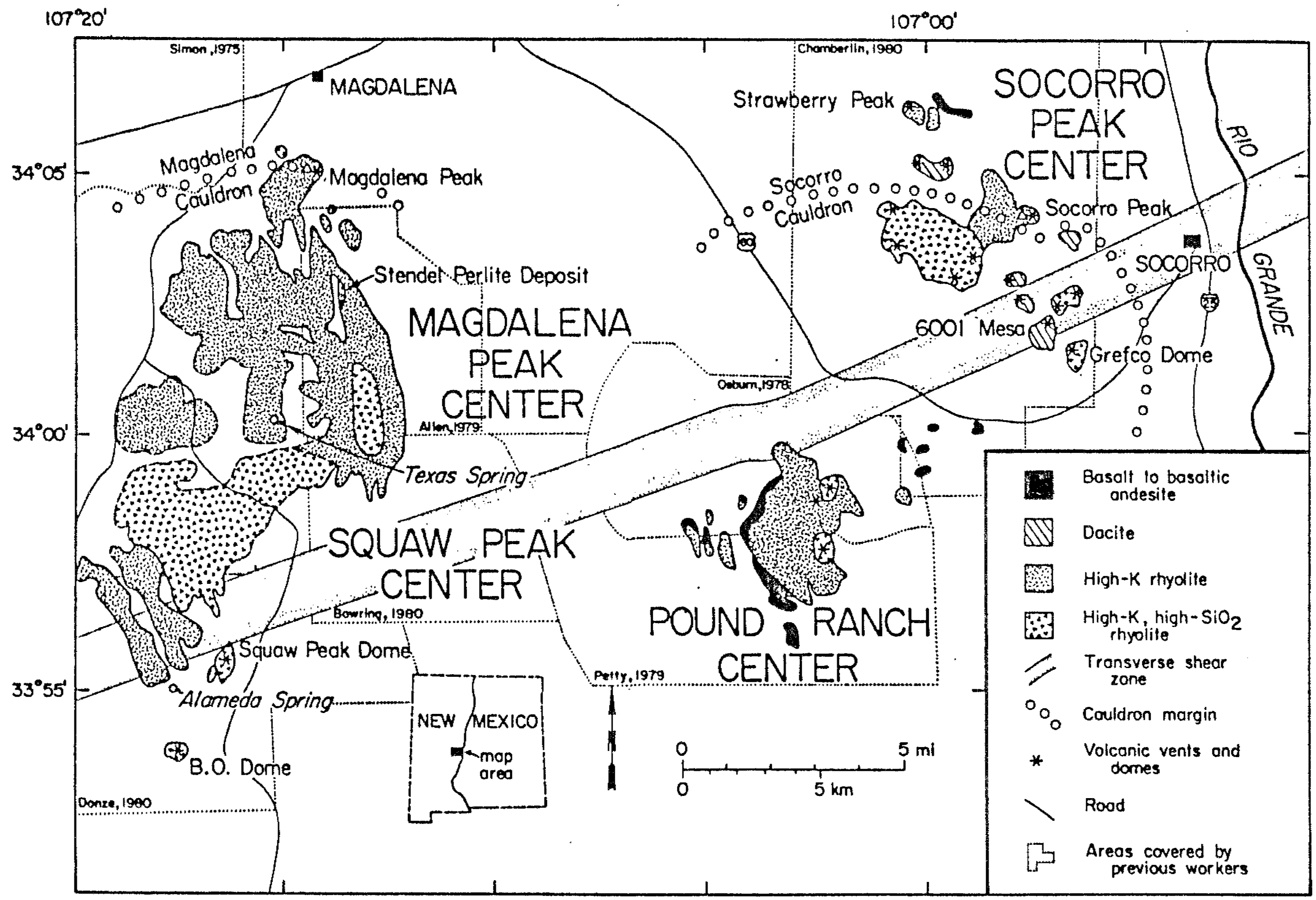


Figure 1. Distribution of middle to late Miocene volcanic rocks of the Socorro-Magdalena area.

REGIONAL GEOLOGY

Tertiary volcanism has been widespread in the Socorro area since about 39 m.y. ago. The earliest phase of volcanism consists of widespread calc-alkaline andesites (Spears Formation) with three rhyodacite and rhyolite ash-flow tuffs (the Rock House Canyon, Blue Canyon, and Datil Well) locally interbedded in the upper third of this sequence (Osburn and Chapin, 1983a). Bimodal rhyolite and basaltic-andesite volcanism replaced the calc-alkaline volcanism about 32 m.y. ago (Elston and Bornhorst, 1979). This sequence consists of interbedded rhyolite to high-SiO_2 rhyolite ash-flow tuffs and basaltic-andesite lava flows. The eruption of these rhyolitic ash-flow tuffs produced at least three calderas (the Socorro, the Magdalena, and the Sawmill Canyon) in the Socorro-Magdalena area between 32 and 26 m.y. ago. No sources (calderas) are known for the other ash-flow tuff units (Osburn and Chapin, 1983b). Ash-flow volcanism in the Socorro-Magdalena area ended about 27 m.y. ago and basaltic-andesite volcanism ended about 24 m.y. ago (Osburn and Chapin, 1983a; Osburn and Chapin, 1983b). Twenty-four to 18 m.y. old volcanic rocks are sparse in the Socorro area.

Following the 24 to 18 m.y. volcanic lull, moderately voluminous silicic lavas began to be erupted near Magdalena. About 12 m.y. ago, silicic and spatially associated, rare basaltic volcanics began to be erupted in the Socorro Peak area. Rhyolitic volcanism continued sporadically at several eruptive centers, possibly until about 7 m.y. ago. Basaltic volcanism continued until at least Pliocene time (4 m.y.; Bachman and Mehnert, 1978) as scattered small-volume basalt and basaltic-andesite flows.

Field Relationships

Previous field studies of the Socorro-Magdalena area have defined several areas where Miocene rhyolitic and basaltic lavas are interbedded with basin-filling sedimentary sequences of the Santa Fe Group (Popotosa Formation; Fig. 1; Osburn and Chapin, 1983b). For this study, the Miocene rhyolite flows were informally grouped into four centers based on the general location of clusters of vents. Figure 1 shows the location of the four volcanic centers, the approximate aerial extent of the rhyolitic and basaltic rocks within these centers, the associated vents, and the areas mapped by previous workers. Stratigraphic units within each center are given in Figure 2. Most of the units are known by informal names; however, the Socorro Peak Rhyolite and the Magdalena Peak Rhyolite are names that have been formalized (Osburn and Chapin, 1983a,b). In addition, a sample of the basalt of Council Rock, collected by C.E. Chapin from an outcrop west of Magdalena, was examined during this study.

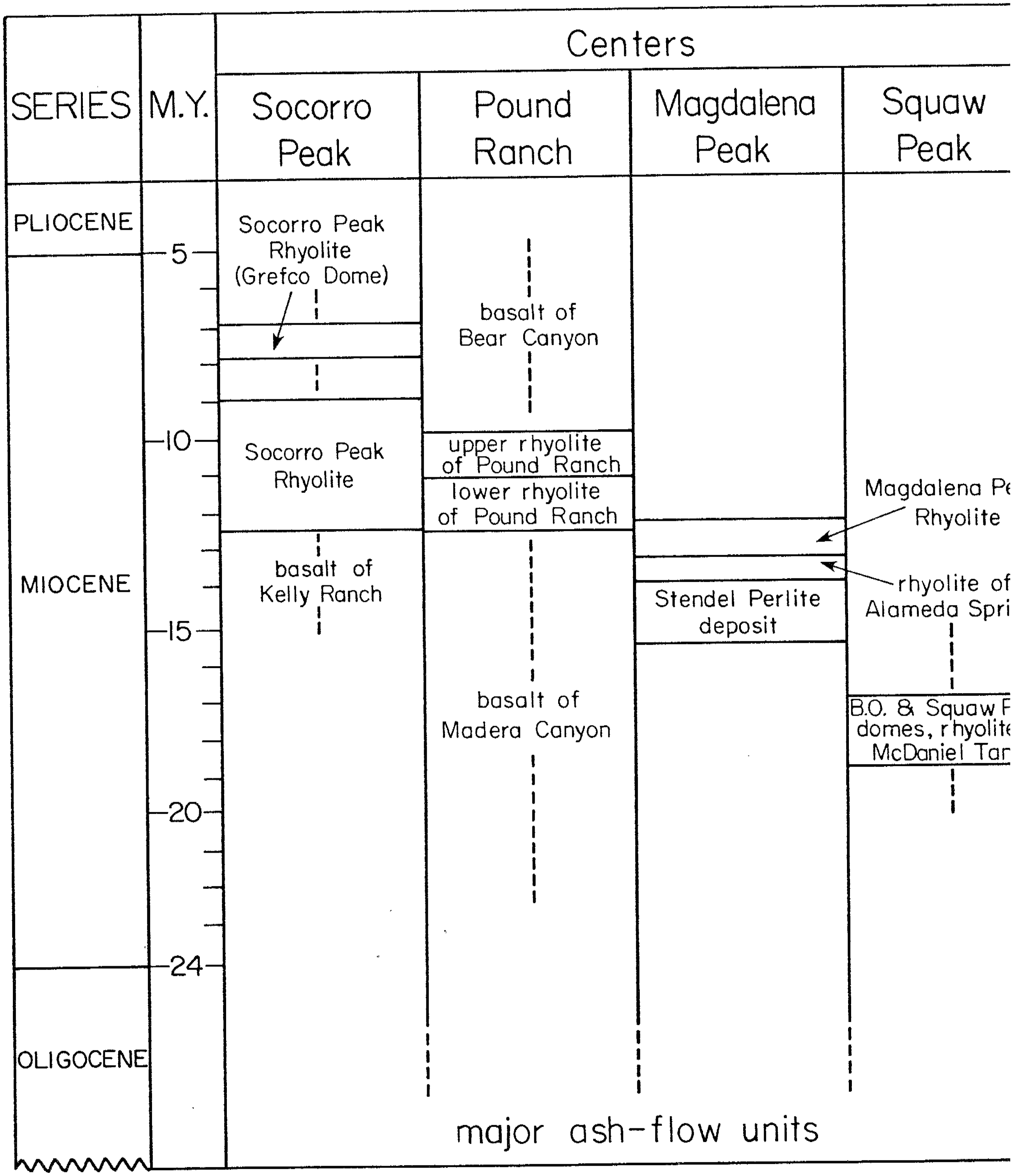


Figure 2. Stratigraphic equivalence chart for Miocene rhyolitic centers in the Socorro area. Dashed lines indicate ranges of uncertainty in ages of the units.

Socorro Peak Center

The Socorro Peak volcanic center is defined by a cluster of silicic vents and domes with associated short, thick, silicic flows, and by basaltic-andesite flows, all of Miocene age (Fig. A2-1). These lavas were erupted contemporaneously with deposition of middle or upper Popotosa sediments onto a playa floor in the Popotosa basin (Chamberlin, 1980).

The oldest volcanic rocks are probably the volumetrically small (approximately 0.04 km^3), high-K basaltic-andesite lavas of the basalt of Kelly Ranch (Fig. 2). East of Strawberry Peak and northwest of Socorro Peak, faulted outcrops of the basaltic andesite dip under landslide deposits surrounding the rhyolitic domes that cap these peaks. Thus, the basalt of Kelly Ranch is interpreted to be stratigraphically below the Socorro Peak Rhyolite (Chamberlin, 1980). Although a K-Ar age of 9.3 m.y. on a basaltic andesite sample (Table 1) is younger than the K-Ar ages for the dacites of the Socorro Peak Rhyolite, a fission-track age of 12.1 m.y. on a dacitic tephra stratigraphically higher than the basaltic andesite (Chamberlin, 1980) and petrographically correlative to the high-K dacites, suggests an age for the basaltic andesite of at least 12.1 m.y. In hand sample the basaltic andesite is dark gray to black and contains phenocrysts of clear, tabular to stubby, rectangular plagioclase and reddish,

Table 1. Radiometric dates on Miocene rocks of the Socorro area, New Mexico. All age determinations were recalculated using the 1977 decay constants, except for sample 272-C (C.E. Chapin, personal communication 1983).

Sample number	Stratigraphic unit	Field rock type	Geochemical rock type	Est. volume (km^3)	Age (m.y.)
Md-B1	tuff of McDaniel Tank	rhyolite	high-K, high-SiO_2 rhyolite	4.1	18.3±0.7
79-10-7	rhyolite of Alameda Springs	dacite	high-K rhyolite	11.0 to	16.1±0.6
76-2-5	Magdalena Peak Rhyolite	dacite	high-K rhyolite	17.0	13.5±0.5
272-C	Stendel perlite deposit	rhyolite	high-K, high-SiO_2 rhyolite	0.01	14.3±1.0
77-3-2	lower rhyolite of Pound Ranch	rhyolite	high-K, high-SiO_2 rhyolite	0.7	12.1±0.5
77-3-1	upper rhyolite of Pound Ranch	dacite	high-K rhyolite	4.1	10.8±0.4
76-6-1	Socorro Peak Rhyolite (Strawberry Peak)	dacite	high-K rhyolite	1.4	12.1±0.5
77-8-1	Socorro Peak Rhyolite (Stonewall dome)	dacite	dacite	1.6	10.6±1.5
76-6-2	Socorro Peak Rhyolite (Signal Flag)	rhyolite	high-K, high-SiO_2 rhyolite	4.5 to	10.6±1.5
76-6-3	Socorro Peak Rhyolite (Railroad Quarry)	rhyolite	high-K, high-SiO_2 rhyolite	4.7	9.2±0.4
77-5-4	Socorro Peak Rhyolite (Grefco dome)	rhyolite	high-K, high-SiO_2 rhyolite	0.05	7.4±0.3
76-1-9	basalt of Kelly Ranch	basalt	high-K basaltic andesite	0.04	9.3±0.5

oxidized pyroxene and olivine. Also present are quartzite and possibly cognate gabbroic xenoliths. Throughout this paper all phenocryst assemblages are listed in decreasing order of abundance.

The Socorro Peak Rhyolite of the Santa Fe Group consists of high-K dacite to high-K, high-SiO_2 rhyolite. It can be subdivided into three petrographic units: 1) dacite to high-K rhyolite, 2) porphyritic, high-K, high-SiO_2 rhyolite, and 3) the aphyric, high-K, high-SiO_2 rhyolite of Grefco dome. Changes in the phenocryst assemblage between these three units will be shown in Chapter 4 (Geochemistry) to correspond to changes in the major- and trace-element chemistry. The dacite to high-K rhyolite units occur stratigraphically above the basaltic andesite and below the porphyritic, high-K, high-SiO_2 rhyolite unit. The dacite to high-K rhyolite units commonly form domes and stubby, columnar-jointed flows (Chamberlin, 1980). In hand sample these units appear reddish brown to gray and contain variable amounts of phenocrysts (9 to 15%) consisting of plagioclase, amphibole, and biotite. The amount of biotite increases with increasing SiO_2.

The porphyritic, high-K, high-SiO_2 rhyolite unit is the most voluminous rock type within the Socorro Peak center with an estimated volume of 4.7 km^3 (Fig. A2-1). Stratigraphic control for this porphyritic unit is present near Cook Spring where these lavas overlie the dacite to high-K rhyolite lavas, and they are in turn overlain by tuffs of the phenocryst-poor, high-K, high-SiO_2 Grefco dome rhyolite (Chamberlin, 1980, plate 1). In hand sample the porphyritic, high-K, high-SiO_2 rhyolite is light pink to gray and coarsely porphyritic; it contains phenocrysts of plagioclase, sanidine, quartz, biotite, and amphibole.

The Grefco dome (Table 1) and associated pyroclastic rocks are the only known outcrops of the phenocryst-poor, high-K, high-SiO_2 rhyolite unit in the Socorro Peak center (Fig. A2-1; Chamberlin, 1980). An age of 7.4 m.y. has been assigned to the unit; however, there has been little consistency with dating of this unit and ages ranging from 33.2 to 7.4 m.y. have been obtained (C.E. Chapin, personal communication 1983). In the northwest and southeast corners of Grefco dome, exposures with fan-like foliation patterns delineate two possible vents for this unit. Hand samples of this aphyric rhyolite are gray to buff, glassy, perlitic, and contain only scarce phenocrysts of sanidine, plagioclase, and quartz. The rhyolite is currently mined for perlite.

Pound Ranch Center

The eruptive sequence in the Pound Ranch center consists of an older basic unit (the basalt of Madera Canyon), followed by the lower and upper rhyolites of Pound Ranch, and finally the overlying basalt of Bear Canyon (Fig. 2; Osburn, 1978). The age of the basalt of Madera

Canyon is poorly constrained. It overlies the 27 m.y. old South Canyon Tuff (C.E. Chapin, unpublished data 1983), and it is in turn overlain by the 10.8 m.y. old upper rhyolite of Pound Ranch (Table 1; Fig. 2; Osburn, 1978). The basalt varies widely in hand sample and in petrographic characteristics between locations which suggests that more than one flow is present. The color varies from black to red, and the amount of phenocrysts (plagioclase, olivine, and pyroxene) varies from 5 to 20%.

The 12.1 m.y. old lower rhyolite of Pound Ranch (LRPR; Table 1) occurs at two separate outcrops (Fig. A2-2). Both outcrops have bulbous shapes and are topographically higher than the surrounding upper rhyolite of Pound Ranch (URPR) that dips away from the contact. This suggests that the lower unit was a topographically higher dome(s) when the overlying unit was emplaced (Osburn, 1978). In hand sample the high-K, high-SiO_2 LRPR is pale red to light brown and coarsely porphyritic; it contains phenocrysts of plagioclase, quartz, sanidine, biotite, and amphibole. This phenocryst assemblage is similar to the porphyritic, high-K, high-SiO_2 rhyolites of the Socorro Peak Rhyolite (Table 2).

The upper rhyolite of Pound Ranch (URPR) unconformably overlies all older units above the Lemitar Tuff (28 m.y., C.E. Chapin, unpublished data 1983); at one isolated eastern outcrop the URPR is overlain by upper Popotosa mudstones (Osburn, 1978). The original eastward extent of the upper rhyolite is uncertain because it is downfaulted and covered.

Table 2. Modal analyses of representative Miocene volcanic rocks from the Socorro area; * = includes minor olivine; t = trace (<0.1%)

Sample number	Strati-graphic unit	SiO_2 content (wt %)	Geochemical rock type	Phenocryst modes (volume %) plagioclase	sanidine	quartz	biotite	amphibole	pyroxene	opaque oxides	apatite	sphene	zircon	Ground-mass
76-1-9	basalt of Kelly Ranch	54.7	high-K basaltic andesite	5.8					2.7*	1.3	t			90.2
8-7-4	Socorro Peak Rhyolite	67.3	dacite	10.6	t		t	3.6	t	0.6	t		t	85.2
76-4-1a	Socorro Peak Rhyolite	70.5	high-K rhyolite	10.4	t		1.5	1.5		0.3	t		t	86.3
7-3-9	Magdalena Peak Rhyolite	71.1	high-K rhyolite	10.2	t	t	1.4	2.2		0.3	t		t	85.9
7-24-4	upper rhyolite of Pound Ranch	71.2	high-K rhyolite	10.1	t	t	1.3	2.0		0.4	t	t	t	86.2
7-22-11	rhyolite of Alameda Springs	72.1	high-K rhyolite	9.6	0.5	t	1.0	1.6	t	0.4	t	t	t	86.9
8-22-3	Socorro Peak Rhyolite	73.1	high-K, high-SiO_2 rhyolite	11.5	6.7	3.5	3.3	0.5		0.2	t	t	t	74.3
7-24-1	lower rhyolite of Pound Ranch	73.9	high-K, high-SiO_2 rhyolite	10.1	4.3	5.2	3.9	0.3		0.2	t	t	t	76.0

(Table 2 continued)

				Phenocryst modes (volume %)										
Sample number	Strati-graphic unit	SiO_2 content (wt %)	Geochemical rock type	plagioclase	sanidine	quartz	biotite	amphibole	pyroxene	opaque oxides	apatite	sphene	zircon	Ground-mass
7-23-4	rhyolite of McDaniel Tank	74.Ø	high-K, high-SiO_2 rhyolite	1.6	Ø.7	t	Ø.5		t	t			t	97.2
7-3-1	rhyolite of Stendel perlite	76.6	high-K, high-SiO_2 rhyolite	5.2	6.3	4.4	1.9	Ø.1		Ø.1			t	82.Ø
8-23-3	Socorro Peak Rhyolite (Grefco dome)	77.1	high-K, high-SiO_2 rhyolite	1.1	1.4	Ø.5	t	t		t				97.Ø
7-18-6	rhyolite of Squaw Peak	77.6	high-K, high-SiO_2 rhyolite	4.3	7.2	8.1	1.3	Ø.1		Ø.1			t	78.9

The major portion of the URPR forms a 120-m-thick, 3.3-km-wide outcrop that flowed south-southwest from the Pound Ranch area for approximately 6 km (Fig. A2-2; Osburn, 1978). A probable vent, delineated by a linear zone of vertical foliation, is located in the northeastern part of the flow (Osburn, 1978). In a typical section, the upper Pound Ranch consists of a black, basal vitrophyre overlain by a finely flow banded interval that grades upward into a more massive interval (Osburn, 1978). In hand sample the upper rhyolite is pale red to gray and contains phenocrysts of plagioclase, amphibole, and biotite; it is similar to the dacite to high-K rhyolite of the Socorro Peak Rhyolite and the dacite and high-K rhyolites of the Magdalena Peak Rhyolite (Table 2).

The volumetrically small (approximately 0.08 km^3) basalt of Bear Canyon is exposed at the top of several small hills to the northwest of the rhyolites. The basalt overlies upper Popotosa mudstones and is overlain by sands and conglomerates possibly of the upper Santa Fe Group (Osburn, 1978). Hand samples of Bear Canyon are greenish black, have white specks on fresh surfaces, and contain phenocrysts of plagioclase, pyroxene, and olivine. Petrographically the white specks appear to be zeolites.

Magdalena Peak Center

Magdalena Peak is the prominent mountain located approximately 2 km south of Magdalena. It is the erosional remnant of a mid-Miocene (13.5 m.y. old; Table 1) volcanic center inferred to be the point of origin for three of the four flows present in the Magdalena Peak center: the dacite flow(s) of the Magdalena Peak Rhyolite, the rhyolite flow(s) of the Magdalena Peak Rhyolite, and the rhyolite of Alameda Springs. The fourth flow is the rhyolite of the Stendel perlite deposit (Fig. A2-3), for which no vent has been identified (Weber, 1957). A detailed geologic map (1:12,000) of Magdalena Peak was made for this study. A copy of the map and the accompanying discussion compose Appendix 1.

Flows erupted from Magdalena Peak are a volumetrically small (approximately 0.01 km^3), high-K dacite and a relatively large-volume (11 to 17 km^3), high-K rhyolite (Fig. A2-3). The dacitic flow, probably an early, more mafic phase of the Magdalena Peak Rhyolite, crops out on Magdalena Peak and several hills to the southwest of Magdalena Peak (Appendix 1). In hand sample the dacite is light to medium gray and contains phenocrysts of plagioclase, amphibole, and biotite.

The high-K rhyolites of the Magdalena Peak Rhyolite form many of the prominent flat-topped, steep-sided hills to the south, southwest, and southeast of Magdalena Peak.

These rhyolites consist of flow-banded to massive lavas that are often underlain by a vitrophyre. In the vent area, a thick (>60 m) pyroclastic deposit (Appendix 1) is usually present beneath the vitrophyre. Away from the vent area the underlying tuffaceous interval is usually thinner (Allen, 1979). In hand sample the rhyolite lavas are light brown to pinkish gray and contain phenocrysts of plagioclase, amphibole, and biotite, and scarce amounts of sanidine and quartz.

The high-K rhyolite of Alameda Springs is here defined as an informal name for the Magdalena Peak-like rhyolite (Donze, 1980) found at Alameda Springs (Fig. A2-4). It is inferred from the chemical data that the rhyolite of Alameda Springs also occurs at Texas Spring and above the Stendel perlite deposit closer to Magdalena Peak (Figs. 1, A2-3a); however, these occurrences have not been confirmed in the field.

Near Squaw Peak the rhyolite of Alameda Springs unconformably overlies the Popotosa Formation. It also lies unconformably on previously tilted strata of the Oligocene Lemitar Tuff and on the early-Miocene basaltic andesite lavas, the lower Popotosa Formation, and the rhyolite of McDaniel Tank (Donze, 1980). In hand sample the rhyolite of Alameda Springs is pinkish brown and contains phenocrysts of plagioclase, biotite, and amphibole and scarce amounts of quartz and sanidine; it is therefore indistinguishable from the other rhyolites of Magdalena Peak.

The rhyolite of the Stendel perlite deposit is here defined as the high-K, high-SiO_2 rhyolites that occur at the Stendel perlite deposit (Weber, 1957) and in the area to the south of this deposit (Fig. A2-3a). This flow was not mapped separately by Allen (1979) and no additional mapping was done during this study. The flow boundaries have been approximated in Figures 1 and A2-3a by assuming that the thin sections prepared by Allen (1979) from the Magdalena Mountains area that contain abundant sanidine and quartz phenocrysts are related to the Stendel perlite deposit, which also contains abundant sanidine and quartz phenocrysts (Tables 2, A3). The source vent for this flow is not known. In hand sample the rhyolite of the Stendel perlite deposit is medium gray to pinkish, glassy and perlitic, and contains phenocrysts of sanidine, quartz, plagioclase, and biotite.

The Magdalena Peak Rhyolite has been dated at 13.5±0.5 m.y.; the rhyolite of the Stendel perlite deposit has been dated at 14.3±1.0 m.y. (Weber and Bassett, 1962), and the rhyolite of Alameda Springs has been dated at 16.1±0.6 m.y. (Table 1). The stratigraphic succession observed at the Stendel perlite exposure (Fig. A2-3b) shows, however, that the rhyolite of the Stendel perlite deposit is the oldest and is overlain in turn by the rhyolite of Alameda Springs and by the rhyolite of the Magdalena Peak Rhyolite.

Squaw Peak Center

Three distinct mid- to late-Miocene rhyolite domes with associated flows are present in the Squaw Peak area (Fig. A2-4). The oldest is the finely flow banded, phenocryst-poor, high-K, high-SiO_2 rhyolite of McDaniel Tank (18.3 m.y.; Table 1) that covers much of the northern part of the Squaw Peak area (Fig. A2-4). It is interbedded with the Popotosa Formation and is unconformably overlain by the 16.1 m.y. old rhyolite of Alameda Springs from the Magdalena Peak center. The rhyolite of McDaniel Tank consists of a dark brown to black, welded, basal ash-flow tuff overlain by an intricately folded, lithoidal lava (Donze, 1980). In hand sample the lithoidal lava is foliated on a scale of a few mm with alternating dark and light bands, and it contains a few percent phenocrysts of clear plagioclase and black to coppery-colored biotite. Additionally, it contains thin quartz-rich bands of vapor-phase minerals (Donze, 1980).

The B.O. Ranch high-K, high-SiO_2, phenocryst-poor rhyolite dome occurs south of Squaw Peak where it is interbedded in the Popotosa Formation and overlies early-Miocene andesites that overlie the 27 m.y. old South Canyon Tuff (Donze, 1980). This dome consists of bedded pyroclastic deposits that are intruded and overlain by a rhyolitic dome (Donze, 1980). In hand sample the pyroclastic deposits are a buff color and contain light-gray to black, glassy fragments. The rhyolitic lavas are usually light gray and contain scarce phenocrysts of feldspar and quartz.

Squaw Peak is a prominent high-K, high-SiO_2, moderately crystal rich rhyolite dome (Fig. A2-4; Table 2). Its age constraints are similar to those of the B.O. Ranch dome. In hand sample it is light pink to light gray and contains phenocrysts of quartz and sanidine in subequal amounts and lesser amounts of plagioclase and biotite. The B.O. Ranch and Squaw Peak domes, although they differ mineralogically (Table A3), have similar chemical compositions (Appendix 4).

Council Rock

The basalt of Council Rock (Chamberlin, 1974) is dated at 17.4 m.y. (C.E. Chapin, personal communication 1983). The outcrops are generally thin (0 to 30 m thick) and cover large areas west of Magdalena (Osburn and Chapin, 1983b). In hand sample the basalt appears gray to black, is generally fine-grained, and contains phenocrysts of plagioclase, olivine, and pyroxene. In Appendix 3 (Petrographic descriptions) and Appendix 4 (Chemical data sheets), sample 76-6-6 of the basalt of Council Rock has been grouped with the samples from the Magdalena Peak center. This grouping was made because the location of sample 76-6-6 is closer to the Magdalena Peak center than any other center, but it does not imply any genetic relationship between the basalt of Council Rock and the Magdalena Peak Rhyolite.

Structural Controls of Volcanism

The location of vents and domes for the 18 to 7 m.y. old silicic and mafic lavas is believed to be controlled largely by the Morenci lineament (called the transverse shear zone in the Socorro area; Chapin and others, 1978), the caldera-margin ring-fracture zones, and the north-trending Rio Grande rift-related fractures (Chapin and others, 1978; Chamberlin, 1980). The Morenci lineament, a northeast-trending zone of crustal weakness of probable Precambrian ancestry, is thought to have provided a less resistant path for rising magmas (Chapin and Seager, 1975; Baldridge, 1979; Lipman, 1979; Chamberlin, 1980). The surface expressions of the Morenci lineament are: 1) a zone approximately 1.5 km in width, across which the dips of beds change; and 2) the alignment of volcanic centers for the eruptive episodes between 32 and 26 m.y. ago, 18 and 7 m.y. ago, and 4 m.y. ago (Chapin and others, 1978; Chamberlin, 1980).

Closer to the surface, caldera ring-fracture zones also may have influenced the ascent of rising magmas and consequently the location of vents and domes by providing steeply dipping fractures through the upper crust (Chapin and Seager, 1975). The vents and domes for the 12 to 7 m.y. old volcanic rocks of the Socorro Peak center form an arcuate pattern, roughly parallel to the Socorro cauldron margin. Additionally, Magdalena Peak, a 13 m.y. old volcanic center, is located on or near the ring-fracture zone of the Magdalena cauldron. North-northwest trending, high-angle normal faults, related to Rio grande rift tectonism, also may have served as a fractured zone permitting magmas easier access to the surface in the Socorro-Magdalena area (Chapin and Seager, 1975; Baldridge, 1979; Lipman, 1979). In the Socorro Peak area, the 12 to 7 m.y. old volcanic vents and domes have a north-northwest trend that appears to parallel Rio Grande rift-related faults (Chamberlin, 1980, Fig. 39.)

PETROGRAPHY

Introduction

The samples have been divided into three petrographic groups: 1) basaltic andesites; 2) dacites, high-K dacites, and high-K rhyolites; and 3) high-K, high-SiO_2 rhyolites (Table 2). These three groups exhibit differences in the modal abundances of plagioclase, sanidine, quartz, amphibole, and biotite phenocrysts. Conversely, most of the samples have the following textural similarities: they are porphyritic, fine to medium grained (average phenocryst size is 1-2 mm in length), and they contain sieve-textured plagioclase phenocrysts (Table A3).

Summaries for each of the petrographic groups are given below, and individual sample descriptions are given in Table A3. Phenocryst abundances were determined by the visual examination of 50 representative thin sections and by modal analysis of 12 thin sections with approximately 2,000 points counted per thin section (Table 2) using a 1/3 mm by 2/3 mm grid. Sanidine was determined by staining the thin sections with sodium-cobalt-nitrate. The extinction angle of plagioclase phenocrysts was determined on a four-axis universal stage using standard extinction techniques (Emmons, 1943), and the corresponding calcium content (percent anorthite) was determined using the high-temperature curves of the Rittman zone method (Troger, 1959).

The anorthite content for the plagioclase phenocrysts in the Socorro Peak lavas is not in agreement with the anorthite content calculated by Chamberlin (1980). The reason for the discrepancy is that Chamberlin inadvertently used the low-temperature curves of the Rittman zone method (R. M. Chamberlin, personal communication 1983).

Basaltic Andesites

Four representative samples of the basaltic andesite of the basalt of Kelly Ranch were visually examined for petrographic content (Table A3), and one representative sample was point counted (Table 2). The basaltic andesites are slightly porphyritic (approximately 9% phenocrysts), fine-grained (average phenocryst size approximately 1 mm), and have a subophitic texture. They contain phenocrysts of plagioclase, pyroxene, olivine, opaque oxides and accessory apatite (Table 2). Plagioclase occurs as clear, tabular phenocrysts (1-2 mm in length), and as groundmass microlites. Some of the plagioclase phenocrysts have normal zoning whereas others have reverse zoning with smaller scale, sharp oscillatory zoning. Additionally, the larger plagioclase phenocrysts have albite and carlsbad twinning and a compositional range from An 40 to An 60.

Orthopyroxene, clinopyroxene, and olivine occur as subhedral phenocrysts approximately 1 mm in length; the olivine is moderately altered to iddingsite. Some of the pyroxene and olivine phenocrysts have a skeletal structure. The groundmass has a pilotaxitic texture consisting of interlocking plagioclase microlites, pyroxene microphenocrysts, finely disseminated opaque oxides, and intersertal glass. The glass usually has been altered to a dark-brown material. The basaltic andesite samples also contain quartzite and cognate gabbroic xenoliths and sieve-textured plagioclase phenocrysts (approximately 2 mm in length; Table A3).

Dacites, High-K Dacites, High-K Rhyolites

Twenty-seven representative samples of dacite, high-K dacite, and high-K rhyolite of the upper rhyolite of Pound Ranch, dacite and rhyolite of the Socorro Peak Rhyolite, dacite and rhyolite of the Magdalena Peak Rhyolite, and the rhyolite of Alameda Springs were visually examined for petrographic features (Table A3; Figs. 3a, b). In addition, five samples were point counted (Table 2). The samples are moderately porphyritic (approximately 15% phenocrysts) and fine to medium grained (average phenocryst size 1-2 mm in length). The mineral phases present are plagioclase, amphibole, biotite, opaque oxides and accessory sanidine, quartz, zircon, apatite, and sphene (Table 2).

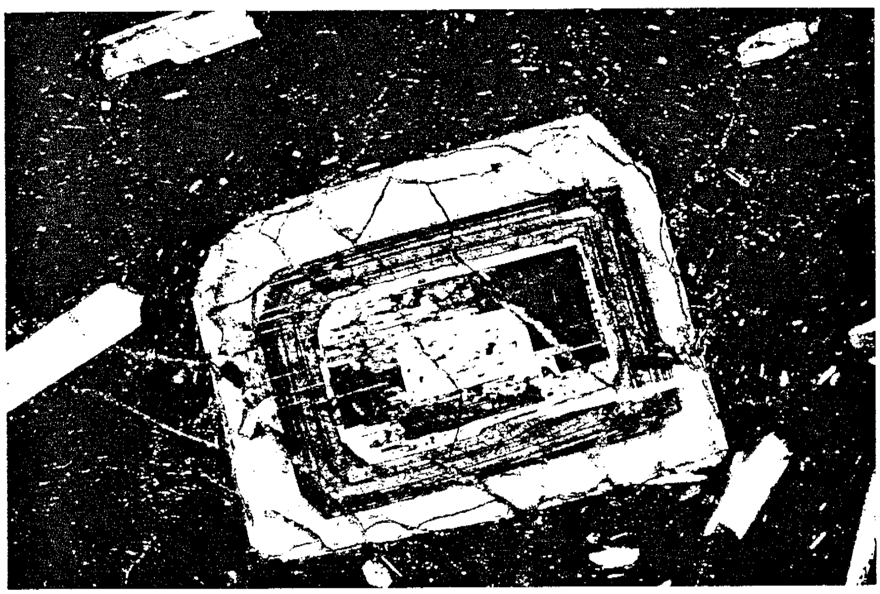


Figure 3a. Photomicrograph (crossed polarized light) illustrating a zoned and sieve-textured plagioclase phenocryst common to the dacite to high-K, high-SiO_2 rhyolite magmas. Note the weak, sieve-textured core surrounded by an oscillatory zone and finally an unzoned rim. Sample (8-14-5) is from the dacite of the Socorro Peak Rhyolite. Field of view is 1.3 mm.

Figure 3b. Photomicrograph (crossed polarized light) of a euhedral amphibole and smaller zoned plagioclase phenocrysts (lower right) in a groundmass consisting of flow-aligned sanidine, quartz, plagioclase, and amphibole microphenocrysts. Sample (8-15-5) is from the dacite of the Socorro Peak Rhyolite. Field of view is 1.3 mm.

They also contain sieve-textured plagioclase phenocrysts and glomeroporphyritic aggregates consisting of plagioclase, amphibole, biotite, and magnetite. The biotite/amphibole ratio increases with increasing SiO_2 content (Table 2).

Plagioclase occurs as large (1-4 mm in length), stubby to tabular phenocrysts, smaller (approximately 1 mm in length), lath-shaped phenocrysts and as groundmass microlites. The large plagioclase phenocrysts compose about 5% of the sample and have andesine to labradorite cores and oligoclase rims. The cores are 2-3 mm wide; the rims are generally <1 mm wide. Some of the cores have normal zoning, whereas others have reverse zoning. Additionally, most cores have a sieve texture and are surrounded by a zone of fine oscillatory zoning, which in turn is surrounded by a rim that has normal zoning and lacks a sieve texture. Additionally, the cores show albite and carlsbad twinning, whereas the rims are generally untwinned. The lath-shaped plagioclase phenocrysts are unresorbed, have normal and oscillatory zoning, and typically show carlsbad twinning. Amphibole occurs as groundmass microphenocrysts and as subhedral to euhedral prisms (1-3 mm in length) which occasionally have altered to opaque oxides. Some amphibole phenocrysts appear to have been partially replaced by biotite. Biotite occurs as plates and prisms (0.5-1 mm in longest dimension) which frequently have an opaque oxide alteration rim. Opaque oxides occur as 0.25-0.5 mm subhedral phenocrysts and as disseminated grains within the groundmass. Zircon occurs in the groundmass and as inclusions within opaque oxides, plagioclase, and biotite phenocrysts. Sanidine rarely occurs as a phenocryst except in the rhyolite of Alameda Springs (Tables 2, A3).

The groundmass of the dacites, high-K dacites, and high-K rhyolites has a flow-aligned (fluxion) structure and contains microphenocrysts of quartz, sanidine, plagioclase, amphibole, and opaque oxides and trace amounts of biotite, apatite, and zircon within a glassy to finely crystalline (occasionally spherulitic) matrix. The rhyolite of Alameda Springs contains about 0.5% of sanidine as subhedral (approximately 0.5 mm in length), stubby to lath-shaped phenocrysts. Clinopyroxene also occurs in the rhyolite of Alameda Springs as twinned subhedral to euhedral phenocrysts (0.5 mm in length) that display a reddish-brown alteration rim.

High-K, High-SiO_2 Rhyolites

Type 1
(Amount of Plagioclase Phenocrysts > Amount of Sanidine Phenocrysts)

The high-K, high-SiO_2 rhyolite petrographic group can be subdivided into three types: type 1 has a greater volumetric amount of plagioclase than sanidine phenocrysts; type 2 is a phenocryst-poor rhyolite; and type 3 has a greater volumetric amount of sanidine than plagioclase phenocrysts. Type 1 (plagioclase > sanidine) appears to be petrographically related to the dacites and high-K rhyolites. The dacites, high-K rhyolites, and the type 1 subgroup all contain sieve-textured plagioclase, amphibole, and biotite phenocrysts; the amount of amphibole decreases and the amount of biotite increases with increasing SiO_2 content.

Seven representative samples of the type 1 (plagioclase > sanidine), high-K, high-SiO_2 rhyolites from the lower rhyolite of Pound Ranch and the phenocryst-rich, high-K, high-SiO_2 rhyolite of the Socorro Peak Rhyolite were visually examined for petrographic features (Table A3; Fig. 4a). In addition, two samples (8-22-3, of the Socorro Peak Rhyolite; and 7-24-1, of the lower rhyolite of Pound Ranch) were point counted (Table 2). The average phenocryst size is approximately 2 mm in length. The samples are strongly porphyritic (approximately 25% phenocrysts), contain abundant plagioclase, quartz, sanidine, and biotite and accessory amphibole, opaque oxides, sphene, apatite, and zircon. Plagioclase, the most abundant mineral, occurs as subhedral laths (1-3 mm in length) and as corroded sieve-textured phenocrysts (0.5-1.5 mm in length). The latter compose about 4% of each sample, show carlsbad and albite twinning, and have an overall normal zoning which is locally oscillatory. The lath-shaped plagioclase phenocrysts compose about 7% of each sample, show carlsbad and albite twinning, and normal and

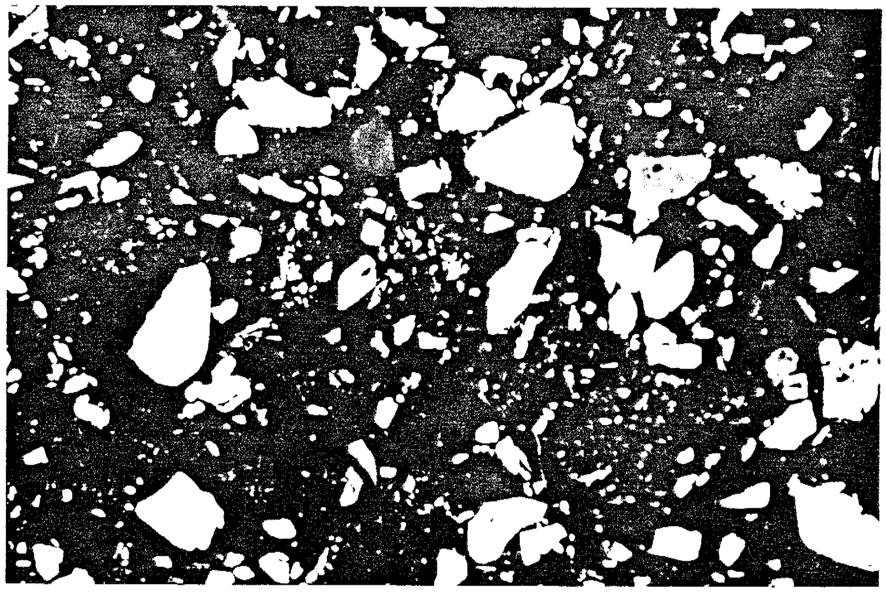


Figure 4a. Photomicrograph (crossed polarized light) illustrating the strongly porphyritic (25% phenocrysts) nature of the type 1 (plagioclase > sanidine) high-K, high-SiO_2 rhyolites. The phenocryst population is composed of plagioclase, quartz, sanidine, and biotite. Sample (7-24-5) is from the lower rhyolite of Pound Ranch. Field of view is 6.5 mm.

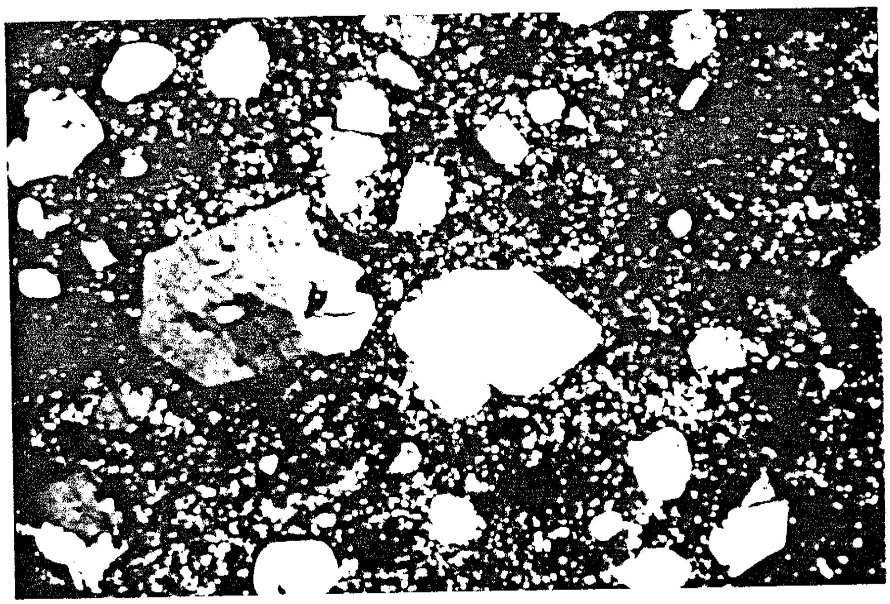


Figure 4b. Photomicrograph (crossed polarized light) illustrating moderately porphyritic (approximately 12% phenocrysts) nature of type 3 (sanidine > plagioclase), high-K, high-SiO_2 rhyolites. The phenocryst population is composed of sanidine, quartz, pagioclase, and scarce amounts of biotite. Note euhedral quartz (center of photograph) and gray sanidine or anorthoclase phenocrysts (left of center). Sample (7-18-6) is from the rhyolite of Squaw Peak. Field of view is 6.5 mm.

oscillatory zoning. Sanidine frequently occurs as untwinned, anhedral to subhedral phenocrysts (1-2 mm in length) and less commonly as euhedral, carlsbad-twinned phenocrysts (from 2 mm to 2 cm in length). Some of the sanidine contains blebs of glass and small plagioclase phenocrysts. These phases possibly became trapped within the late, rapid-growing sanidine phenocrysts.

Quartz occurs as anhedral to subhedral, rounded and embayed phenocrysts (approximately 1.5 mm in length). Some of the quartz phenocrysts contain numerous curvilinear cracks. Biotite composes approximately 4% of the phenocrysts present. The biotite phenocrysts are frequently reddish brown, approximately 1 mm in length, and they contain abundant inclusions of rutile, zircon, and apatite; in addition they frequently have an opaque oxide alteration rim. Amphibole occurs as subhedral to euhedral prisms (approximately 0.5 mm in length) that contain an opaque oxide alteration rim similar to that of biotite.

Opaque oxides, sphene, apatite, and zircon rarely occur as phenocrysts; they occur more frequently as inclusions within biotite and plagioclase phenocrysts. The sphene phenocrysts commonly occur as twin, wedge-shaped phenocrysts (approximately 0.5 mm in length). Additionally, glomeroporphyritic aggregates consisting of plagioclase, biotite, amphibole, and opaque oxides are present in some samples (Table A3). The groundmass consists of microphenocrysts of sanidine, quartz, plagioclase, biotite, and amphibole plus trace amounts of opaque oxides sphene, apatite, and zircon set in a glassy, cryptocrystalline, or spherulitically-devitrified matrix.

Type 2
(Phenocryst-poor Rhyolite)

One representative sample (7-23-4) of the type 2 (phenocryst-poor rhyolite), high-K, high-SiO_2 rhyolite of McDaniel Tank was visually examined for petrographic features and point counted (Tables 2, A3). The rhyolite of McDaniel Tank is a finely flow banded, fine-grained, phenocryst-poor rock (Table A3). The phenocryst phases present are plagioclase, sanidine, and biotite. They compose about 3% of the sample and are individually <1 mm in length. Also present are trace amounts of quartz, pyroxene, opaque oxides, and zircon. The fine flow banding consists of alternating dark and light bands. The dark, reddish-brown bands are approximately 1 mm thick and contain most of the phenocrysts present in the sample. The lighter-colored bands are approximately 2 mm thick and contain cryptocrystalline material or altered glass. The rhyolite of McDaniel Tank differs from the type 1 (plagioclase > sanidine), high-K, high-SiO_2 rhyolite samples in the following ways: it is pyroxene bearing, it has a smaller average phenocryst size (Table A3), it has fewer phenocrysts (Table 2), it contains no sieve-textured plagioclase phenocrysts, and it has plagioclase phenocrysts that are possibly less calcic (An 20 on 1 phenocryst; Donze, 1980).

Type 3
(Amount of Sanidine Phenocrysts > Amount of Plagioclase Phenocrysts)

Twelve representative samples of the type 3 (sanidine > plagioclase), high-K, high-SiO_2 rhyolite group from the Stendel perlite deposit, Squaw Peak dome, B.O. Ranch dome, and Grefco dome of the Socorro Peak Rhyolite were visually examined for petrographic features (Table A3; Fig. 4b). In addition, three samples were point counted (Table 2). The samples vary in the amount of phenocrysts (Table 2) and average phenocryst size (Table A3), but characteristically they contain more sanidine than plagioclase. The phenocryst-rich samples of type 3 (sanidine > plagioclase) are from the rhyolites of the Stendel perlite deposit and Squaw Peak. They generally contain more sanidine and quartz, and less plagioclase and biotite than the phenocryst-rich samples of type 1 (plagioclase > sanidine; Table 2). Sanidine occurs as carlsbad twinned or untwinned, euhedral to anhedral-rounded phenocrysts (0.5-2 mm in length). Plagioclase occurs as carlsbad and fine albite twinned, unzoned to normally zoned, subhedral laths, and as stubby phenocrysts. Some of the plagioclase phenocrysts show slight corrosion. Quartz occurs as anhedral-rounded to euhedral phenocrysts (0.5-2 mm in length). Curvilinear fractures are present in most quartz phenocrysts.

Biotite occurs as subhedral plates (0.5-2 mm in length) that usually have an opaque oxide alteration rim. Amphibole occurs as scarce prisms (0.5-1 mm in length) that have an alteration rim similar to that of biotite. The groundmass contains microphenocrysts of sanidine, quartz, plagioclase, biotite, and opaque oxides set in a glassy to spherulitically devitrified intergrowth of quartz and potassium feldspar. Additionally, the groundmass of samples 7-3-1 and 8-23-3 (Table A3) contain pervasive perlitic cracks.

GEOCHEMISTRY

Introduction

One hundred and fifty samples were analyzed for major elements by X-ray fluoresence analysis using a modified version of the Norrish and Hutton (1969) procedure. Fifty-five representative samples also were analyzed for selected trace elements using X-ray fluoresence (XRF) and instrumental neutron-activation analysis (INAA). Sr isotopic data for four samples, given in Chapin and others (1979), were recalculated to initial values from the given measured Sr 87/Sr 86 values using Rb and Sr concentrations determined in this study (Table 3). In addition, two samples were analyzed for initial Sr 87/Sr 86 values by Sam Bowring, from the University of Kansas (personal communication 1983), who graciously allowed me to use his data. Pb isotopic data also were determined on three samples (Sam Bowring personal communication, 1983; Table 4). Discussion of the analytical procedures for all elements is given in Appendix 5; sample locations are given in Appendix 2; and major-element analyses, trace-element analyses, and CIPW norms are given in Appendix 4.

Major-, Trace-, and Rare-earth-element Chemistry

Major- and trace-element data are plotted using Harker variation diagrams (Harker, 1909; Figs. 5, 6, 7, 8,) with SiO_2 concentration chosen as the abscissa due to convention and its high correlation coefficients with other elements. Harker variation diagrams display evolutionary chemical trends of igneous rocks in a simplified and condensed manner (Cox and others, 1980). Analyses have been normalized to 100% volatile free and the total iron is represented by FeO* (Appendix 4). The samples examined in this study have been classified using the K_2O versus SiO_2 plot of Ewart (1979; Fig. 5); the rhyolites containing 73% or more SiO_2 are classified as high-SiO_2 rhyolites.

The rare-earth elements (REE) comprise the 14 elements from La to Lu. They are frequently subdivided into two groups: the light rare-earth elements (LREE--La to Sm) and the heavy rare-earth elements (HREE--Eu to Lu). Seven REE (La, Ce, Sm, Eu, Tb, Yb, and Lu) were analyzed by INAA. The data are displayed on chondrite-normalized plots (Masuda, 1962; Coryell and others, 1963; Figs. 9, 10, 11) using the Leedy chondrite REE abundances of Sun and Hanson (1976) for normalization. Eu anomalies (Eu/Eu*) were determined using the measured Eu abundance times chondritic abundance and Eu* equal to the hypothetical Eu value interpolated by drawing a straight line between Sm and Gd on chondritic-normalized diagrams. (Gd occurs between Eu and Tb on REE plots.) The

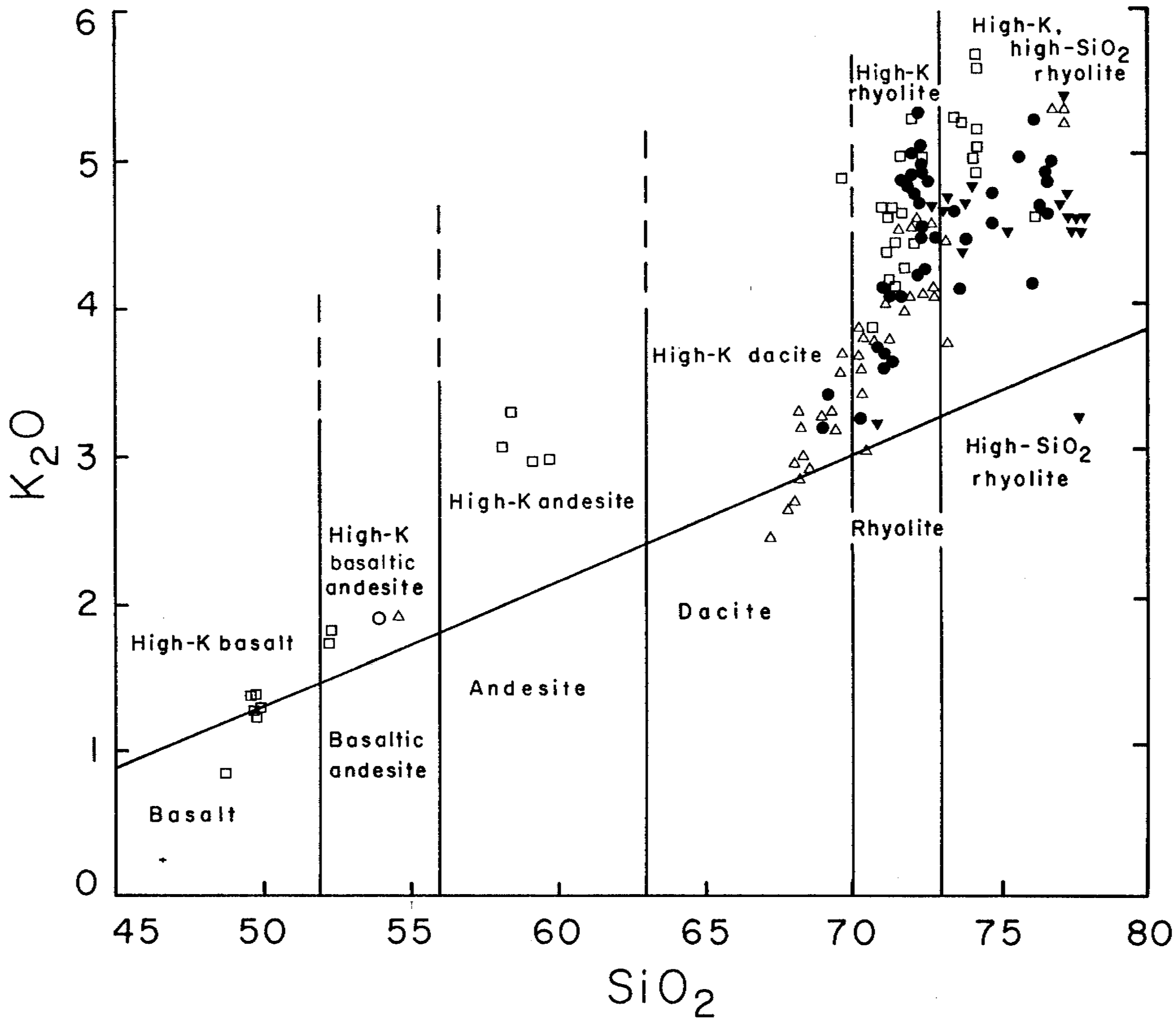


Figure 5. K_2O (weight percent) versus SiO_2 (weight percent) plot modified from Ewart (1979) and used here to classify the mafic and silicic rocks. All analyses were recalculated to 100% volatile free.

△ = Socorro Peak center
□ = Pound Ranch center
▼ = Squaw Peak center
● = Magdalena Peak center
○ = basalt of Council Rock

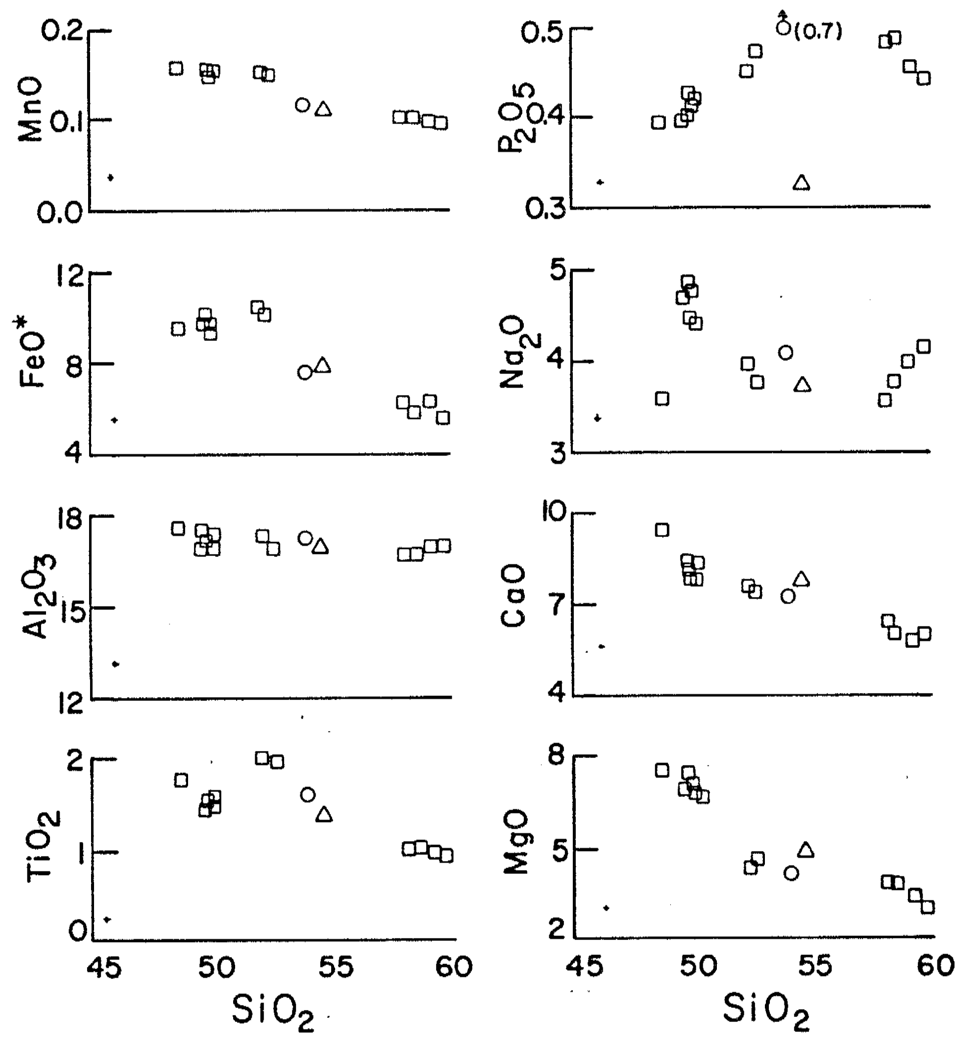


Figure 6. Major-element variation diagrams (weight percent) for mafic lavas. All analyses were recalculated to 100% volatile free. Total Fe expressed as FeO*.

△= Socorro Peak center
□= Pound Ranch center
○= basalt of Council Rock

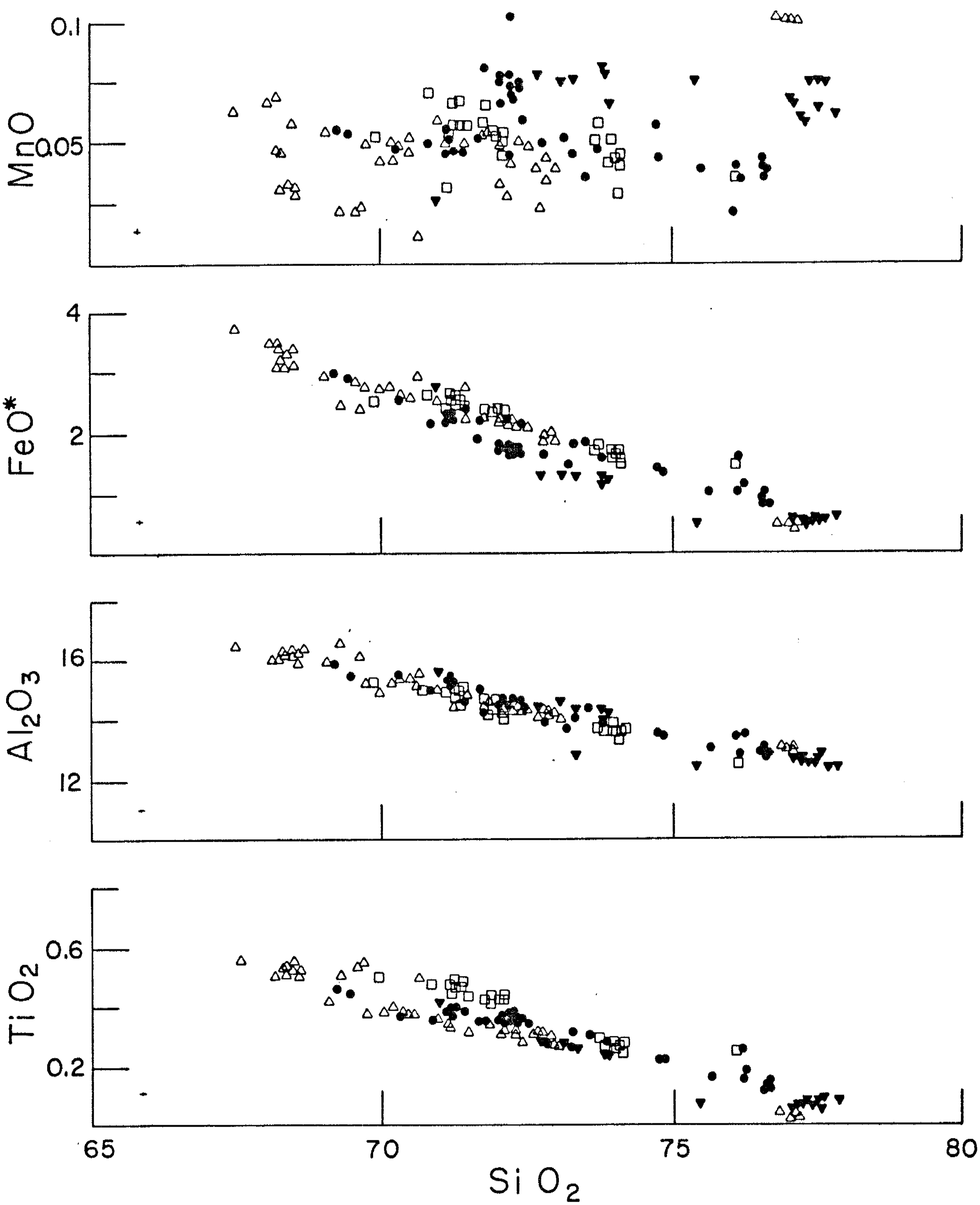
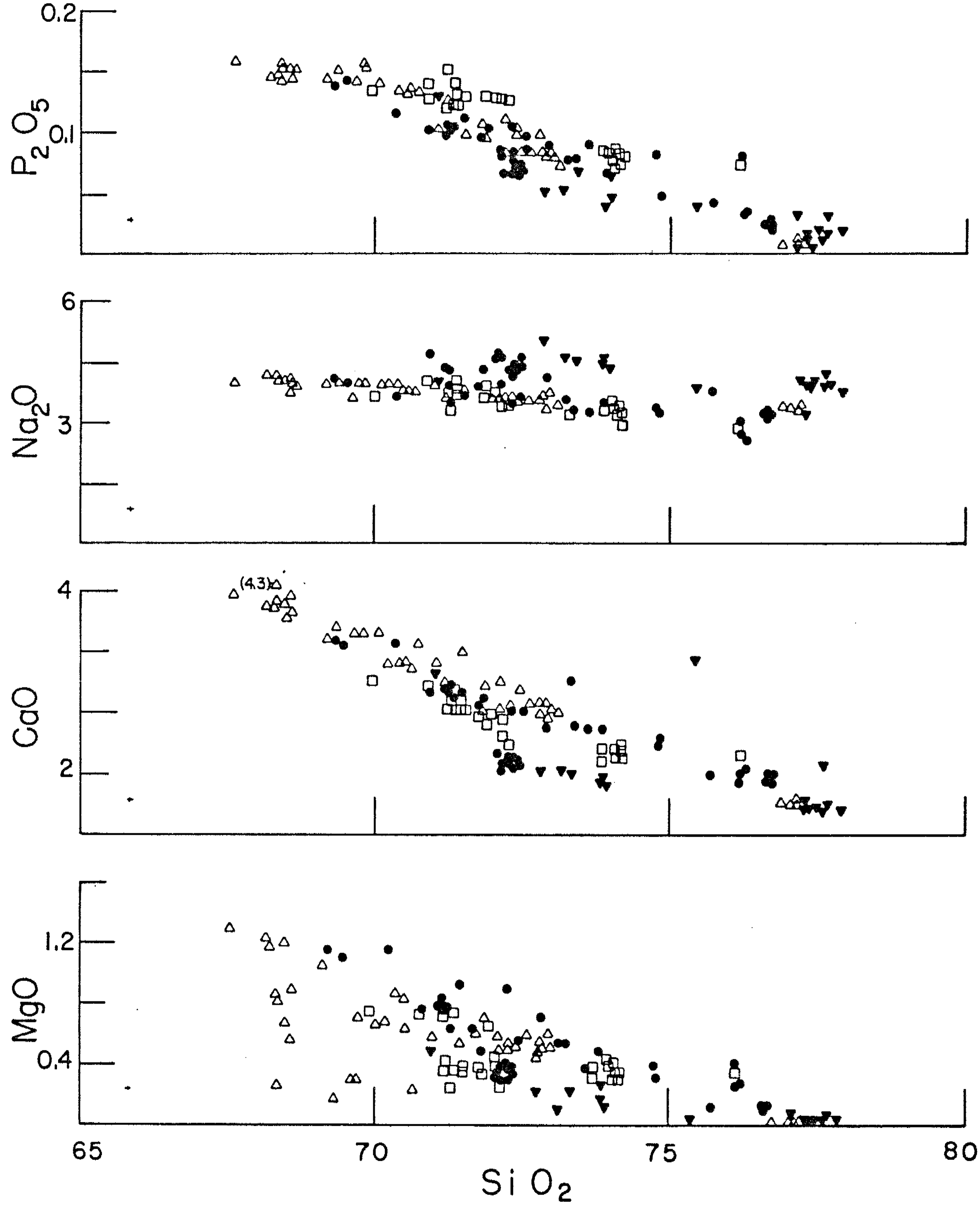


Figure 7. Major-element variation diagrams (weight percent) for silicic lavas. All analyses were recalculated to 100% volatile free. Total Fe is expressed as FeO*.

△ = Socorro Peak center
□ = Pound Ranch center
● = Magdalena Peak center
▼ = Squaw Peak center



(Figure 7 continued)

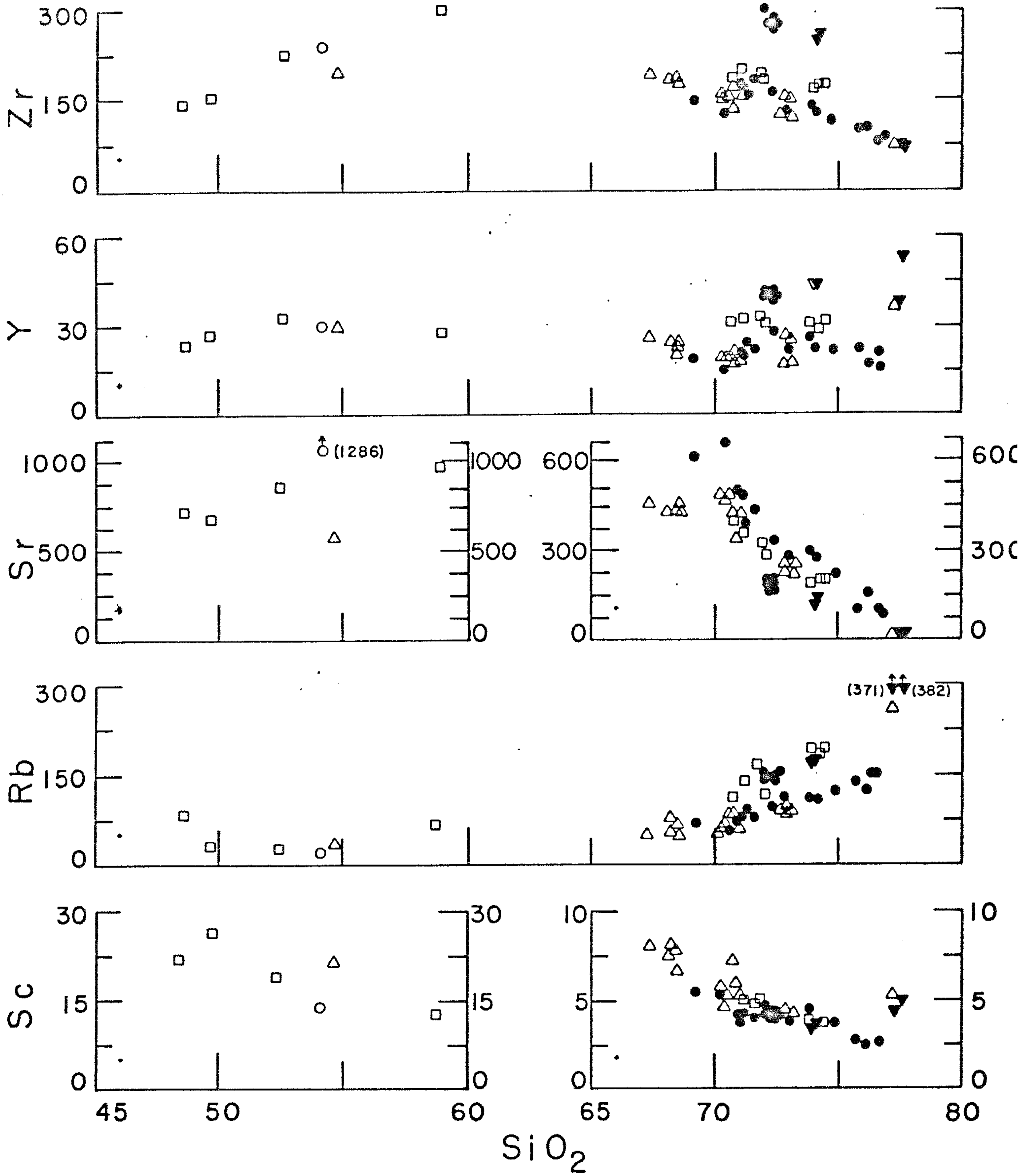
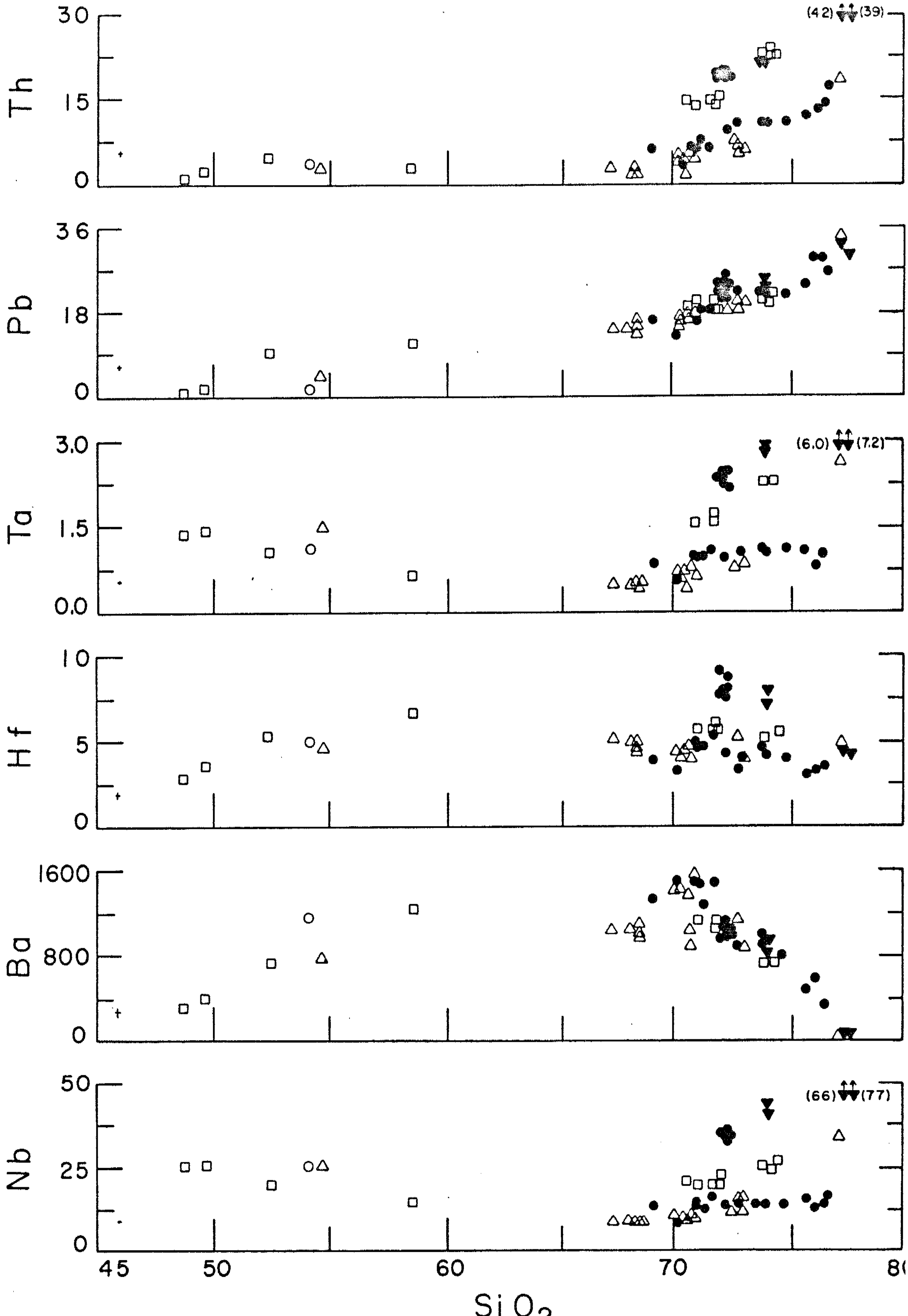


Figure 8. Trace-element (ppm) variation diagrams for representative samples of the mafic and silicic lavas. SiO_2 (weight percent) was recalculated to volatile free.

△= Socorro Peak center
□= Pound Ranch center
●= Magdalena Peak center
▼= Squaw Peak center
O= basalt of Council Rock



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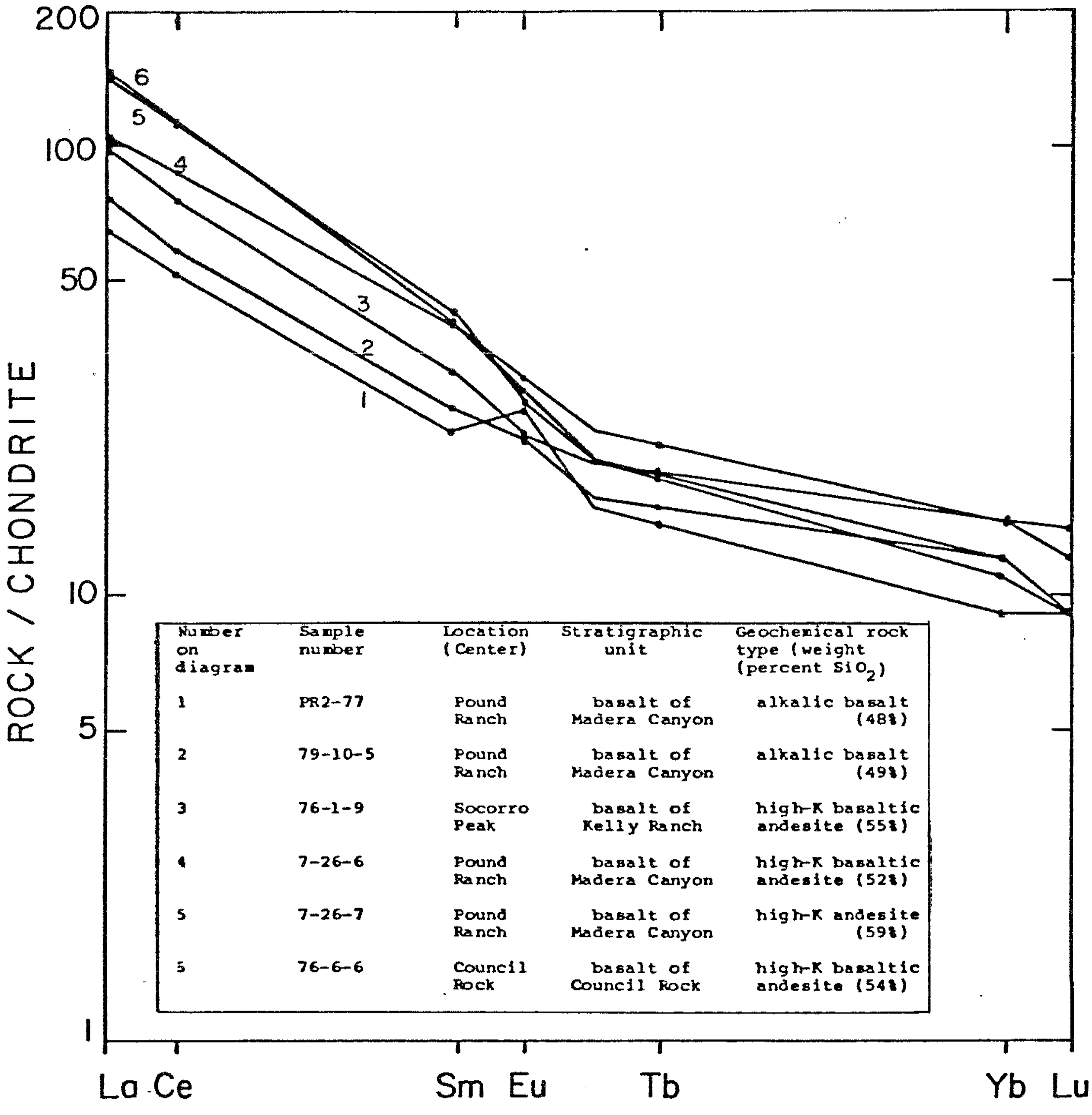

Number on diagram	Sample number	Location (Center)	Stratigraphic unit	Geochemical rock type (weight (percent SiO_2)
1	PR2-77	Pound Ranch	basalt of Madera Canyon	alkalic basalt (48%)
2	79-10-5	Pound Ranch	basalt of Madera Canyon	alkalic basalt (49%)
3	76-1-9	Socorro Peak	basalt of Kelly Ranch	high-K basaltic andesite (55%)
4	7-26-6	Pound Ranch	basalt of Madera Canyon	high-K basaltic andesite (52%)
5	7-26-7	Pound Ranch	basalt of Madera Canyon	high-K andesite (59%)
5	76-6-6	Council Rock	basalt of Council Rock	high-K basaltic andesite (54%)

Figure 9. Chondrite-normalized REE plots for mafic lavas. Sample data have been normalized to the Leedy chondrite values of Sun and Hanson (1976).

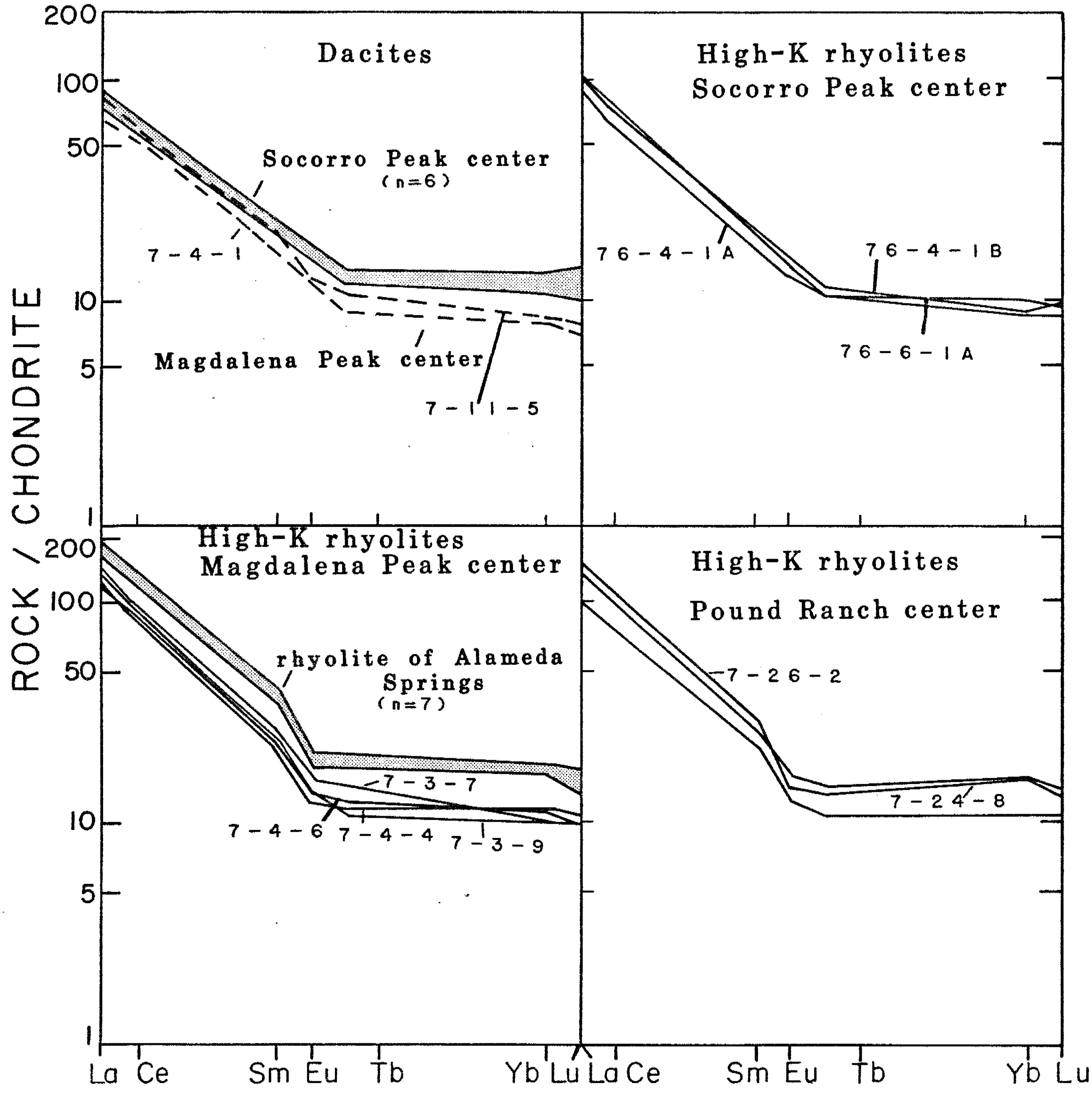

Figure 10. Chondrite-normalized REE plots for selected dacite to high-K rhyolite lavas. Stippled pattern represents REE envelope. These plots show the overall similarities in REE patterns for the dacites to high-K rhyolites at each center. (n = number of samp

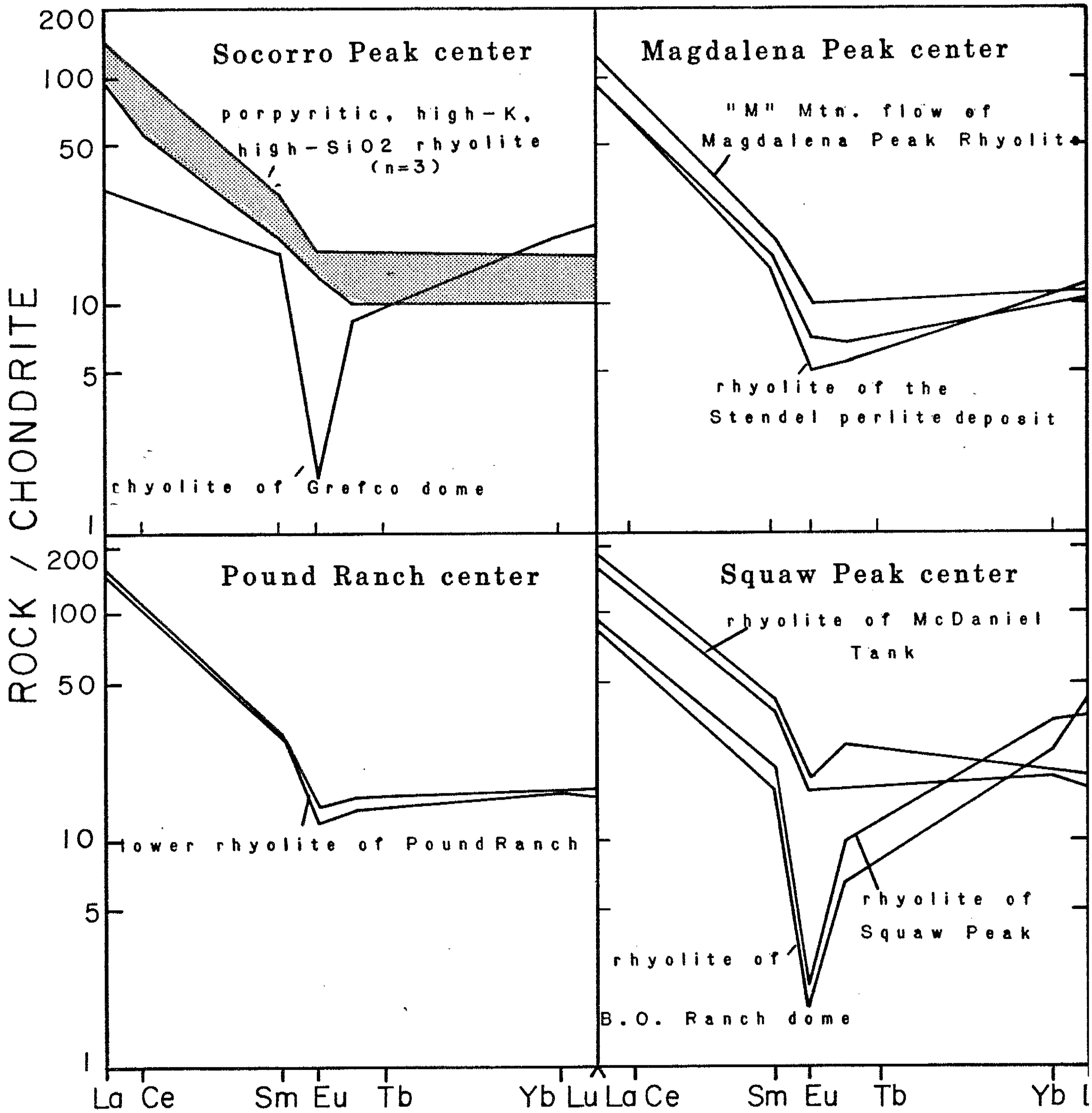

Figure 11. Chondrite-normalized REE plots for high-K, high-SiO2 rhyolite lavas. Stippled pattern represents REE envelope. (n = number of samples)

major- and trace-element data are discussed in this chapter first by the geochemical rock types and then by the four volcanic centers.

Mafic Lavas

Mafic lavas ranging from basalt to high-K andesite (48 to 60% SiO_2) occur in the Socorro Peak and Pound Ranch centers and near Council Rock. TiO_2, FeO*, MnO, MgO, and CaO show a negative covariation with SiO_2 concentration (Fig. 6). The Al_2O_3 pattern is effectively flat. The Na_2O trend is scattered. K_2O (Fig. 5) and P_2O_5 contents increase with increasing SiO_2 content; the K_2O covariation is continuous throughout the entire SiO_2 range. P_2O_5 content increases from 48 to 54% SiO_2 and then decreases with increasing SiO_2 content. The basaltic andesite of the basalt of Kelly Ranch shows a depletion, whereas the basaltic andesite of the basalt of Council Rock shows an enrichment in P_2O_5 relative to the mafic lavas of the Pound Ranch center (Fig. 6).

Plots of Rb, Hf, Ba, Pb, and Zr show a positive covariation with SiO_2 content (Fig. 8). The basaltic andesite of Kelly Ranch shows a depletion in Pb, sample PR2-77 of the basalt of Madera Canyon shows enrichment in Rb, and the basaltic andesite of Council Rock shows enrichment in Ba relative to the other mafic lavas. Nb, Ta, and Sc display a negative covariation with increasing SiO_2

concentration; the basaltic andesite of Kelly Ranch shows an enrichment in Sc and Ta. The Y and Th patterns are effectively flat. Sr displays no clear trend; the basaltic andesite of Council Rock shows enrichment in Sr (Fig. 8).

The mafic lava samples are REE-enriched relative to chondrite (Fig. 9) and the LREE are further enriched relative to the HREE. The basaltic andesite of Kelly Ranch displays a small negative Eu anomaly, whereas the samples of the basalt of Madera Canyon and basaltic andesite of Council Rock do not have a negative Eu anomaly, nor do they display a positive Eu anomaly. Sample PR2-77 of the basalt of Madera Canyon shows a large positive Eu anomaly (Fig 9). A thin section of this sample contains approximately 20% plagioclase which probably accounts for the positive Eu anomaly.

Dacites, High-K Dacites, High-K Rhyolites

Dacite, high-K dacite, and high-K rhyolite samples from the Socorro Peak, Pound Ranch, and Magdalena Peak centers have SiO_2 contents ranging from 67 to 73% (Fig. 5). TiO_2, Al_2O_3, FeO*, CaO, and P_2O_5 display negative covariations with SiO_2 concentration (Fig. 7). The upper rhyolite of Pound Ranch shows an enrichment in TiO_2 and the rhyolite of Alameda Springs shows a depletion in FeO*, CaO, and P_2O_5 relative to the samples from the other centers. MgO also displays a negative covariation with SiO_2, but it displays an appreciable amount of scatter due to analytical error, secondary remobilization, or a real Mg variation in the rocks (Fig. 7). Na_2O is constant or decreases slightly with increasing SiO_2. MnO shows no correlation with SiO_2 content. The rhyolite of Alameda Springs shows an enrichment in Na_2O and MnO relative to the samples from the other centers. The concentration of K_2O differs from the other major elements by showing a positive linear covariation with increasing SiO_2 content.

Zr and Sc exhibit a negative covariation with SiO_2 content throughout the entire SiO_2 range (Fig. 8). Hf and Y exhibit a negative covariation with SiO_2 content from 67 to 70% and then exhibit flat patterns with increasing SiO_2 content. The rhyolite of Alameda Springs (at about 72.5% SiO_2) shows an enrichment in Zr, Hf, and Y.

Ta, Nb, and Th display little variation in concentration between 67 and 70% SiO_2 and then a positive correlation with SiO_2 content (Fig. 8). The upper rhyolite of Pound Ranch shows an enrichment in Ta and the rhyolite of Alameda Springs shows an enrichment in Ta, Nb, and Th relative to the other samples.

Sr and Ba display a positive correlation with SiO_2 content from 67 to 71% and then a negative correlation with SiO_2 content. The samples from the Socorro Peak and Magdalena Peak centers show an enrichment in Sr and Ba content, and the rhyolite of Alameda Springs shows a depletion in Sr relative to the other dacite to high-K rhyolite samples.

Rb and Pb exhibit a positive covariation with SiO_2 content throughout the entire SiO_2 range. The upper rhyolite of Pound Ranch shows an enrichment in Rb, and the rhyolite of Alameda Springs shows an enrichment in both Rb and Pb.

The REE patterns for the dacite, high-K dacite, and high-K rhyolite samples show slight variations. All of the samples are enriched in REE relative to chondrite and they are LREE-enriched relative to HREE (Fig. 10). La shows significant enrichment and ranges from 76 to approximately 200 times chondritic abundance. The La concentration is lower in the Socorro Peak center samples relative to the samples from the other centers. Lu concentration ranges from 7 to 16 times chondritic abundance. The dacite of the Magdalena Peak Rhyolite shows a depletion in the HREE relative to the dacite of the Socorro Peak Rhyolite.

The size of the Eu anomaly generally increases with increasing SiO_2 content. The dacites show no Eu anomaly, whereas the Eu anomaly for the high-K rhyolites varies between centers. The Eu/Eu* anomaly is about 0.95 for the high-K rhyolites of the Socorro Peak center, 0.81 to 0.70 for the high-K rhyolites of the Pound Ranch center, and 0.88 to 0.51 for the high-K rhyolites of the Magdalena Peak center (Fig. 10).

The samples of the high-K rhyolite of Alameda Springs form a very coherent group that shows an overall enrichment in the REE relative to the samples from the other centers (Fig. 10). Additionally, the samples from the rhyolite of Alameda Springs display a moderate Eu anomaly (0.70).

High-K, High-SiO_2 Rhyolites

High-K, high-SiO_2 rhyolites are found in all four volcanic centers and have SiO_2 contents ranging from 73 to 78% SiO_2 (Fig. 5). TiO_2, Al_2O_3, FeO*, MgO, CaO, Na_2O, and P_2O_5 show a negative covariation with SiO_2 content (Fig. 7). The rhyolite of McDaniel Tank (at about 74% SiO_2) displays a slight depletion in FeO*, MgO, CaO, and P_2O_5, whereas the rhyolites of Grefco dome, Squaw Peak dome, and B.O. Ranch dome (at about 77% SiO_2) display extreme depletion in MgO (<0.01%), P_2O_5 (0.01%), and TiO_2 (0.05%) relative to the other high-K, high-SiO_2 rhyolite samples. The rhyolites of McDaniel Tank, Squaw Peak dome, and B.O. Ranch dome show an enrichment in Na_2O (Fig. 7).

MnO concentration shows no clear correlation with SiO_2 content; the rhyolite of Grefco dome of the Socorro Peak Rhyolite shows an enrichment in MnO. The K_2O trend, however, shows a positive covariation with SiO_2 content. The lower rhyolite of Pound Ranch displays an enrichment in K_2O, whereas the rhyolites of Squaw Peak dome and B.O. Ranch dome show a slight depletion in K_2O (Fig. 5).

Zr, Sc, Sr, and Ba exhibit a negative covariation with SiO_2 content (Fig. 8). The rhyolites of Squaw Peak dome, B.O. Ranch dome, and Grefco dome exhibit an extreme depletion in Sr and a slight enrichment in Sc. The lower rhyolite of Pound Ranch shows a slight enrichment in Zr, whereas the rhyolite of McDaniel Tank is significantly enriched in Zr relative to the other high-K, high-SiO_2 rhyolites.

The concentration of Hf is essentially constant, but the rhyolite of McDaniel Tank shows an enrichment Hf. Nb and Y display no clear trends with SiO_2 content and the rhyolite of Squaw Peak shows an enrichment in both Nb and Y (Fig. 8).

Th, Ta, Rb, and Pb exhibit positive covariations with SiO_2 content. The rhyolites of Squaw Peak dome and B.O. Ranch dome show an enrichment in Th, Ta, and Rb and the rhyolite of Grefco dome is enriched in Pb. The rhyolite of the Stendel perlite deposit shows a depletion in Ta relative to the other high-K, high-SiO_2 rhyolite samples.

Considerable variation is present in the REE patterns of the high-K, high-SiO_2 rhyolite samples (Fig. 11), but all of the samples display a negative Eu anomaly that increases with increasing SiO_2 content. The rhyolites of Grefco dome, Squaw Peak dome, and B.O. Ranch dome display large Eu anomalies (0.14) and HREE patterns that are steeply fractionated, but the rhyolite of Grefco dome shows a depletion in LREE relative to the rhyolites of Squaw Peak dome and B.O. Ranch dome.

The rhyolites of McDaniel Tank, Pound Ranch, and the Stendel perlite deposit display significant enrichment in LREE, modest Eu anomalies (0.74 to 0.57), and relatively flat HREE patterns (approximately 15 times chondritic abundance), except for the rhyolite of the Stendel perlite deposit which shows a fractionated HREE pattern (Fig. 11).

Geochemistry of the Volcanic Centers

Socorro Peak Center

In the Socorro Peak center, the sequence of volcanic lavas is not continuous and has distinct breaks from 55 to 67% SiO_2 content and from 73 to 77% SiO_2 content. The high-K basaltic andesite of the basalt of Kelly Ranch (Fig. 5) contains about 55% SiO_2. On the basis of Irvine and Baragar's (1971) A-F-M diagram, alkalies (Na_2O + K_2O) versus SiO_2 diagram, and Pearce and Cann's (1973) Ti-Zr-Y diagram, the basaltic andesite is considered to be calc-alkaline. However, the lavas erupted in the Socorro Peak center display the most complete sequence in composition of the four centers studied. Therefore, the Socorro Peak lavas will be examined in greater detail to serve as a model of comparison for the other eruptive centers.

Although the basaltic andesites appear to be stratigraphically and temporally associated with the silicic lavas of the Socorro Peak center (Table 1), the lack of lavas with compositions between 55 and 67% SiO_2 make it difficult to understand the evolutionary relationship between the basaltic andesite and the silicic lavas if there is one.

For the silicic lavas, TiO_2, Al_2O_3, FeO*, MgO, CaO, and P_2O_5 show a negative covariation with SiO_2 content (Fig. 7). The MnO concentration shows no clear trend as well as considerable scatter. The high-K, high-SiO_2 rhyolite of Grefco dome of the Socorro Peak Rhyolite shows an enrichment in MnO. The Na_2O pattern is effectively flat or decreasing slightly. K_2O differs from the other major elements because it displays a positive covariation with increasing SiO_2 content.

Most trace elements show very little scatter about their trend lines, indicating that secondary alteration has not affected the trace-element concentrations significantly. Y, Sc, Zr, and Eu exhibit negative covariations with SiO_2 content throughout the entire SiO_2 range (Fig. 8).

The concentration of Hf shows a flat to slightly decreasing trend with increasing SiO_2 content. The Sr and Ba concentrations peak at about 71% SiO_2 and then show a negative correlation with SiO_2 content (Fig. 8). The rhyolite of Grefco dome shows an extreme depletion in both Sr and Ba. Ta and Nb exhibit constant concentrations between 67 and 71% SiO_2 and then positive correlations with SiO_2 content. Rb, Th, and Pb display positive covariations with SiO_2 throughout the entire SiO_2 range.

The samples from the Socorro Peak center are enriched in REE relative to chondritic abundances (Figs. 9, 10, 11). LREE enrichment ranges from 33 to 138 times chondritic abundance and HREE enrichment ranges from 9 to 21 times chondritic abundance. When the sample representing the rhyolite of Grefco dome is excluded, the remaining samples cluster with LREE values 77 to 138 times chondrite and with HREE values 9 to 17 times chondrite. The HREE patterns are relatively flat except for the sample of the rhyolite of Grefco dome which has a markedly fractionated HREE pattern.

The magnitude of the negative Eu anomaly increases with increasing SiO_2 content. The Eu anomaly is 1.00 in the dacites, 0.95 in the high-K rhyolites, 0.84 to 0.73 in the phenocryst-rich, high-K, high-SiO_2 rhyolites, and 0.14 in the high-K, high-SiO_2 rhyolite of Grefco dome.

Pound Ranch Center

Similar to the eruptive sequence of the Socorro Peak center, the eruptive sequence in the Pound Ranch center was also bimodal. There is, however, limited age control on the basalt of Madera Canyon and the basalt of Bear Canyon which underlie and overlie the rhyolites respectively. Although spatially related, it is uncertain if a genetic relationship exists between these two basalt flows and the rhyolites of the Pound Ranch center. The basalts are variable chemically and mineralogically.

The basalt of Bear Canyon and sample PR2-77 of the basalt of Madera Canyon are undersaturated alkali basalts, containing about 5% normative Ne and 17% normative Ol (Appendix 4). They are plotted in the alkali basalt field on Pearce and Cann's (1973) Zr-Ti-Y diagram and within the alkali basalt field on Irvine and Baragar's (1971) Na_2O + K_2O versus SiO_2 and A-F-M diagrams. Their chemistries appear to be similar to the young alkali basalts found in the Rio Grande rift, and this suggests that alkali volcanism has occurred for more than 12 m.y. in the southern area of the Rio Grande rift.

The basalt of Madera Canyon comprises alkali basalt, high-K basaltic andesite, and high-K andesite (Fig. 5). Using the same classification diagrams described above, sample 7-26-7 of the basalt of Madera Canyon appears transitional between an alkali and calc-alkali basalt. Using Pearce and Cann's Zr-Ti-Y diagram, Irvine and Baragar's A-F-M diagram, and Wood's (1980) Th-Ta-Hf diagram, sample 7-26-6 of the basalt of Madera Canyon can be classified as a calc-alkali basalt. The basalt of Bear Canyon and the basalt of Madera Canyon will not be discussed any further in this paper, but representative major- and trace-element plots are presented in Figs. 5, 6, 8, and 9, and chemical data sheets are presented in Appendix 4.

There are no meaningful major- and trace-element variation trends for the high-K upper rhyolite and high-K, high-SiO_2 lower rhyolite of Pound Ranch (Figs. 7, 8). Major-element plots representing these silicic flows generally fall within the composite trend lines that represent the four eruptive centers (Fig. 7), except that TiO_2 and P_2O_5 show an enrichment in the upper rhyolite of Pound Ranch.

Trace-element plots of the rhyolites generally fall within the composite trend lines that represent the four eruptive centers (Fig. 8) with the following exceptions: Rb, Zr, Nb, Ta, and Th. All of these elements show enrichment in the rhyolites of Pound Ranch relative to the other silicic lavas of this study (Fig. 8). The REE patterns are similar to those of the Socorro Peak center lavas, except that the Pound Ranch lavas have a greater enrichment in the LREE and a greater Eu anomaly (Figs. 10, 11).

Magdalena Peak Center

Considerable spread in both the major- and trace-element data is present in the analyses of the high-K rhyolites from the Magdalena Peak center; the spread is greater than the variation seen in samples from a single flow at any one location. Therefore, although field observations indicate only one flow for the Magdalena Peak

Rhyolite the chemistry suggests that there are probably more.

Analyses of the Magdalena Peak center silicic lavas exhibit trends on major-element plots similar to the silicic lavas of the Socorro Peak center (Fig. 7) with one exception. The rhyolite of Alameda Springs which averages 72.5% SiO_2 has lower FeO*, MgO, CaO values and higher MnO, Na_2O, and K_2O values than the Socorro Peak Rhyolite and the Magdalena Peak Rhyolite with equivalent SiO_2 content (Fig. 7).

On trace-element plots against SiO_2 (Fig. 8), the Magdalena Peak center lavas exhibit trends similar to the lavas of the Socorro Peak center. However, Y, Th, Nb, and Ta show a depletion in the Magdalena Peak Rhyolite relative to the rhyolites from the Pound Ranch and Squaw Peak centers. The Ta concentration shows little variation throughout the entire SiO_2 range of the Magdalena Peak center lavas (Fig. 8). The high-K rhyolite of Alameda Springs shows an enrichment in Rb, Y, Zr, Nb, HF, Ta, Pb, and Th and a depletion in Sr relative to the other lavas of the Magdalena Peak center (Fig. 8).

The REE patterns are similar to those of the Socorro Peak center lavas (Figs. 10, 11). Excluding the rhyolite of Alameda Springs, the LREE show enrichment (75-140 times chondritic abundance), Eu anomalies increase with increasing SiO_2 content and the HREE patterns are essentially flat, except for the high-K, high-SiO_2 rhyolite of the Stendel perlite deposit which shows a fractionated HREE pattern.

Squaw Peak Center

All the three eruptive units in the Squaw Peak center are high-K, high-SiO_2 rhyolites (Fig. 5). The high-K, high-SiO_2 rhyolites of Squaw Peak and B.O. Ranch domes have similar chemistries (Appendix 4). These two rhyolites are the most SiO_2-rich lavas (approximately 78% SiO2) found in the Socorro area.

The rhyolites of Squaw Peak and B.O. Ranch domes lie on the major-element trend lines defined by the other lavas of this study with the following exceptions: MnO and Na_2O show an enrichment, whereas K_2O and MgO show a depletion (Fig. 7). The rhyolite of McDaniel Tank lies on the TiO_2, Al_2O_3, and K_2O trend lines defined by the other lavas of this study; however, MnO and Na_2O show an enrichment and FeO*, MgO, CaO, and P_2O_5 show a depletion relative to the other lavas of this study (Fig. 7).

The rhyolites of Squaw Peak and B.O. Ranch domes display an enrichment in most trace elements (Sc, Rb, Y, Nb, Hf, Ta, Pb, and Th; Fig. 8) relative to the other lavas of this study. Additionally, they show an extreme depletion in Sr and Ba. The rhyolite of McDaniel Tank shows an enrichment in Y, Zr, Nb, Hf and Ta and a depletion in Sr relative to the other rhyolites of this study (Fig. 8).

The REE patterns for all three units in this center show a greater LREE enrichment and greater Eu anomalies when compared to the lavas from the other centers (Fig. 11). The HREE pattern of the rhyolite of McDaniel Tank is relatively flat, whereas the rhyolites of the two domes have a steeply fractionated HREE pattern similar to the rhyolite of Grefco dome of the Socorro Peak Rhyolite and the rhyolite of the Stendel perlite deposit.

Rb/Sr Chemistry

Four Sr 87/Sr 86 determinations of lavas in the Socorro area were given by Chapin and others (1979). Using Rb and Sr determinations made in this study, the initial Sr 87/Sr 86 ratios have been calculated (Table 3). Two additional Sr 87/Sr 86 determinations were made by Sam Bowring (personal communication 1983). The six analyses vary from 0.7049 to 0.7067.

The dacites, high-K rhyolites, and high-K, high-SiO_2 rhyolites of the Socorro Peak Rhyolite show variable initial Sr 87/Sr 86 ratios ranging from 0.7049 to 0.7064. A basaltic andesite sample has a 0.7051 ratio which overlaps with a high-K rhyolite sample. The initial Sr 87/Sr 86 ratios generally increase with increasing SiO_2 concentration.

Table 3. Strontium isotopic analyses of Miocene samples from the Socorro area, New Mexico. Rb and Sr (ppm) were determined using XRF analysis (this study) unless otherwise noted.

Sample number	Stratigraphic unit (weight percent SiO_2)	Age (m.y.)	Rb (ppm)	Sr (ppm	Measured Sr87/Sr86	Initial Sr87/Sr86
76-1-9	basalt of Kelly Ranch (55%)	~12.0	38	588	0.7051*	0.7051
8-15-5	Socorro Peak Rhyolite (68%)	10.6	55**	432**	0.7063**	0.7062**
76-6-1a	Socorro Peak Rhyolite (71%)	12.1	62	434	0.7050*	0.7049
76-6-3	Socorro Peak Rhyolite (73%)	9.2	90	225	0.7065*	0.7064
7-28-3	upper rhyolite of Pound Ranch (72%)	10.8	43**	424**	0.7069**	0.7067**
77-3-1	lower rhyolite of Pound Ranch (74%)	12.1	185	203	0.7070*	0.7066

$\lambda = 1.42 \times 10^{-11}$ yrs

* Chapin and others (1979)

** determined by Sam Bowring (personal communication 1983)

U/Pb Chemistry

Three determinations of Pb 207/Pb 204 and Pb 207/Pb 204 on silicic lavas of the Socorro area were made by Sam Bowring (personal communication 1983) for this study. The three analyses display very similar Pb 207/Pb 204 and Pb 206/Pb 204 ratios (Table 4) and do not show a positive correlation with increasing SiO_2 content.

Table 4. Lead isotopic data of samples from the Socorro area, New Mexico.

Sample number	Stratigraphic unit	Geochemical rock type (weight percent SiO_2)	U (ppm)	Pb (ppm)	Pb 206/204	Pb 207/204
7-28-3	upper rhyolite of Pound Ranch	high-K rhyolite (72%)	3.17	20.0	17.537	15.500
7-18-5	rhyolite of Squaw Peak	high-k, high-SiO_2 rhyolite (78%)	11.29	29.9	17.530	15.487
8-15-5	Socorro Peak Rhyolite	dacite (68%)	0.87	15.0	17.339	15.468

Analyst: Sam Bowring (personal communication 1983)

PETROGENESIS

Introduction

Most of the silicic volcanics at the four volcanic centers of this study are similar geochemically, isotopically, and petrographically. On major-element plots they appear to define a single evolutionary trend (Figs. 5, 7). It is, therefore, likely that the processes controlling the evolution of the silicic magmas were similar for each center. However, trace-element data are not so coherent and there are small, but apparent, differences between each center (Fig. 8). Also, because the rocks span a considerable period of time, possibly as much as 10 m.y., they must represent a series of discrete magma pulses. Because the rocks from the Socorro Peak center represent the most complete sequence, they will be examined in greater detail to serve as a model for the petrogenesis of similar volcanic rocks from the other eruptive centers.

Petrogenetic models for magma types not found at the Socorro Peak center are discussed at the end of this chapter. In the discussion that follows, the high-K, high-SiO_2 rhyolites of the Socorro Peak Rhyolite refer to phenocryst-rich rhyolites, and they do not include the phenocryst-poor, high-K, high-SiO_2 rhyolite of Grefco dome of the Socorro Peak Rhyolite.

Mafic rocks are found in the Socorro Peak and Pound Ranch centers, but it is not clear that the basalts in the Pound Ranch center are genetically related to the rhyolites. However, I believe the basaltic andesite of the basalt of Kelly Ranch is genetically related to the silicic rocks of the Socorro Peak center for the following reasons: 1) the basalt is temporally and spatially close to the dacites and rhyolites (Table 1); 2) a basalt sample has a similar Sr isotope composition to one of the rhyolites (Table 3); and 3) the basaltic, dacitic, and rhyolitic rocks all contain sieve-textured, basic, plagioclase phenocrysts (Appendix 3). Because of the large compositional gap between the basaltic andesite and the dacites and the limited amount of sampling done on the basaltic andesite, petrogenetic modelling for the evolution of the lavas has been restricted to the silicic lavas only.

At this time, the petrogenesis of the dacites (67 to 70% SiO_2) is uncertain. The strongest evidence for the origin of the dacites is believed to be the isotopic Sr and Pb ratios (Tables 3, 4). The initial Sr 87/Sr 86 (0.7062), Pb 207/Pb 204 (15.5), and Pb 207/Pb 204 (17.4) ratios likely restrict the origin of the dacites to: 1) a partial melting of mantle rocks; 2) a partial melting of nonradiogenic upper-crustal rocks; 3) a differentiate of a more mafic magma; and 4) a partial melting of lower-crustal rocks.

The SiO_2 content of the dacites (67 to 70%) probably eliminates the possibility of direct partial melting of mantle rocks because the small amount of melting that would be necessary to produce the dacites could not be effectively removed from the source. A partial melting of nonradiogenic upper-crustal rocks cannot be conclusively eliminated as a possible origin for the dacites.

The REE data suggests that the dacites were probably not derived by fractional crystallization of the basalt of Kelly Ranch, a mafic lava that is temporally and spatially close to the dacites (Fig. 2; Table 1). The REE pattern for the basalt of Kelly Ranch has a negative Eu anomaly and a greater LREE concentration when compared to the REE pattern for the dacites. If the dacites evolved by fractional crystallization of a more mafic lava, it is likely that plagioclase would be removed fractionally from the mafic lava. Therefore, it is also likely that the REE pattern of the dacites would show a negative Eu anomaly and an increase in the LREE concentration relative to the parent mafic lava. However, the REE pattern of the dacites does not have a negative Eu anomaly and shows LREE depletion relative to the basalt of Kelly Ranch (Figs. 9, 10). Therefore, the REE pattern of the dacites does not appear to be consistent with a petrogenesis of the dacites by fractional crystallization of the basalt of Kelly Ranch. However, the initial Sr isotopic ratio and initial Pb isotopic ratios are within the range of lavas generated by partial melting of mantle rocks that have undergone subsequent crustal contamination. Therefore, the evidence is ambiguous for derivation of the dacites from a mantle-derived mafic lava.

The constraints for the evolution of the dacites by a partial melting of the lower crust are: 1) the lower crust may have a Sr isotopic ratio between 0.705 and 0.708 (Thompson and others, 1982); 2) the lower crust has Pb isotopic ratios that are probably equivalent to those of the dacites (Doe and Zartman, 1979); 3) the light/heavy REE ratio of the dacites suggests that melting likely occurred where garnet or amphibole were stable residual phases and/or the source was LREE enriched; and 4) the lack of an Eu anomaly in the REE pattern of the dacites suggests that if the source rocks contained plagioclase and/or K-feldspar these two mineral phases were not preferentially melted nor were they preferentially retained in the mineralogy of the source. Although, these four criteria can be satisfied by a partial melting of lower-crustal rocks, a partial melting of three lower-crustal rock types (amphibolite, granulite, basalt; Table 9) did not produce the measured REE patten nor the trace-element concentrations of the dacite (Fig. 13). Thus, the evidence for the production of the dacites by a direct partial melting of the lower crust is also ambiguous and more work needs to be done on the petrogenesis of the dacites.

The two major processes that may have controlled the evolution of the rhyolitic lavas of the Socorro Peak center are fractional crystallization of a more mafic lava or partial melting of the same sources that were examined for the petrogenesis of the dacitic magma. In addition, secondary processes that may have occurred include: 1) crustal contamination; 2) magma mixing; or 3) a combination of the above processes. In the following section I will discuss evidence supporting the hypothesis that the high-K to high-K, high-SiO_2 rhyolite suite of the Socorro Peak center is genetically related to and was probably produced by fractional crystallization starting with a dacitic magma.

Consanguinity of the Silicic lavas of Socorro Peak

Several lines of evidence indicate that the silicic rocks (dacite, high-K rhyolite, and high-K, high-SiO_2 rhyolite) of Socorro Peak are comagmatic. First, they plot as a coherent and continuous trend on major- and trace-element Harker variation diagrams (Figs. 5, 7, 8). Second, the limited number of initial Sr 87/Sr 86 ratios show a general increase with increasing SiO_2 (Table 3). Third, Rayleigh fractionation calculations closely model changes in trace-element and REE concentrations throughout the rock series (Fig. 12; Table 7).

Fractional Crystallization Model

Major-Element Modelling

Introduction

For the Socorro Peak lavas, a fractional crystallization model was tested using least-squares calculations (Wright and Doherty, 1970). The assumption was made that the dacite was the parent of the high-K rhyolite and then that the high-K rhyolite was the parent of the phenocryst-rich, high-K, high-SiO_2 rhyolite.

In each calculation the major-element composition of the parent rock was calculated by adding the major-element composition of the daughter rock (the residual liquid) to the major-element composition of the phenocryst phases thought to have fractionally crystallized from the parent rock (Tables 5, 6). The daughter rock represents the residual liquid left after the phenocryst phases have fractionally crystallized. The selection of the fractionally crystallized minerals was based on the phenocryst phases observed to be present in the rocks. The composition of the phenocryst phases used are from Deer, Howie, and Zussman (1962).

Table 5. Fractional crystallization model for the derivation of high-K rhyolite by crystal fractionation of a dacite.

	Measured** dacite parent	Calc- ulated dacite parent	Measured high-K rhyolite daughter	Mineral phases fraction- ated	Weight % of mineral phases fractionated
SiO_2	68.39 ±0.72	67.53	70.25	high-K rhyolite	83.81
TiO_2	0.54 ±0.01	0.56	0.40		
Al_2O_3	16.22 ±0.11	16.53	15.25	plagioclase (An 41)	13.01 (80.4)X
FeO*	3.16 ±0.22	3.09	2.58		
MnO	0.05 ±0.01	0.05	0.05	amphibole	2.35 (14.5)X
MgO	0.95 ±0.22	0.98	0.79	titano- magnetite	0.76 (4.7)X
CaO	3.64 ±0.26	3.80	2.93		
Na_2O	3.89 ±0.14	4.15	3.92	apatite	0.08 (0.5)X
K_2O	3.02 ±0.27	3.15	3.68		
P_2O_5	0.15 ±0.01	0.15	0.14		

** Mean and standard deviation (expressed in weight percent) of 11 samples from the Socorro Peak Rhyolite formation: 8-5-1, 8-7-4, 8-7-5, 8-15-5, 8-14-6, 8-14-7, 8-15-1, 8-15-3, 8-15-4, 8-15-5, 8-19-2

X = Mineral abundances recalculated to 100%

Composition of mineral phases fractionated

	Plagioclase (An 41)	Amphibole	Titano- magnetite	Apatite
SiO_2	58.35	45.22	0.34	0.00
TiO_2	0.00	0.70	27.66	0.00
Al_2O	25.95	15.32	2.39	0.00
FeO*	0.64	14.56	66.37	0.22
MnO	0.00	0.28	0.63	1.59
MgO	0.04	12.45	2.00	0.56
CaO	8.05	10.53	0.61	52.69
Na_2O	6.51	0.82	0.00	0.00
K_2O	0.46	0.12	0.00	0.00
P_2O_5	0.00	0.00	0.00	44.93
Total	100.00	100.00	100.00	100.00

Table 6. Fractional crystallization model for the derivation of the high-K, high-SiO_2 rhyolite by crystal fractionation of the high-K rhyolite.

	Measured high-K rhyolite parent++	Calculated high-K rhyolite parent	Measured high-K, high-SiO_2 rhyolite daughter+	Mineral phases fractionated	Weight % of mineral phases fractionated
SiO_2	70.25 ±0.23	70.15	72.32 ±0.66	high-K, high-SiO_2 rhyolite	82.63
TiO_2	0.40 ±0.02	0.40	0.32 ±0.02		
Al_2O_3	15.25 ±0.35	15.39	14.43 ±0.24		
FeO*	2.58 ±0.00	2.56	2.06 ±0.20	plagioclase (An 37)	12.06 (69.4)X
MnO	0.05 ±0.00	0.05	0.05 ±0.01		
MgO	0.79 ±0.05	0.79	0.54 ±0.08	biotite	2.49 (14.3)X
CaO	2.93 ±0.03	2.88	2.24 ±0.37	quartz	2.21 (12.7)X
Na_2O	3.92 ±0.09	3.87	3.66 ±0.20	magnetite	0.41 (2.4)
K_2O	3.68 ±0.13	3.76	4.29 ±0.38	apatite	0.15 (0.9)X
P_2O_5	0.14 ±0.00	0.14	0.09 ±0.01	sphene	0.05 (0.2)X

++ Mean and standard deviation (expressed in weight percent) of eight samples from the Socorro Peak Rhyolite formation: 76-4-1a, 76-4-1b, 76-6-1a, 8-7-1, 8-7-2, 8-7-3, 8-10-3, 8-10-4

\+ Mean and standard deviation (expressed in weight percent) of 16 samples from the Socorro Peak Rhyolite formation: 76-6-3, 8-10-5, 8-10-6, 8-10-7, 8-10-8, 8-10-9, 8-15-6, 8-15-7, 8-15-8, 8-22-1, 8-22-2, 8-22-3, 8-22-4, 8-22-5, 8-22-6, 8-22-7

X = Mineral abundances recalculated to 100%

<u>Compositions of mineral phases</u>

	Plagioclase (An 37)	Biotite	Quartz	Magnetite	Apatite	Sphene
SiO_2	59.25	41.21	100.00	0.29	0.00	30.99
TiO_2	0.02	4.50	0.00	0.01	0.00	37.92
Al_2O_3	25.91	13.79	0.00	0.23	0.00	1.50
FeO*	0.09	17.57	0.00	99.47	0.22	1.02
MnO	0.00	0.15	0.00	0.00	1.59	0.18
MgO	0.05	13.42	0.00	0.00	0.56	0.01
CaO	7.45	1.73	0.00	0.00	52.69	28.39
Na_2O	6.90	0.74	0.00	0.00	0.00	0.00
K_2O	0.32	6.90	0.00	0.00	0.00	0.00
P_2O_5	0.00	0.00	0.00	0.00	44.93	0.00
Total	99.99	100.01	100.00	100.00	99.99	100.01

Dacites to High-K Rhyolites

The results of the least-squares calculations suggest that fractional crystallization of the dacitic parent magma involving the removal of plagioclase (An 41), amphibole, titanomagnetite, and minor apatite could produce the high-K rhyolites (Table 5). There is an excellent agreement between the chemistry of the calculated and the measured parent. For the calculated and measured parent rocks, the concentrations of the major elements are generally within 5%. The single exception is that Na_2O was measured to be 7% higher in the calculated dacite parent (Table 5). This result may be due to the higher mobility of the alkalies during the post-solidification processes (Cameron and others, 1980).

High-K Rhyolites to High-K, High-SiO_2 Rhyolites

Derivation of the high-K, high-SiO_2 rhyolites by crystal fractionation of a High-K rhyolite is possible if plagioclase (An 37), biotite, quartz, and magnetite and minor apatite and sphene phenocrysts are removed (Table 6). Once again there is an excellent agreement between the chemistry of the calculated and measured parent. It should be noted that abundant amounts of sanidine were observed to be present in the high-K, high-SiO_2 rhyolites, but that sanidine was not used in the fractional crystallization model that was used to derive the high-K, high-SiO_2 rhyolite from the high-K rhyolite.

Trace-Element Modelling

Introduction

The mineral phases determined to have been separated during the major-element modelling were also used for trace-element modelling using a Rayleigh fractionation equation (Appendix 6). The calculated trace-element concentrations of the high-K rhyolite daughter were then compared to the measured trace-element concentrations of the high-K rhyolite (Tables 7, 8). Rayleigh fractionation assumes that crystal fractionation occurs in a closed system (Allegre and others, 1977). The partition coefficients used were compiled from a search of the literature and are presented in Appendix 7.

Dacites to High-K Rhyolites

Trace-element calculations show that in the production of the high-K rhyolites from the dacites the Ce/Yb, Rb/Sr ratios, and the size of the negative Eu anomaly increase, whereas the middle and heavy REE and Y concentrations decrease (Table 7). Fractional crystallization involving appreciable amounts of amphibole would likely result in a decrease in the middle and heavy REE concentrations

Table 7. Measured and calculated* trace-element concentrations (ppm) of the high-K rhyolites and the high-K, high-SiO_2 rhyolites of the Socorro Peak Rhyolite.

	High-K rhyolite		High-K, high-SiO_2 rhyolite	
	Measured**	Calculated	Measured***	Calculated
(ppm) Rb	64 ±2	68	89 ±7	72
Sr	469 ±23	422	265 ±44	265
Y	20 ±0.5	23	22 ±4.5	22
Nb	10.3 ±0.5	8.9	13.4 ±2.4	12.4
Ba	1447 ±65	1163	979 ±170	1353
La	33.8 ±2.5	30.1	32.7 ±9	38.3
Ce	59.3 ±3.6	57.6	59.7 ±22	60.3
Sm	4.13 ±0.3	4.28	4.17 ±1.4	4.43
Eu	1.11 ±0.08	1.12	1.01 ±0.3	1.10
Tb	0.54 ±0.02	0.60	0.58 ±0.2	0.61
Yb	2.00 ±0.1	2.30	2.50 ±0.8	2.30
Lu	0.31 ±0.01	0.37	0.39 ±0.10	0.34
Hf	4.50 ±0.3	4.90	4.50 ±0.80	5.10
Ta	0.64 ±0.05	0.59	0.99 ±0.27	0.77
Th	4.90 ±0.40	3.30	6.70 ±0.90	5.80

* derived by using the mineral phases fractionally crystallized in the major-element program in a Rayleigh fractionation equation (Appendix 6, equation 1)

** mean and standard deviation (expressed in ppm) of four analyses: 76-4-1a, 76-4-1b, 76-6-1a, 8-10-4

*** mean and standard deviation (expressed in ppm) of three analyses: 8-22-6, 8-15-7, 8-10-8; Rb, Sr, Y, Zr, Nb, and Th also include data from samples 8-22-2 and 76-6-3

Table 8. Measured trace-element concentrations (ppm) for the average dacite, high-K rhyolite and high-K, high-SiO_2 rhyolite of the Socorro Peak Rhyolite.

(ppm)	Dacite+	High-K rhyolite++	High-K, high-SiO_2 rhyolite+++
Rb	57 ±14	64 ±2	89 ±7
Sr	445 ±18	469 ±23	265 ±44
Ba	1021 ±59	1447 ±65	979 ±170
La	27.5 ±2.4	33.8 ±2.5	32.7 ±9.0
Ce	53.0 ±2.2	59.3 ±3.6	59.7 ±22.0
Sm	4.45 ±0.26	4.13 ±0.30	4.17 ±1.40
Eu	1.20 ±0.09	1.11 ±0.08	1.01 ±0.30
Tb	0.64 ±0.03	0.54 ±0.02	0.58 ±0.21
Yb	2.48 ±0.30	2.00 ±0.12	2.50 ±0.82
Th	2.85 ±0.41	4.90 ±0.40	6.70 ±0.90

+ mean and standard deviation (expressed in ppm) of four analyses: 8-7-4, 8-7-5, 8-15-5, 8-19-2

++ mean and standard deviation (ppm) of four analyses: 76-4-1a, 76-4-1b, 76-6-1a, 8-10-4

+++ mean and standard deviation (ppm) of three analyses: 8-22-6, 8-15-7, 8-10-8; Rb, Sr, and Th also include data from samples 8-22-2 and 76-6-3

(Nagasawa and Schnetzler, 1971; Arth and Barker, 1976). The increase in the Eu anomaly and Rb/Sr ratio, when progressing from the dacites to the high-K rhyolites, can be interpreted to result from plagioclase fractionation. Additionally, plagioclase and amphibole crystallizing together would be likely to increase the light REE concentrations and result in an increase in the Ce/Yb ratio (Cameron and Hanson, 1982).

The increase in the Sr and Ba concentrations, when progressing from the dacites to the high-K rhyolites, is possibly the result of the crystallizing phases (Table 5) rejecting Sr and Ba. Hildreth (1977) and Arth (1976) noted that only K-feldspar and biotite possess partition coefficients greater than unity for Ba and these phases were present in only trace amounts in the dacitic parent magma. Cullers and others (1981) noted that Ba concentration may be constant or increase initially in a fractionally crystallizing, silicic magma chamber. Philpotts and Schnetzler (1970) and Sun and others (1974) noted that the variation in the partition coefficients (Kd values) with the composition of the liquid occurs in plagioclase-melt systems for Sr, K, Rb, and Ba. However, the plagioclase Kd value for Sr in the dacite parent would have to be less than unity to achieve the Sr concentration calculated for the high-K rhyolite daughter. Alternatively, secondary enrichment, by hydrothermal solutions, of Sr and Ba may have occurred in the high-K rhyolites.

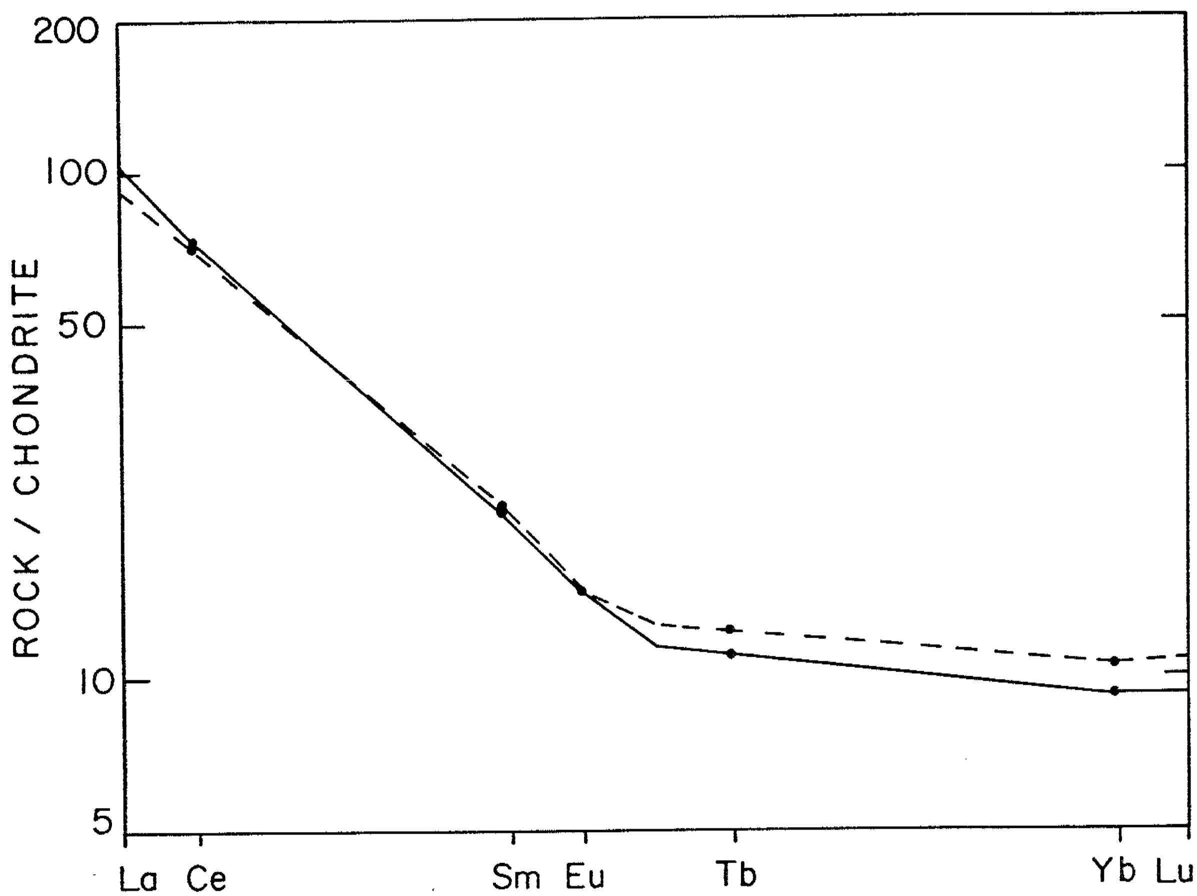

Figure 12a. Comparison of measured and calculated chondrite-normalized REE patterns for high-K rhyolite lavas of the Socorro Peak center. Solid line represents the measured pattern; dashed line represents the calculated pattern.

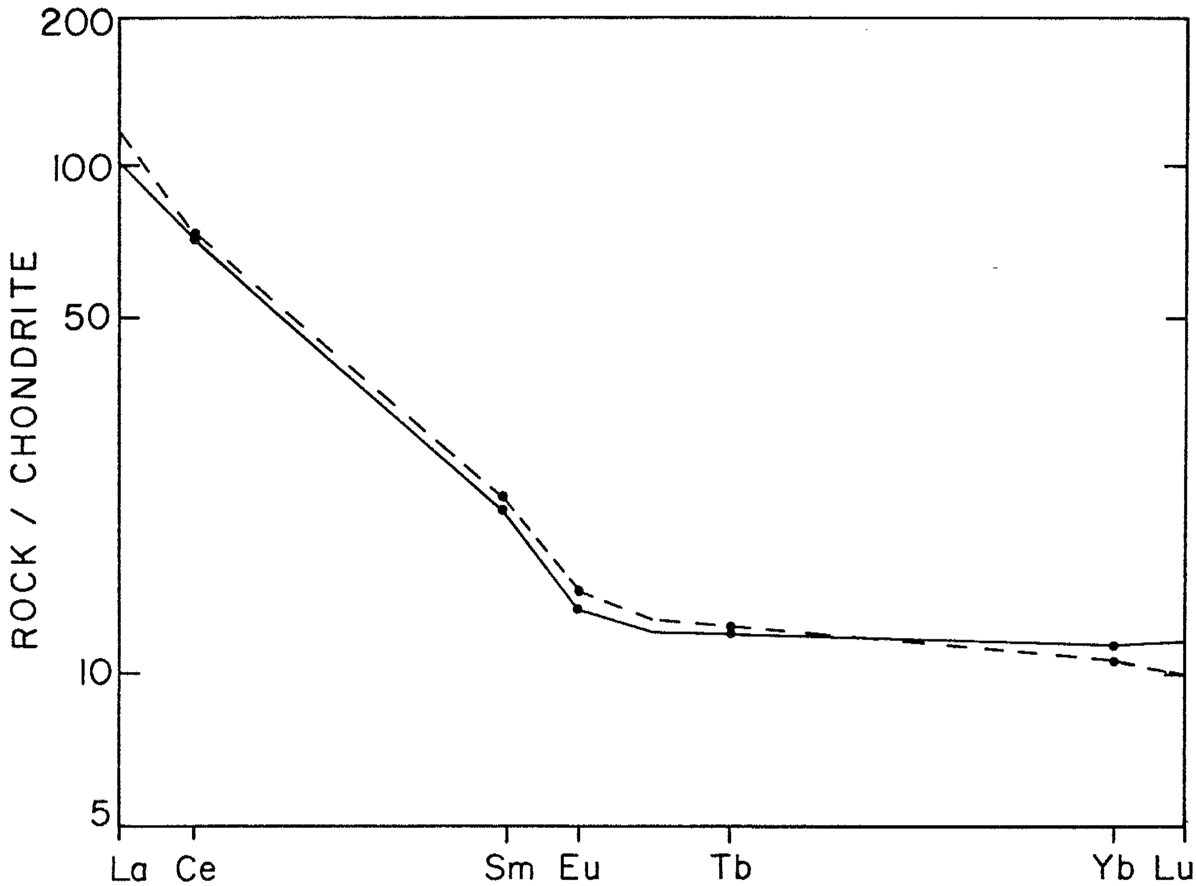

Figure 12b. Comparison of measured and calculated chondrite-normalized REE patterns for high-K, high-SiO_2 rhyolite lavas of the Socorro Peak center. Solid line represents the measured pattern; dashed line represents the calculated pattern.

A comparison of measured and calculated REE patterns for the high-K rhyolites is presented in Figure 12a. It shows a good agreement between the measured and calculated REE patterns. However, there is a small discrepancy between the measured and calculated middle and heavy REE patterns. These could have been caused by either a higher amphibole/plagioclase ratio in the fractionated minerals or by a higher amphibole Kd value for the middle and heavy REE than those used here (Table A7a). The lower Y concentration in the high-K rhyolite, relative to the dacite, also possibly results from the fractional crystallization of amphibole in the dacitic magma.

High-K Rhyolites to High-K, High-SiO_2 Rhyolites

Plagioclase, quartz, and biotite were the major-mineral phases calculated to have been removed during the production of the high-K, high-SiO_2 rhyolite from a high-K rhyolite parent when using a fractional crystallization model (Table 7). Of these mineral phases, only biotite and plagioclase have an appreciable effect on the trace-element concentrations in the high-K, high-SiO_2 rhyolite daughter.

Biotite concentrates the light REE rather than the middle or heavy REE (Table A7b). This may account for the lower Ce/Yb ratio and higher Y concentration in the high-K, high-SiO_2 rhyolites relative to the high-K rhyolites (Figs. 12a, 12b). For the calculated high-K, high-SiO_2

rhyolites, the Ba concentration is too high relative to the measured concentration. This is possibly due to the omission of sanidine as a fractionating phase in the fractional crystallization modelling program when progressing from the high-K rhyolites to the high-K, high-SiO_2 rhyolites. Alternatively, the calculated Ba concentration in the high-K, high-SiO2 rhyolite may reflect secondary enrichment by hydrothermal solutions. The concentration of Sr shows an excellent agreement for the measured versus calculated high-K, high SiO_2 rhyolites (Table 7).

A comparison of the measured and calculated REE patterns for the high-K, high-SiO_2 rhyolites is presented in Figure 12b. Figure 12b shows a good fit between the measured and calculated REE patterns. However, the calculated La concentration is too high when compared to the measured value (Fig. 12b; Table 7). A possible reason for this is that Kd values are known to vary with temperature, pressure, and composition of the phases (Allegre and Minster, 1978); therefore, the Kd value of plagioclase and/or biotite for La may have been greater than the values reported in the literature (Appendix 7).

The daughter magmas show good agreement between the calculated and measured concentrations of most trace elements (Table 7). Reasons for the discrepancies between the calculated and measured concentrations of the trace elements could occur for two reasons. First, Rayleigh fractionation is used to model equilibrium crystallization of an infinitesimal fraction of the magma body that is followed by the instantaneous removal of the phenocrysts which are then covered over by more fractionally crystallized mineral phases, thus preventing a re-equilibration of the fractionally crystallized phenocrysts with the remaining melt. The least-squares fractional crystallization program of Wright and Doherty (1970), however, implies equilibrium crystallization over rather large ranges of crystallization before removal of the crystallized phases (Cameron and Hanson, 1982). Second, the choice of distribution coefficients (Kd values) would strongly affect the amount of fractionation in the trace-element calculations required to produce a daughter from a parent magma.

Zircon

Zircon was not included in the least-squares fractional crystallization program; however, it was observed as a phenocryst phase in all of the silicic magmas from the Socorro Peak center. Zirconium concentration decreased from the dacite to the high-K, high-SiO_2 rhyolite, so it was probably fractionally crystallized. In this paper it was assumed that all the zirconium was removed with zircon, although one should note that the partition coefficient of zirconium in amphibole is high (4-6; Table A7a). Therefore, by using the amount of residual melt (83.8 and 82.6 for the high-K and high-K, high-SiO_2 rhyolites respectively) and weight percent of zirconium in zircon (approximately 48%), the weight percent of zircon microphenocrysts was calculated to be approximately 0.0001% for both the high-K and high-K, high-SiO_2 rhyolites. This amount of zircon is petrographically reasonable.

Partial Melting Model

Introduction

The partial melting model cannot be tested as rigorously as the fractional crystallization model because of lack of knowledge concerning: the composition and mineralogy of the crust beneath the Socorro Peak center, the mid-Miocene geothermal gradient, and the amount of H2O present that might help promote anatexis of the crust.

Direct partial melting of a mantle source is unlikely because of the siliceous composition of the rhyolitic rocks. The initial Sr 87/Sr 86 ratios are probably too low (Table 3) for the silicic suite to have been generated by upper-crustal melting because the silicic rocks of this study are less radiogenic than most upper-crustal material (Moll, 1981). Therefore, the lower crust probably has the most suitable chemical and isotopic composition for the generation of the Socorro Peak center magmas by partial melting. The heat source for partial melting of the lower crust might have been mantle derived, basaltic magmas underplating the continental crust locally. The basalt of Kelly Ranch could be a surface manifestation of these underplating basaltic magmas.

Three parent rocks were tested in the partial melting model: amphibolite (garnet free), siliceous granulite, and basalt (Table 9). Only modal melting models were tested. Modal melting models assume that all of the mineral phases present in the source undergo the same percentage of melting. Table 9 shows the possible mineralogy of a granulitic, amphibolitic, and basaltic rock, the percent of modal partial melting that would be necessary to produce a rock with a major-element chemistry similar to the high-K and high-K, high-SiO_2 rhyolites, and the calculated trace-element concentrations for various percentages of modal partial melting of a granulitic, amphibolitic, and basaltic rock. The trace-element concentrations were calculated for various degrees of modal partial melting. Then the REE concentrations were calculated, normalized to chondrite, plotted in Figure 13, and compared to the measured REE patterns for the average high-K rhyolite of the Socorro Peak Rhyolite.

Table 9. Mineralogy, daughter magmas produced, and calculated trace-element concentrations for various percentages of modal partial melting of a granulitic, amphibolitic, and basaltic rock.

Granulite*		Amphibolite**		Basalt***	
mineralogy	weight percent	mineralogy	weight percent	mineralogy	weight percent
plagioclase	50	amphibole	63	plagioclase	55
orthopyroxene	15	plagioclase	23	clinopyroxene	30
K-feldspar	10	quartz	10	orthopyroxene	8
quartz	10	magnetite-hematite	2	olivine	7
magnetite	5	biotite	1		100
garnet	5		99		
biotite	5				
	100				

Daughter magmas and trace-element concentrations produced by modal partial melting of the following rock types

	Granulite			Amphibolite		Basalt		
Percent of Melting	25	35	50	5	15	5	20	30
Daughter Magma Produced****	Rhyolite		Dacite	Rhyolite	Dacite	Rhyolite		Dacite
(ppm)								
Rb	254	211	168	63	47	267	117	86
Sr+	54 to 275	61 to 278	75 to 283	285	277	437	439	441
Ba	638	633	625	466	370	1558	938	740
La	57	50	42	58	44	69	36	27
Ce	123	106	87	122	97	136	88	70
Sm	9.3	8.4	7.2	8.4	7.8	14.1	11.0	9.5
Eu	1.4	1.4	1.5	2.4	2.3	3.1	2.7	2.4
Tb	0.73	0.73	0.72	0.90	0.89	2.30	1.81	1.51
Yb	0.9	0.9	1.1	5.9	5.5	6.2	5.0	4.5
Th	7.1	5.3	3.8	--	--	27.1	7.4	4.9

* Mineralogy from Condie and Hunter (1976); Condie (1978); Kd values, Appendix 7

** Mineralogy from Condie and Budding (1979); Kd values, Henderson (1982)

*** Mineralogy from Krauskopf (1979); Kd values, Henderson (1982)

\+ The variation in the concentration of Sr for a partial melt of a granulitic rock is due to the wide variation in the Kd values of Sr (Appendix 7)

**** K. Condie, personal communication 1983.

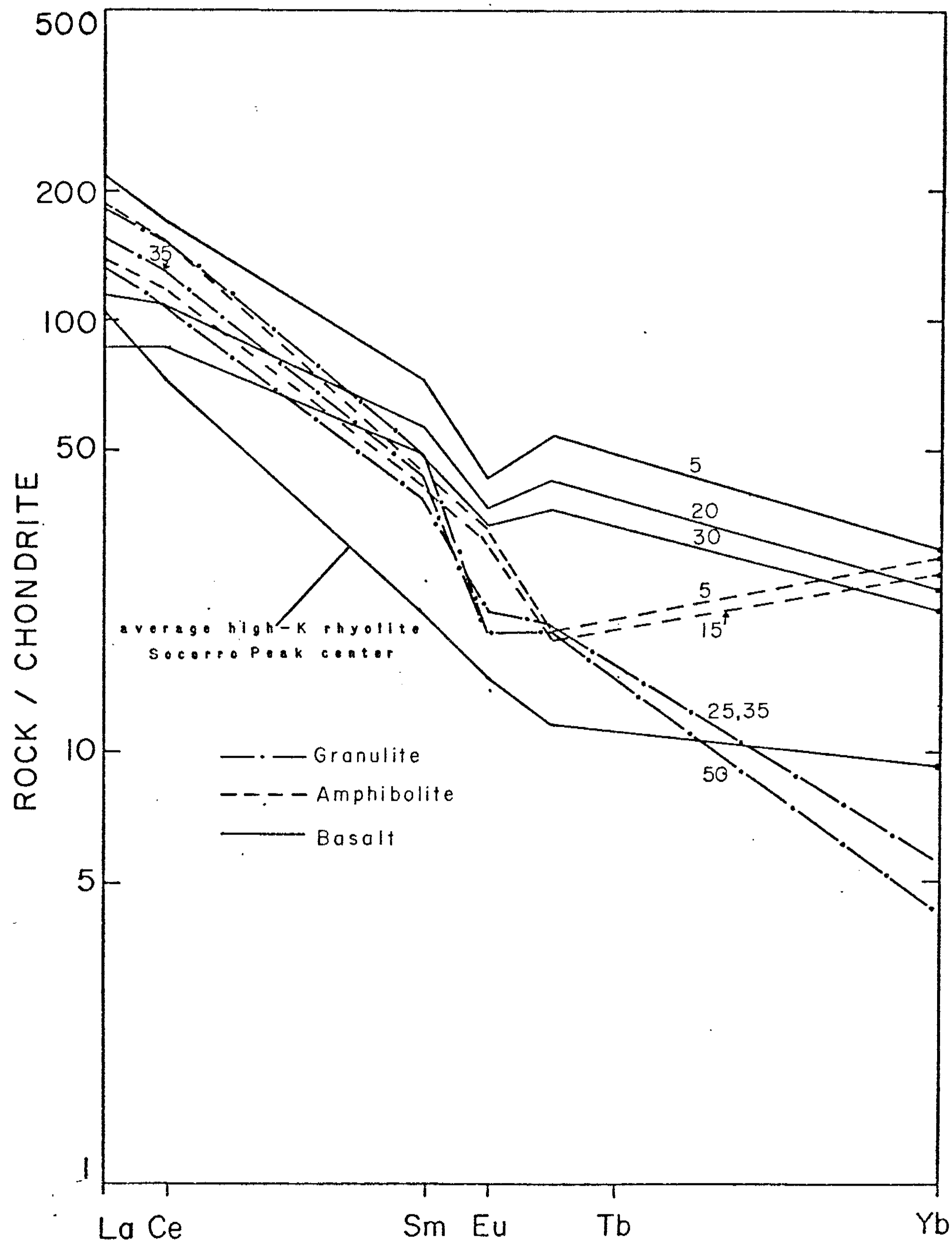

Figure 13. A comparison of chondrite-normalized REE patterns for various percentages of modal partial melting of a granulitic, amphibolitic, and basaltic rock, and average REE pattern for the high-K rhyolite from the Socorro Peak center. Numbers above and below curves represent percent of partial melting.

Results of Calculations

The REE patterns that result from a partial melt of an amphibolitic, granulitic, or basaltic parent show a poor fit when compared to the REE pattern of the average high-K rhyolite of the Socorro Peak Rhyolite (Fig. 13). A five to 15% melt of an amphibolite parent (using the mineralogy suggested in Table 9) produces a REE pattern that is too enriched when compared to the high-K rhyolite (Fig. 13). If plagioclase was fractionally crystallized the Eu concentration would be lower, and if a greater amount of amphibole was fractionated the middle and heavy REE concentrations would be lower, but this would raise the LREE pattern even higher and probably would not lower the HREE concentrations sufficiently.

A 25 to 50% partial melting of a siliceous granulite produces REE patterns that also show a poor fit when compared to the high-K rhyolite of the Socorro Peak Rhyolite (Fig. 13): the HREE concentrations are too low; the LREE are too high; and the Eu anomaly is greater (0.52 for a melt of a siliceous granulite compared to 0.92 for the average high-K rhyolite of the Socorro Peak Rhyolite). A five to 30% partial melting of a basaltic parent produces REE patterns that are too enriched and have a greater Eu anomaly (0.79) than was measured for the average high-K rhyolite of the Socorro Peak Rhyolite. If large amounts of clinopyroxene were fractionally crystallized the middle and heavy REE concentrations would be lower; however, it still would be necessary to lower the LREE concentrations and the middle REE concentrations even more in order to obtain a good fit.

Crystallizing or adding xenotime, allanite, and monazite could help the REE fit, but the Kd values of these phases are so great that removal or addition of even small amounts of these mineral phases would change the REE pattern appreciably, a technique I did not choose to use for this study. Also, I did not see petrographic evidence for xenotime, allanite, or monazite in any of the thin sections that I examined visually or point counted. The poor fit of the REE patterns for a modal partial melting of amphibolitic, granulitic, or basaltic rock compared to the measured REE patterns of the high-K rhyolite of the Socorro Peak Rhyolite suggests that the high-K rhyolitic lavas of Socorro Peak were not produced by a partial melting of lower-crustal rocks that have mineralogies similar to those given in Table 9.

Crustal Contamination

The initial Sr 87/Sr 86 ratios show slight but significant variations when progressing from the dacites to the high-K, high-SiO_2 rhyolites (Table 3). The initial Sr isotopic ratios limit the amount of radiogenic, upper-crustal contamination that may have occurred during the petrogenesis of the silicic rocks. However, the general increase in the ratios when progressing from the dacites to the rhyolites (Table 3) suggests that some contamination has occurred.

The mantle has a Sr 87/Sr 86 ratio of 0.704±0.002 and the bulk earth has a ratio of 0.7047. Therefore, if the basaltic andesite (0.7051; Table 3) is directly from the mantle then the mantle source was probably enriched in Sr 87/Sr 86. Alternatively, the basaltic andesite may represent a mantle-derived magma that has undergone a limited amount of crustal contamination. The Sr isotope data for the silicic rocks also suggests that crustal contamination has occurred, but it is difficult to determine whether it is upper- or lower-crustal contamination.

Additionally, the three lead isotopic ratios (Table 4) are plotted below the average orogene curve on Doe and Zartman's (1979) Pb 207/Pb 204 versus Pb 206/Pb 204 diagram. Stacey and Hedlund (1983) suggest that this area on Doe and Zartman's diagram is indicative of magmas that contain lead components that developed either within the mantle or in the lower crust.

Magma Mixing

Magma mixing is another petrogenetic model that was not rigorously tested, but some preliminary observations suggest that it may have occurred. The presence of basic, sieve-textured plagioclase phenocrysts in most of the silicic rocks (Appendix 3) may be due to magma mixing. Also, the linear trends seen for some major and trace elements (Figs. 5, 7, 8) are typical of those resulting from magma mixing. However, the initial Sr 87/Sr 86 ratios preclude mixing of a mantle-derived basalt with a high-SiO_2 rhyolite derived by melting of radiogenic upper-crustal material. Also, the non-linear trends for some trace elements (Fig. 8) are not compatible with simple mixing.

Petrogenetic Models for the Other Magmas

Dacites and High-K Rhyolites of the Magdalena and Pound Ranch Centers

The petrogenesis of the upper and lower rhyolites of the Pound Ranch center and the silicic lavas of the Magdalena center (except for the rhyolites of Alameda Springs and the Stendel perlite deposit) is believed to be similar to that of the Socorro Peak center lavas. The following reasons support this hypothesis. 1) The silicic lavas of the Magdalena Peak, Pound Ranch, and Socorro Peak centers are temporally similar (Table 1). 2) The limited number of Sr isotope values on the Socorro Peak and Pound Ranch lavas are generally similar (Table 3). 3) The phenocryst assemblages for the lavas at all three centers are dominated by plagioclase, amphibole, and biotite for SiO_2 values between 67% and 73% and by plagioclase, sanidine, quartz, and biotite for SiO_2 values >73% (Tables

2, A3). 4) On most major-element and some trace-element versus SiO_2 diagrams the silicic lavas from all three centers define single evolutionary trends (Figs. 5, 7, 8). 5) The REE patterns for the silicic lavas are similar from all three centers (Figs. 10, 11). 6) On a plot of Ta versus Th, two hygromagmatophile elements (elements having a great affinity for the liquid; Treuil and Varet, 1973), the silicic lavas from all three centers produce a straight line with a slope of approximately 45 that passes through the origin. In addition, a plot of La/Sm versus La (hygromagmatophile/magmatophile elements versus a hygromagmatophile element; H/M versus H) produces a horizontal line. Magmatophile elements are considered partially compatible (Allegre and Minster, 1978). When these two plots are evaluated together they suggest that fractional crystallization was the dominant process responsible for the origin of the silicic magmas at the Socorro Peak, Pound Ranch, and Magdalena Peak, centers (Allegre and others, 1977).

High-K, High-SiO_2 Rhyolites

The high-K, high-SiO_2 rhyolites (>75% SiO_2) comprise the rhyolites of Grefco, Squaw Peak, and B.O. Ranch domes and the Stendel perlite deposit. The rocks representing these domes and flows appear to be extremely evolved. The most characteristic features are a strong depletion in Sr, Ba, and Eu and an enrichment in Rb, Th, Ta, and Nb. The extreme depletion in Sr and Eu suggests significant amounts of feldspar fractionation. Petrogenetic modelling for the production of the rhyolite of Grefco dome from the phenocryst-rich, high-K, high-SiO_2 rhyolites of the Socorro Peak center produced a poor fit for the major elements when using the least-squares fractional crystallization model of Wright and Doherty (1971). The poor fit may be the result of choosing the wrong magma as the parent for the rhyolite of Grefco dome. Alternatively, the rhyolite of Grefco dome and the other >75% SiO_2 rhyolites may have been produced by a process other than fractional crystallization.

The major- and trace-element trends and the REE patterns for the >75% SiO_2 rhyolites of this study and those from the Bishop Tuff (Hildreth, 1979, 1981) show good agreement. These chemical similarities suggest that the liquid-state thermogravitational-diffusion model, suggested as the means of petrogenesis for the Bishop Tuff (Hildreth, 1979), may be applicable in explaining the petrogenesis of the >75% SiO_2 rhyolites of this study. Alternatively, E. H. Christiansen (1983) proposed a double-diffusive fractional crystallization model for the origin of the Bishop Tuff. Briefly, he suggests that crystallization starting at the walls of the magma chamber produced a buoyant, chemically evolved liquid that rose to the top of the magma chamber leaving behind the crystallized phenocryst phases.

Rhyolites of Alameda Springs and McDaniel Tank

The high-K rhyolite of Alameda Springs has an overall REE pattern and petrography similar to the other high-K rhyolites of this study. This suggests that the rhyolite of Alameda Springs may have evolved by crystal fractionation of a more basic magma. Also, the rhyolite of Alameda Springs and the rhyolite of McDaniel Tank have similar major- and trace-element concentrations (Appendix 4), although they are not similar petrographically (Tables 2, A3). It is therefore possible that some of the processes controlling the evolution of these two flows were similar.

DISCUSSION

Petrogenetic Comparison with Older Tertiary Volcanics of the Mogollon-Datil Volcanic Field

Tertiary rhyolitic volcanism occurred in the Socorro area from approximately 40 to 7 m.y. ago and generally displays a decrease in initial Sr isotopic ratios with time. The 40 to 18 m.y. old volcanic rocks have higher initial Sr 87/Sr 86 ratios, contain more K_2O, Rb, Ta, Th, and REE, and contain less CaO, Sr, and Ba compared to the volcanic rocks used in this study (Elston and Bornhorst, 1979; Bornhorst, 1980; Leeman, 1982). The overall petrogenetic origin of the 40 to 18 m.y. old volcanic rocks differs from the origin of the 18 to 7 m.y. old volcanic rocks of this study in the following ways: the 40 to 18 m.y. old volcanics may incorporate subducted oceanic crust in the primary magma; their initial Sr isotopic ratios are higher (suggesting that they have undergone a greater amount of crustal contamination); and there is petrographic evidence that some of the 40 to 18 m.y. old rhyolites were generated by direct fusion of crustal rocks (Bornhorst, 1980). The petrogenetic models for the 40 to 18 m.y. old volcanic rocks and the volcanic rocks of this study include fractional crystallization and probably lower-crustal contamination (Elston and Bornhorst, 1979; Bornhorst, 1980).

Petrogenetic comparison with Younger Lavas of the Rio Grande Rift

Rhyolitic volcanism occurred in several other locations within the Rio Grande rift and adjacent areas including the Taos Plateau, the central and northern Rio Grande rift, and the Mt. Taylor area. The lavas of the Taos Plateau volcanic field (TPVF), which were erupted mainly between 2.0 and 4.5 m.y. ago, range from tholeiitic basalt to silicic rhyolite (50 to 76% SiO_2; Lipman and Mehnert, 1979). A quartz latite dome, Cerro Chieflo (67% SiO_2), has been dated at about 10 m.y., but falls on the same variation trends as the other rocks of the TPVF (Lipman and Mehnert, 1979).

The volcanic rocks from the TPVF and the Socorro Peak center display the following similarities: 1) the major-element concentrations are similar; 2) the initial Sr isotopic ratios generally increase with increasing SiO_2; 3) initial Sr isotopic ratios from the TPVF of 0.7054 (Zimmerman and Kudo, 1979) and 0.7070 (Lipman and Mehnert, 1979), for a dacite and rhyolite sample respectively, are quite similar to the initial Sr isotopic ratios on the dacites and rhyolites from the Socorro Peak volcanic center; 4) the Cerro Chieflo quartz latite dome (67% SiO_2) is similar temporally, mineralogically (amphibole and plagioclase are the dominant phenocryst phases present), and in major-element composition to the dacite domes of the Socorro Peak volcanic center; and 5) both the Socorro Peak and TPVF lavas are calc-alkaline with alkaline affinities based on Miyashiro's (1974) FeO + Fe_2O_3/MgO versus SiO_2

classification diagram (Zimmerman and Kudo, 1979). However, the two groups of rocks also show differences. The lavas of the TPVF show an enrichment in K_2O and their REE patterns show an overall enrichment, a positive Ce anomaly, a larger Eu anomaly, and a fractionated heavy REE pattern relative to the Socorro Peak lavas.

The suggested petrogenesis of the silicic magmas at both centers is similar and includes fractional crystallization dominated by amphibole and plagioclase and some crustal contamination suggested by the positive correlation between the initial Sr 87/Sr 86 ratios and SiO_2 content (Dungan and others, 1983; McMillan and Williams, 1983). However, in the TPVF there is petrographic (hypersthene xenocrysts) and isotopic (Nd isotopic data) evidence suggesting lower-crustal contamination (McMillan and Williams, 1983), whereas these data are not available for the Socorro Peak lavas. The possible evidence for lower-crustal contamination in the Socorro Peak lavas is based on Pb and Sr isotopic ratios (Tables 3, 4).

Zimmerman and Kudo (1979) compiled data on the 1 to 4 m.y. old andesites and related rocks of the north-central Rio Grande rift. When their petrogenetic models for the origin of the lavas are compared to the models presented in this study, similar phases were fractionally crystallized, but in different proportions. In Zimmerman and Kudo's study, hornblende was the major phase fractionated in the production of high-SiO_2 andesites to rhyolites, whereas plagioclase was the major phase fractionated in the production of the Socorro Peak center lavas. This may account for the relatively lower HREE concentration in the lavas of Zimmerman and Kudo's study since amphibole concentrates HREE. Also, the initial Sr 87/Sr 86 ratios on Zimmerman and Kudo's rhyolites (0.7076 quartz latite; Eppler, 1976; Kasten, 1977) are generally higher than the ratios for the rhyolitic volcanic rocks of this study, thus, suggesting a greater amount of crustal contamination in their samples. The amphibolite and granulite inclusions present in the magmas of Zimmerman and Kudo's study could be petrographic evidence for lower-crustal contamination.

The 4.5 to 2.5 m.y. old Mt. Taylor volcanic center lies on the Jemez lineament and is composed predominantly of an alkalic-rock suite, but also contains calc-alkaline andesites to rhyolites (60 to >72% SiO_2; Baker and Ridley, 1970; Crumpler, 1982). Initial Sr 87/Sr 86 ratios of 0.7041 to 0.7046 (Pushkar, 1970) on the calc-alkaline andesites of the Mt. Taylor volcanic center are comparable to the initial Sr isotopic ratio on the basaltic andesite from Kelly Ranch. However, an initial Sr 87/Sr 86 ratio of 0.7193 (Pushkar, 1970) on a Mt. Taylor dacite sample is much higher than the initial Sr isotopic ratios on the dacites to rhyolites of this study. Additionally, Mt. Taylor rhyodacite to rhyolite samples show an enrichment in Rb and a depletion in Sr relative to the silicic lavas of this study. On a Rb versus

Sr diagram (Baker and Ridley, 1970, Fig. 4) the Socorro Peak lavas display values characteristic of the more mafic lavas from the Mt. Taylor volcanic field (e.g., the dacites of the Socorro Peak Rhyolite are plotted near the Mt. Taylor andesites and basaltic andesites). The differences in the Rb and Sr concentrations, initial Sr isotopic ratios, and the presence of granitic xenoliths in the Mt. Taylor volcanics probably rule out a similar petrogenetic origin for the lavas at the two centers.

CONCLUSIONS

Volcanism occurred at four main centers in the Socorro area between 18 and 7 m.y. ago. Although predominantly silicic, the sequence ranges from basalt to high-K, high-SiO_2 rhyolite. The silicic volcanic rocks were erupted from numerous vents, and except for the rhyolite of Alameda Springs which is a relatively large-volume flow (11 to 17 km^3), these silicic volcanic rocks generally formed many small domes and short flows. The structural controls for the location of the vents are believed to be the intersection of the northeast-trending Morenci lineament with the north-trending extensional faults of the Rio Grande rift and the ring-fracture zones of the Socorro and Magdalena cauldrons. The 18 to 7 m.y. old volcanic rocks are generally high-K dacites or high-K rhyolites, and they have calc-alkaline affinities.

The petrogenetic origin of the dacites remains uncertain. They may have been generated by a partial melting of lower-crustal rocks, fractional crystallization of a more mafic lava, or a combination of processes which may include: mixing of a mafic magma with a partial melt of lower-crustal rocks, upper crustal contamination, and fractional crystallization. The continuous nature of the chemical trends and good major-element, trace-element, and REE fit when using the Wright and Doherty least-squares fractional crystallization program suggest that crystal fractionation was the dominant process that produced the rhyolite magmas. The linear trends for some major and trace elements suggest that magma mixing also may have occurred. Although there is a lack of mineralogical evidence for crustal contamination, the general increase in the initial Sr isotopic ratios with increasing SiO_2, the range of the initial Sr isotopic ratios (Table 3), and the low Pb isotopic ratios suggest that lower and/or upper-crustal contamination occurred during the petrogenesis of the silicic rocks.

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APPENDIX 1: STRATIGRAPHY OF MAGDALENA PEAK

The Magdalena Peak vent area had not been previously mapped by anyone in detail; therefore, during this project a five-square-mile area of Magdalena Peak was mapped at a scale of 1:12,000 (Fig. A1). Previous work in the surrounding areas consists of M.S. theses by Simon (1973), Allen (1979), and Bowring (1980; Fig. 1).

In the Magdalena Peak area, the oldest unit exposed is the late-Oligocene (29 m.y.; C.E. Chapin, personal communication 1983) andesite of Landavaso Reservoir. The andesite of Landavaso Reservoir (ALR) consists of a number of flows of variable composition (Simon, 1975). These flows form a thin (generally <30 m), discontinuous band of outcrops that nearly encircle Magdalena Peak (Fig. A1). In hand specimen the ALR is reddish, dark gray, or black and contains phenocrysts of lath-shaped plagioclase and clots of greenish or reddish, altered ferromagnesian phenocrysts. In most outcrops the ALR is extensively weathered and has a stained greenish or reddish appearance.

The Nitt stock is a late-Oligocene (28 m.y.; Weber and Bassett, 1963) monzonite intrusive that crops out north of Magdalena Peak and is well exposed on the northward-trending hill 7266 (Fig. A1). The Nitt stock intrusive contains abundant hornfelsic xenoliths; the probable original composition of these xenoliths was the ALR and Pennsylvanian shales. The Nitt stock weathers to pale orange, angular

GEOLOGIC MAP OF MAGDALENA PEAK, SOCORRO COUNTY, NEW MEXICO

by Danny J. Bobrow

1983

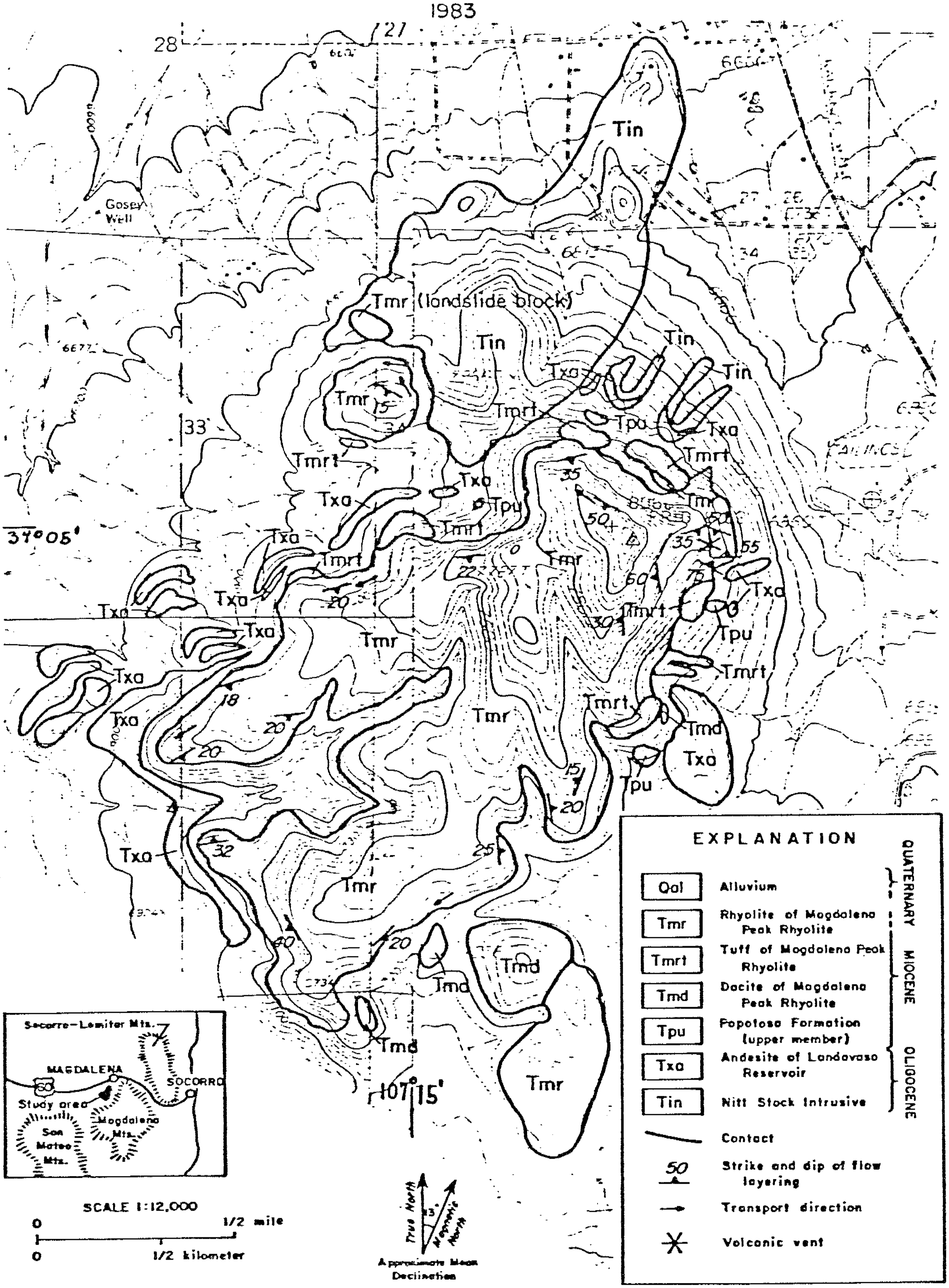


Figure A1.

blocks. In hand specimen it is fine to medium grained and contains phenocrysts of feldspar and scarce amounts of quartz. The Popotosa Formation occurs in outcrops that overlie the ALR in the eastern-half of the map area. The Popotosa Formation occurs in eroded stream channels as small, poorly exposed outcrops that consist of heterolithic conglomerates and conglomeratic sandstones (Allen, 1979).

Overlying the conglomerates and sandstones of the Popotosa Formation are the silicic lavas of Magdalena Peak. Except for the short, stubby flow, which has a northwesterly trend and caps "M" Mountain, the lavas from Magdalena Peak generally flowed south-southwesterly, possibly within a topographic basin (Allen, 1979). The vent area is the jagged, dome-like structure on the east face of Magdalena Peak. It is characterized by a central core of vertically foliated rhyolite with the vertical dip fanning outward away from the vent area. As discussed previously (Regional geology chapter), the flows on Magdalena Peak have been separated into high-K dacite and high-K rhyolite flows. The high-K dacite flow overlies the upper Popotosa Formation, and it occurs as a small outcrop on Magdalena Peak (hill 7236) and as a few scattered outcrops westward of hill 7236 (Fig. A1). On hill 7236 this flow is approximately 60 m thick and consists of a black, basal, vitric interval overlain by a gray, lithoidal interval. In hand specimen the dacites contain abundant plagioclase and amphibole phenocrysts and minor amounts of biotite phenocrysts.

The high-K rhyolites of Magdalena Peak also overlie the upper Popotosa Formation. In the vent area, well-indurated pyroclastic deposits (>60 m thick) underlie the lithoidal, rhyolite lavas. These probably represent an early, violent period of the eruption (Osburn, 1983). In addition, thick (<50 m) pyroclastic deposits occur below "M" Mountain and below the flow trending southwest from Magdalena Peak. An outcrop of pyroclastic material approximately 0.5 km north-northeast of the vent consists of a basal, brecciated, tuffaceous zone (containing lithic fragments and lenses of black vitrophyre) that grades upward into a columnar-jointed vitrophyre zone which contains buff to orange-brown, pumiceous lenses and a brecciated top. Away from the vent area, occurring below and between overlapping lobes of the rhyolitic lava, is a thin (generally <20 m), poorly indurated, tuffaceous interval (Allen, 1979). In hand specimen these thinner tuffs are buff to grayish-brown, contain dark, reddish-brown lithic fragments, buff pumice, and scarce phenocrysts of plagioclase, biotite, amphibole, and quartz.

A black to dark-gray, vitric interval is usually present above the tuffs. Occasionally, this vitric interval gradationally overlies a gray perlitic interval which contains phenocrysts of plagioclase, biotite, amphibole, and minor amounts of quartz and sanidine. An excellent exposure of this relationship can be seen in the saddle between hills 7236 and 7318, approximately 0.5 km south of the vent area.

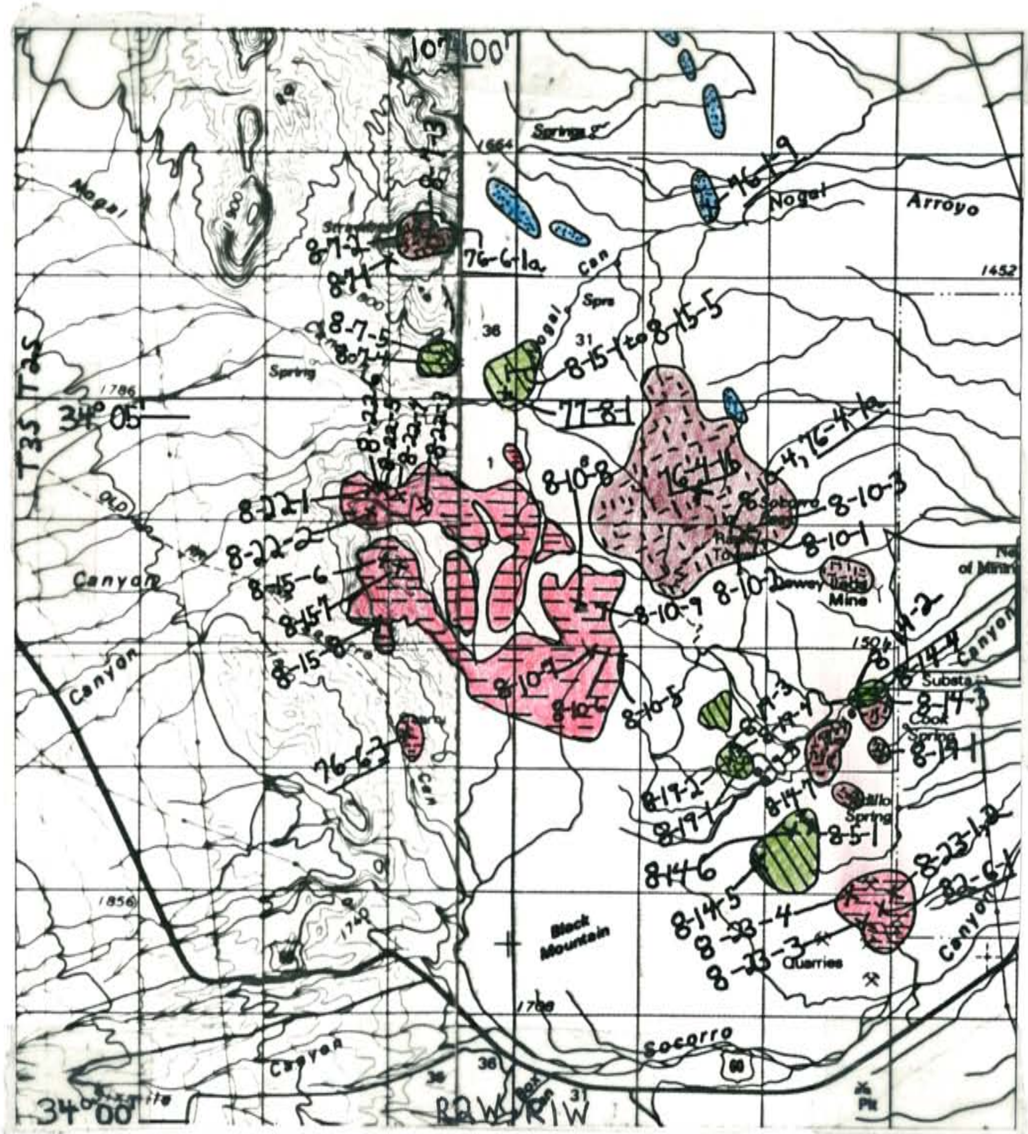
In hand specimen the vitrophyres have a speckled appearance due to light-colored phenocrysts of plagioclase and minor amounts of quartz and sanidine set in a dark matrix; also present in the vitrophyre are phenocrysts of black, euhedral biotite and amphibole. Overlying the vitrophyres are the lithoidal rhyolitic lavas. The contact between the vitrophyres and lithoidal rhyolitic lavas is usually gradational and is frequently delineated by thin lenses of reddish-brown, devitrified glass (Allen, 1979).

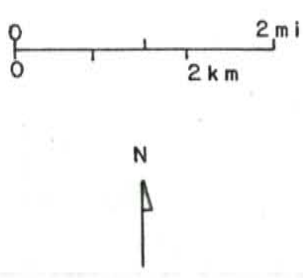
The lithoidal rhyolite flow capping Magdalena Peak is >180 m thick near the vent and up to 120 m thick on the hills trending southwest from Magdalena Peak. The full south-southwestward extent of this flow is unknown. The flow that caps "M" Mountain is similar in appearance and stratigraphic constraints to the other Magdalena Peak rhyolites, and therefore, was not mapped as a separate flow. The rhyolite of Alameda Springs probably originated at Magdalena Peak; however, also because of petrographic similarities, it could not be mapped separately. Due to its distinctive chemistry and thin-section petrography (Appendix 3, 4), however, it is known to occur at Alameda Springs in the Squaw Peak area, at Texas Tank, and above the Stendel perlite exposure (Figs. 1, A2-3a, A2-3b). No attempt has been made to trace this unit between the outcrops in the field.

The rhyolites of Magdalena Peak are frequently vesicular. Occasionally in highly pumiceous flows, such as the "M" Mountain flow, the gas cavities are up to 30 cm across. Another excellent exposure of large cylindrical gas cavities is found on the west side of Hop Canyon in section 14, T. 3 S., R. 4 W. (Allen, 1979, fig. 14). Primary and secondary folding is common in the rhyolite flows, and I refer the interested reader to Allen (1979, p. 83) for excellent discussions of both types of folding.

APPENDIX 2: SAMPLE LOCATIONS

Sample locations are compiled on 1:100,000 topographic maps of Magdalena, Squaw Peak, Molino Peak, and Socorro. Descriptions of individual sample locations can be found in the chemical data sheets (Appendix 4).





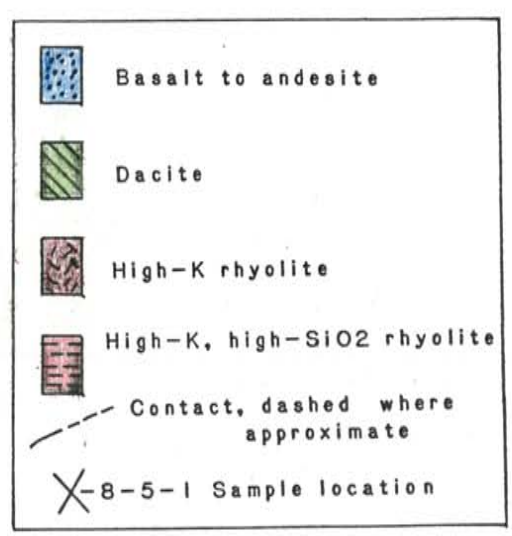


Figure A2-1. Generalized geologic map showing sample locations and lithologic units of the Socorro Peak center.

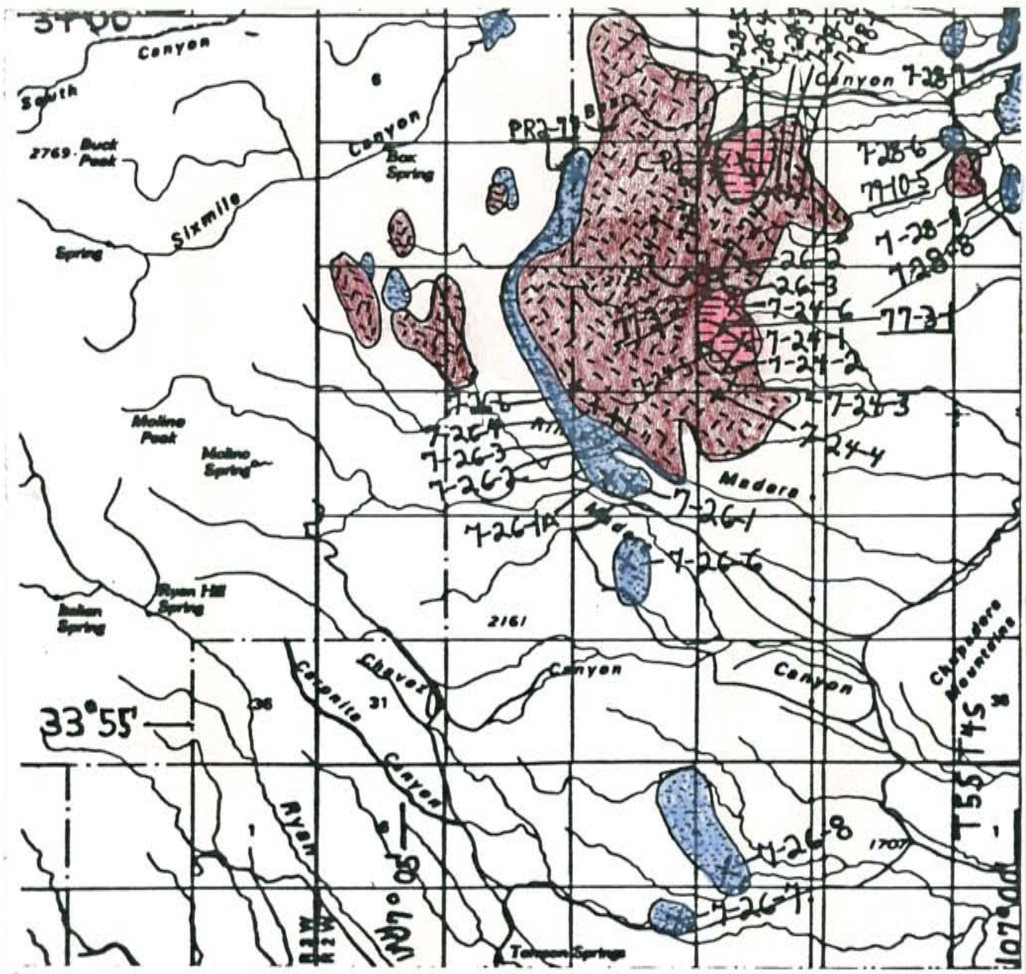


Figure A2-2. Generalized geologic map showing sample locations and lithologic units of the Pound Ranch center. Refer to Fig. A2-1 for explanation of symbols and colors.

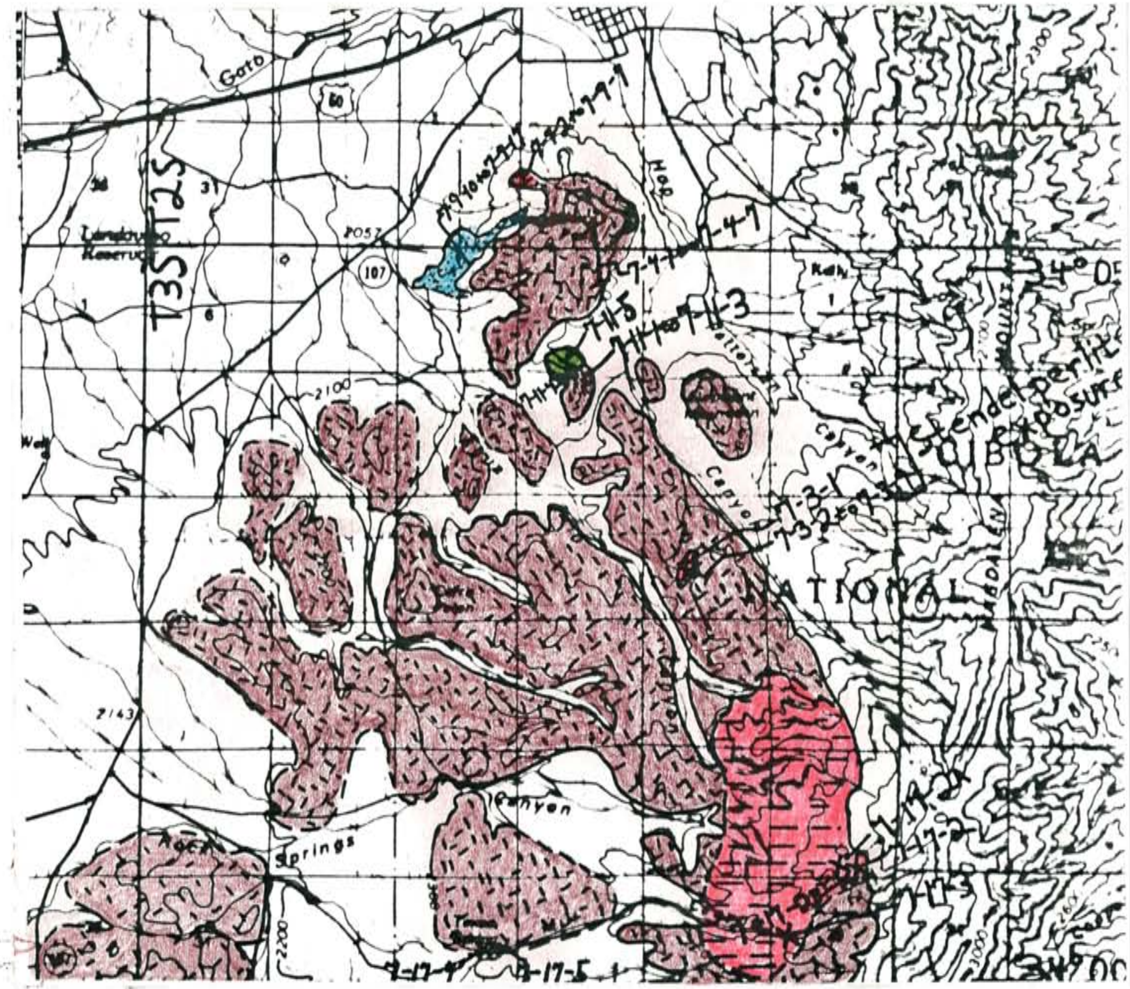


Figure A2-3a. Generalized geologic map showing sample locations and lithologic units of the Magdalena Peak center. Refer to Fig.A2-1 for explanation of symbols and colors.

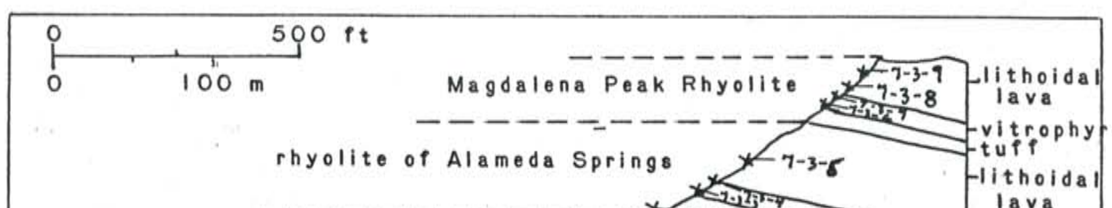


Figure A2-3b. Generalized cross section of the Stendel perlite exposure (after Weber, 1957) showing the three stratigraphic units present and the sample locations. Thickness and dip of units are approximated.

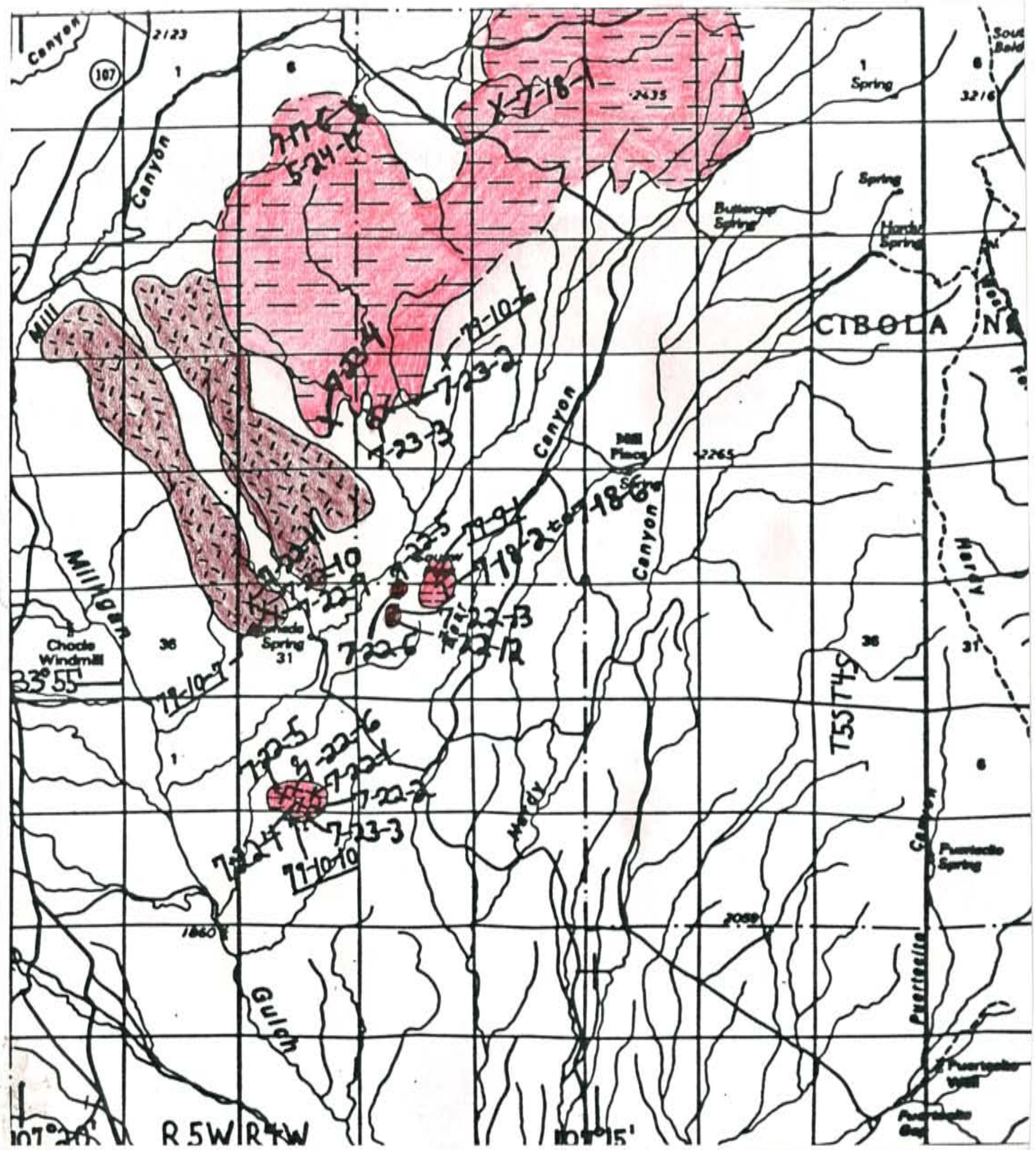


Figure A2-4. Generalized geologic map showing sample locations and lithologic units of the Squaw Peak center. Refer to Fig. A2-1 for explanation of symbols and colors.

APPENDIX 3: PETROGRAPHIC DESCRIPTIONS

Mineral abundances on Table A3 were determined by visual examination, except for the samples that were point counted (Table 2). The An contents of plagioclase were determined on a 4-axis universal stage using the standard extinction techniques (Emmons, 1943). The plagioclase compositions were determined from maximum extinction angles perpendicular to 010 using the high-temperature curves of the Rittman zone method (Troger, 1959).

Table A3. Summary descriptions of representative, individual thin sections. The number printed beneath each sample number refers to similar thin sections.

Sample number (Key to similar thin sections)	Geochemical rock type (% SiO_2)	Texture	Average pheno-cryst size (mm)	An content of plagio-clase	Phenocryst phases (% of whole rock) texture											Ground-mass
					Plagioclase	Sanidine	Quartz	Amph	Biotite	cpx/opx	Ol	opaque oxides	Sph	Ap	Zr	
SOCORRO PEAK CENTER																
basalt of Kelly Ranch																
76-1-9 (1)	high-K basaltic andesite (55%)	slightly porphyritic, subophitic moderately vesicular, gabbroic clots, xenoliths	1.25	An_{48-60}	(4%) 1-2 mm laths, (3%) sieve-structured stubby rectangles, Carlsbad and albite twinning, normal, reverse, and oscillatory zoning					1%/0 opaque oxide rims	t	1%		t		interlocking plagioclase microlites, ferromagnesians, opaque oxides, apatite, intersertal glass
dacites																
8-15-5 (2)	dacite (68%)	porphyritic, fluxion, glomeroporphyritic, devitrified	1.25	An_{24-58}	(12%) elongate laths, sieve-structured stubby rectangles, Carlsbad and albite twinning, normal, reverse, and oscillatory zoning	t		(5%) subhedral to euhedral prisms	t	t		1%		t	t	feldspar, quartz, ferromagnesians, opaque oxides, apatite, zircon
8-14-5 (3)	high-K dacite (68%)	porphyritic, vitrophyric, fluxion, slightly perlitic, glomeroporphyritic	1.00	An_{36-48}	(9%) elongate laths, sieve-structured stubby rectangles, Carlsbad and albite twinning, normal, reverse and oscillatory zoning	t		(3%) opaque oxide rims	(1%)			0.5%		t	t	feldspar, quartz, ferromagnesians, opaque oxides, apatite, zircon

(Table A3 continued)

Sample number (Key to similar thin sections)	Geochemical rock type (% SiO_2)	Texture	Average pheno-cryst size (mm)	An content of plagio-clase	Phenocryst phases (% of whole rock) texture											Ground-mass
					Plagioclase	Sanidine	Quartz	Amph	Biotite	cpx/opx	Ol	opaque oxides	Sph	Ap	Zr	
SOCORRO PEAK CENTER																
rhyolites																
8-7-2 (4)	high-K rhyolite (70%)	porphyritic, slightly fluxion, spherulitic, glomeroporphyritic	0.75	An_{25-43}	(10%) elongate laths, sieve-structured stubby rectangles, Carlsbad and albite twinning, normal, reverse, and oscillatory zoning	t		(2%) opaque oxide rims	(1.5%)			0.5%		t	t	feldspar, quartz, ferromag-nesians, opaque oxides, apatite, zircon
8-10-5 (5)	high-K high-SiO_2 rhyolite (72%)	porphyritic, spher-ulitic, glomeropor-phyritic, slightly fluxion	2.00	An_{24-37}	(8%) elongate laths, rare sieve-structured stubby rectangles, Carlsbad and albite twinning, normal and oscillatory zoning	(6%) stubby euhedral and rounded crystals	(4%) rounded and embayed crystals	(0.5%)	(3%)			t	t	t	t	sanidine, quartz, ferromag-nesians, opaque oxides, apatite, zircon, sphene
rhyolite of Grefco dome																
8-23-3 (6)	high-K, high-SiO_2 rhyolite (77%)	slightly porphyritic, fluxion, perlitic, spherulitic, glassy	0.25	An_{25-30}	(1%) subhedral laths, carlsbad and albite twinning, normal zoning	(1%) subhe-dral laths and angular crystals	(0.5%) rounded crystals		t			t				patches of glass in a mesostasis of crypto-crystal-line grains
MAGDALENA PEAK CENTER																
basalt of Council Rock																
76-6-6	high-K basaltic andesite (54%)	porphyritic, trachytic	1.0	An_{44-60} (Wilkin-son, 1976)	(7%) elongated laths albite twinning, normal zoning					(2.0%)/(0.50%)		(3%) altered to idding-site	t		t	trachytic, plagio-clase, ferromag-nesians, opaque oxides, apatite

(Table A3 continued)

Sample number (Key to similar thin sections)	Geochemical rock type (% SiO_2)	Texture	Average pheno-cryst size (mm)	An content of plagio-clase	Phenocryst phases (% of whole rock) texture: Plagioclase	Sanidine	Quartz	Amph	Biotite	cpx / opx	Ol	opaque oxides	Sph	Ap	Zr	Ground-mass
MAGDALENA PEAK CENTER																
dacites																
7-11-5 (7)	high-K dacite (69%)	porphyritic, fluxion, slightly spherulitic	0.80	An_{34-50}	(13%) elongate laths, sieve-structured stubby rectangles, albite and carlsbad twinning, normal, reverse and oscillatory zoning	t	t	(4%) opaque oxide rims	(1%)			(0.5%)		t	t	feldspar, quartz, ferromag-nesians, opaque oxides, apatite, zircon
rhyolites																
7-3-8 (8)	high-K rhyolite (71%)	porphyritic, fluxion, slightly spherulitic, slightly glomeropor-phyritic	1.00	An_{27-44}	(10%) elongate laths, sieve-structured stubby rectangles, albite and carlsbad twinning, normal, reverse and oscillatory zoning	(0.5%)	t	(3%) opaque oxide rims	(2%)			(0.5%)	t	t	t	feldspar, quartz, ferromag-nesians, opaque oxides, apatite, zircon, sphene
7-4-4 (9)	high-K rhyolite, (72%)	porphyritic, devitri-fied, slightly fluxion, slightly glomeroporphy-ritic	1.00	An_{25-43}	(9%) elongate laths sieve-structured stubby rectangles, albite and carlsbad twinning normal, reverse and oscillatory zoning	(1%)	t	(2%) opaque oxide rims	(2%)			t		t	t	feldspar, quartz, ferromag-nesians, opaque oxides, apatite, zircon
rhyolite of Alameda Springs																
7-3-5 (10)	high-K rhyolite (72%)	porphyritic, spheru-litic, fluxion, slightly glomero-porphyritic	1.00	An_{25-35} (7-22-11)	(10%) elongate laths sieve-structured stubby rectangles, albite and carlsbad twinning, normal, reverse and oscillatory zoning	(1.5%)	t	(2%) opaque oxide rims	(3%)	t / -		(0.5%)	t	t	t	feldspar, quartz, ferromag-nesians, opaque oxides, apatite, zircon, sphene

(Table A3 continued)

Sample number (Key to similar thin sections)	Geochemical rock type (% SiO_2)	Texture	Average pheno-cryst size (mm)	An content of plagio-clase	Phenocryst phases (% of whole rock) texture: Plagioclase	Sanidine	Quartz	Amph	Biotite	cpx/opx	Ol	opaque oxides	Sph	Ap	Zr	Ground-mass
MAGDALENA PEAK CENTER																
rhyolite of the Stendal perlite deposit																
7-3-1 (11)	high-K high-SiO_2 rhyolite (77%)	porphyritic, perlitic, glassy, slightly fluxion, slightly glomeroporphyritic	1.25	An_{21-32}	(5%) laths and stubby rectangles (rarely sieve-structured), albite and carlsbad twinning, normal zoning (rarely oscillatory)	(5%) euhedral to rounded crystals	(4%) rounded and embayed crystals	t	(2%) subhedral plates with opaque oxide rims			t		t	t	sanidine, quartz, biotite, opaque oxides, apatite
POUND RANCH CENTER																
basalt of Madera Canyon																
PR2-77	alkalic basalt (48%)	porphyritic, glomeroporphyritic	1.50	An_{49-70} (Osburn, 1978)	(18%) stubby to tabular sieve-structured, albite and carlsbad twinning, normal, reverse and oscillatory zoning					(2%) show some alteration	(2%) up to 2mm across	1%		t		plagioclase, ferromagnesians, opaque oxides, apatite
7-26-8	high-K basaltic andesite (52%)	slightly porphyritic, pilotaxitic	0.50		(1%) laths and squat rectangles, albite and carlsbad twinning, normal zoning					(3%) highly altered	t	t		t		plagioclase, microlites with a felted texture, ferromagnesians, opaque oxides, apatite
7-26-1	high-K andesite (60%)	porphyritic, pilotaxitic, glomeroporphyritic	1.00		(3%) elongate laths, sieve-structured stubby rectangles, albite and carlsbad twinning, normal and oscillatory zoning					4% / 2%	t	t		t	t	plagioclase, ferromagnesians, opaque oxides, apatite, zircon

(Table A3 continued)

Sample number (Key to similar thin sections)	Geochemical rock type (% SiO_2)	Texture	Average pheno-cryst size (mm)	An content of plagio-clase	Phenocryst phases (% of whole rock) texture											Ground-mass
					Plagioclase	Sanidine	Quartz	Amph	Biotite	$\frac{cpx}{opx}$	Ol	opaque oxides	Sph	Ap	Zr	
POUND RANCH CENTER																
rhyolites																
7-28-1 (12)	high-K rhyolite (72%)	porphyritic, fluxion, spherulitic, glomero-porphyritic	1.00	An_{29-47}	(10%) elongate laths, sieve-structured stubby rectangles, albite and carlsbad twinning, normal, reverse, and oscillatory zoning	t	t	(2%) opaque oxide rims	(2%)			(1%)	t	t	t	micro-crystal-line inter-growth of feldspars, quartz, ferromag-nesians, opaque oxides, apatite, zircon, sphene
7-24-1 (13)	high-K high-SiO_2 rhyolite	porphyritic, glomeroporphyritic, spherulitic	1.50	An_{22-37}	(9%) elongate laths, sieve-structured rectangles, albite and carlsbad twinning normal and oscillatory zoning	(4%) euhedral and broken crystals, carlsbad twinning	(5%) rounded and euhedral crystals	t	(3%) stubby and narrow plates			t	t	t	t	(~3 mm) spheru-litic in-tergrowths of sani-dine and quartz, biotite, opaque oxides, apatite, zircon, sphene

(Table A3 continued)

Sample number (Key to similar thin sections)	Geochemical rock type (% SiO_2)	Texture	Average pheno-cryst size (mm)	An content of plagio-clase	Phenocryst phases (% of whole rock) texture: Plagioclase	Sanidine	Quartz	Amph	Biotite	cpx/opx	Ol	opaque oxides	Sph	Ap	Zr	Ground-mass
SQUAW PEAK CENTER																
rhyolite of McDaniel Tank																
7-23-4	high-K high-SiO_2 rhyolite (74%)	microcrystalline, fluxion, devitrified	0.25	An_{20} (1 crystal, Donze, 1980)	(1%)	t	t		t opaque oxide rims	t		t			t	crypto-crystal-line with alternat-ing red-dish and off white bands
rhyolite of B. O. Ranch dome																
7-22-2 (14)	high-K high-SiO_2 rhyolite (77%)	microcrystalline, fluxion, spherulitic	0.25		t	t	t					t				crypto-crystal-line with alternat-ing brown-ish and off white bands
rhyolite of Squaw Peak dome																
7-18-3 (15)	high-K, high SiO_2 rhyolite (78%)	porphyritic, glassy, slightly fluxion	1.00	An_{21-26} (7-18-6)	(4%) laths and stubby rectangles, albite, carlsbad, and pericline twinning normal zoning	(6%) euhedral and rounded crystals, carlsbad twinning	(7%) euhedral and embayed crystals					t		t	t	slightly spheru-litic, microcrys-talline to glassy

Table A3 continued

Key to Similar Samples

(1)
P-18*
Sp-89*
Sp-124*

(2)
77-8-1*
8-7-4

(3)
77-5-1*
77-6-4*
8-14-6
8-14-7
8-19-1
8-19-3A

(4)
76-4-1a*
76-4-1b*
77-6-1a*
77-6-1b*

(5)
76-6-3*
8-10-7
8-15-7
8-22-1
8-22-3
8-22-6

(6)
8-23-5

(7)
7-11-5

(8)
7-3-6
7-3-7
7-3-9
7-11-7

(9)
7-4-5
7-4-6
7-4-7
7-11-1
8-14b-1*

(10)
79-10-7*
7-3-3
7-3-4
7-3-5
7-22-9
7-22-11
7-23-5
7-23-6
7-23-7
7-23-9

(11)
7-32-3*
7-32-4*
7-32-9*
8-12b-4*
8-13a-1*
8-13a-3*
8-13a-4*
8-13b-4*
8-13b-8*
8-13b-9*
8-14b-3*
8-14b-4*
8-14b-5*
8-14b-7*
8-14b-8*
8-15-1*
8-15-2*

(12)
7-24-3
7-24-7
7-24-8
7-24-9
7-26-2
7-28-2
7-28-3

(13)
7-24-4
7-24-5

(14)
7-22-1
7-22-3
7-22-5

(15)
7-18-6

* samples collected by other workers

APPENDIX 4: CHEMICAL DATA SHEETS

Major-element data was obtained using a Rigaku 3064 X-ray fluoresence spectrometer at the New Mexico Bureau of Mines and Mineral Resources XRF laboratory. The H_2O, volatile free, and CIPW norm data were generated using the NORM program of the New Mexico Institute of Mining and Technology computer library. On the chemical data sheets, the H_2O and volatile-free column shows the total Fe partitioned into Fe_2O_3 and FeO. These values are not analytical results; they are calculated values generated so that CIPW norms could be calculated. The ratio 0.15:0.85 for Fe_2O_3 and FeO respectively was used for all of the rocks. Therefore, the ratio Fe_2O_3:FeO does not reflect the oxygen fugacity nor does it reflect the iron oxidation state of the magma chamber, particularly for the more mafic and the most silicic rocks.

FeO* is the total Fe expressed as FeO. FeO* is equal to: FeO + (0.89981 x Fe_2O_3). For samples that have INAA data available, FeO* is equal to:

$$\frac{\overbrace{(\text{FeO} + 0.89981 \times \text{Fe2O3})}^{\text{XRF data}} + \overbrace{(0.89981 \times \text{Fe2O3})}^{\text{INAA data}}}{2}$$

The Na_2O values used on the Na_2O versus SiO_2 variation diagram are listed under the heading H_2O and volatile free, except for the samples that also have Na_2O values obtained by INAA. For these samples, the Na_2O value used is equal to:

$$\frac{\overset{\text{XRF data}}{Na2O} + \overset{\text{INAA data}}{Na2O}}{2}$$

The chemical data sheets that follow have been placed into groups that correspond to the four volcanic centers of this study. The data sheets within each of these four groups are arranged by increasing SiO_2 content.

APPENDIX 5: ANALYTICAL METHODS and ERRORS

Sampling

The selection of approximately 150 samples for geochemical analysis was based on: sample location in flow sequences, age relationships of flows, and lack of weathering. All visible weathered surfaces were removed during sample collection and preparation. The sample locations were mapped on the Socorro, Molino Peak, and Squaw Peak U.S. Geological Survey 7.5-minute quadrangle maps, and the Magdalena 15-minute quadrangle map (Appendix 2). In the laboratory all 150 samples were analyzed for 10 major elements using XRF; 55 samples were selected for thin-section study and 55 samples were selected for trace-element analyses using XRF and INAA.

Geochemical Analyses

The geochemical samples were broken down to less than 4-cm pieces using a hammer and a steel plate. An alumina-jaw crusher was then used to crush the 4-cm pieces down to fragments less than 5 mm. The altered or weathered fragments were discarded during the crushing steps. The 5 mm fragments were next processed through a high-speed rotary grinder that crushed the sample fragments to less than 2 mm. The 2 mm fragments were then ground in an agate, mechanical mortar and pestle for 60 minutes to produce an approximately <200-mesh powder. Care was taken during each step to prevent any undue contamination of the samples. The preparation equipment was throughly washed with distilled water each time a sample was changed to avoid any contamination.

For X-ray fluoresence analyses, the <200-mesh powder was used to make two different types of target samples. Fusion discs were made for major-element analysis. This procedure involved melting a mixture of approximately 0.5 grams of powdered sample and 2.68 grams of Spectroflux 105 in a platinum crucible. When completely molten, the sample mixture was pressed into flat, glass discs and allowed to cool. Pressed-powder pellets were made for trace-element analysis. In this procedure, a mixture of approximately 6 grams of sample powder and 7 drops of 1% polyvinyl alcohol solution was pressed into pellets with a borax backing. The pellets were compressed using an hydraulic press at 10 tons of pressure.

The discs and pellets were analyzed using standard procedures on an automated Rigaku 3064 X-ray fluoresence spectrometer at the New Mexico Bureau of Mines and Mineral Resources XRF laboratory. The system was calibrated using a wide range of rock standards from various sources.

For neutron activation study, approximately 0.25 grams of the <200-mesh powder was placed in a small polyurethane vial. The vials were sent to the Sandia National Laboratory nuclear reactor for irradiation. A Nuclear Data 4,096-channel gamma-ray spectrometer with an Ortec high-purity, germanium co-axial detector was used for the analysis of 16 trace elements and two major elements: Ba, La, Ce, Sm, Eu, Tb, Yb, Lu, U, Th, Sc, Co, Cr, Cs, Hf, and Ta and Fe_2O_3 and Na_2O respectively.

Table A5-1. Suggested coefficients of variation and machine reproducibility for major-element data generated using x-ray fluoresence. On all major- and trace-element variation diagrams, representative error bars have been placed in the lower-left hand corner.

Sample	8-14-5, n = (4)*		7-24-4, n = (7)**	
	wt %	Coefficient of variation (%)	wt %	Machine reproducibility %
SiO_2	68.31	±0.26	69.92	±0.10
TiO_2	0.54	0.78	0.46	0.01
Al_2O_3	16.25	0.22	14.66	0.02
Fe_2O_3	3.62	1.10	2.60	0.01
MnO	0.06	3.51	0.06	<0.01
MgO	1.20	0.70	0.41	0.01
CaO	3.75	0.20	2.27	0.01
Na_2O	3.45	0.94	3.85	0.04
K_2O	2.98	0.14	4.06	0.01
P_2O_5	0.14	1.46	0.12	<0.01

* Mean (weight percent) and coefficient of variation on four analyses

Table A5-2. Suggested coefficients of variation and machine reproducibility for trace-element data generated using x-ray fluoresence.

Sample	7-18-5, n = (2)*		76-4-1A, n = (2)*		PR2-77, n = (3)		
	ppm	coefficient of variation (%)	ppm	coefficient of variation (%)	ppm**	coefficient of variation (%)**	Machine reproducibility*** (%)
Rb	380	±0.11	66	±6.06	87	±1.15	±0.69
Sr	4	1.00	484	1.24	738	0.18	0.27
Y	53	1.89	20	4.00	24	1.67	0.83
Zr	73	0.01	154	0.52	143	0.70	1.39
Nb	77	0.52	10	2.00	26	3.85	1.54
Pb	30	2.00	17	5.88	0.7	71.00	111.0
Th	39	1.79	5	8.00	2.5	40.00	20.00

* Mean (ppm) and coefficient of variation on two analyses of two individual briquets.

** Mean (ppm) and coefficient of variation on three analyses of three individual briquets.

Table A5-3. Suggested coefficients of variation and machine reproducibility for trace-element data generated using INAA.

Sample	7-4-1, n = (3)*	
	ppm	Coefficient of variation (%)
Sc	5.69	±5.0
Cr	18.08	15.0
Co	6.43	10.0
Sb	0.11	10.0
Cs	1.11	6.0
Ba	1583.00	5.0
La	25.63	8.0
Ce	44.49	10.0
Sm	3.45	5.0
Eu	0.88	10.0
Tb	0.44	10.0
Yb	1.66	8.0
Lu	0.23	9.0
Hf	3.64	7.0
Ta	0.65	5.0
Th	5.10	7.0
	wt %	
Fe_2O_3	2.77	8.0
Na_2O	3.86	10.0

* Mean (ppm) and coefficient of variation on three analyses of three different aliquots of the same sample.

APPENDIX 6: EQUATIONS

The following equations were used in the trace-element modelling of the Socorro Peak volcanic rocks and are given here to aid readers in understanding the calculations. Reviews by Arth (1976), Hanson (1978), and Allegre and Minster (1978) discuss the behavior of trace elements in magmatic processes and provide references, for interested readers, to articles describing the derivations of the equations used in quantitative modelling. Symbols (after Hanson, 1978) used in the following equations include:

F = the weight fraction of melt relative to the original parent rock

c_o = weight concentration of a trace element in the parent rock

c_L = weight concentration of a trace element in a derived melt

Kd = weight fraction of a trace element in a mineral divided by weight fraction in a co-existing melt

X = weight fraction of a mineral phase in an assemblage

i = any mineral phase present

D = bulk distribution coefficient

For [n] number of phases the bulk distribution coefficient is given by the equation:

$$D = \sum_{i=1}^{n} X^{i} \, Kd^{i}$$

Equation (1) below was used to model trace-element concentrations for fractional crystallization and equation (2) was used to model modal partial melting.

$$\frac{C_L}{C_O} = F^{(D-1)} \qquad (1)$$

$$\frac{C_L}{C_O} = \frac{1}{D(1-F) + F} \qquad (2)$$

APPENDIX 7: Kd VALUES

Table A7a. Kd values for mineral phases in felsic rocks. (E = essential)

	Dacite to high-K rhyolite							
	Minerals							
Element	Plag	K-Spar	Bio	Amph	Magt	Zircon	Apatite	Sphene
Rb	0.04 (12)	0.5 (3)	2-3.3 (1,2,3,4)	0.1 (4)				
Sr	1.5-9 (1,4)	4-26 (1,3,4)	0.1-0.4 (1,3)	0.1-0.6 (3)				
Y	0.1 (10)			6 (10)	2 (10)	60 (10)	40 (10)	
Zr	0.1 (10)			4 (10)	0.8 (10)	E		
Nb				4 (1)	2.5 (10)			
Ba	0.5 (4)	6 (1,2,3)	6.4-8 (1,2,3)					
La	0.3 (4)		0.3 (4)	0.9 (4)	0.5 (4)			
Ce	0.2 (1,4,7,9)		0.4 (4)	1 (1,4,7)		3-4 (1,4)	30 (1,4,7)	139 (1)
Sm	0.1 (1,4,6,7,9)		0.3 (7)	4-6 (1,4,6,7)	1 (4)	3-4 (1,4)	30-63 (1,4,7)	70 (1)
Eu	1-2 (1,4,6,9)	1 (1,4,9)	0.1-0.3 (1,4,9)	3-4 (1,4,6)	0.6 (4)	3 (1,4)	27-63 (1,4)	70 (1)
Tb	0.15 (4)		0.4 (4)	3-6 (4,6)	0.8 (4)		18 (12)	
Yb			0.2-0.7 (4,7,9)	5-8 (4,6,7)	0.4 (4)	280 (4)	21 (4,7)	
Lu			0.2-0.7 (1,4)	3-4.5 (1,4,6)	0.4 (4)	230-345 (1,4)	17-31 (1,4)	61 (1)
Hf			2.1 (4)	6 (4)	0.3 (4)			
Ta				0.3 (4)	1.3 (4)			
Th			0.3 (1,2,4)	0.2 (4)	0.1 (4)	1-5 (11)	1-5 (11)	1-5 (11)

(1) Arth and Hanson (1975); (2) Anderson and Cullers (1978); (3) Hanson (1978) consisting of a compilation of: Philpotts and Schnetzler (1970), Nagasawa and Schnetzler (1971), and Sun and Hanson (1976); (4) Henderson (1982) numerous sources; (6) Arth and Barker (1976); (7) Watson and Capobianco (1981); (8) Allegre (1977); (9) Philpotts and Schnetzler (1970); (10) Pearce and Norry (1979); (11) Stuckless (personal communication to Cullers 1981); (12) K. Condie (personal communication 1983)

Table A7b. Kd values for mineral phases in high-SiO_2 rhyolites. All of the Kd values for the high-SiO_2 rhyolite are from: Hildreth (1977, 1979); Mahood and Hildreth (1983); and Michael (1983). (E = essential)

	Minerals			
Element	K-Spar	Biotite	Magnetite	Zircon
Rb	0.6	3-11		
Sr	2			
Zr				E
Ba	6			
La	0.1	2.6-4.6	15	7-26
Ce		2.1-3.8	10-15	10-23
Sm		1.1-2.6	4-8.2	11-17
Eu	4.2	1.3	1.3-3	16
Tb		0.6-1.7	2.0-6	37
Yb		0.3-1.2		490-564
Lu		0.4-1.6		640
Hf		0.4-0.9		2650-3750
Ta		1.3-1.9	0.8	45
Th		0.4-2.4	10-17	62-91

SOCORRO PEAK

CENTER

Sample # 76-1-9

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	53.22	54.66		
Al_2O_3	16.42	16.87		
TiO_2	1.329	1.365		
Fe_2O_3	8.61	1.35		8.89 INAA
FeO		6.77		
MnO	0.114	0.117		
MgO	4.83	4.96		
CaO	7.73	7.94		
Na_2O	3.62	3.72		3.72 INAA
K_2O	1.91	1.96		
P_2O_5	0.312	0.320		
H_2O^+/LOI	0.69	-		
H_2O -	1.41	-		
CO_2	-	-		
Others				
FeO*				7.98
Total	100.20	100.03		

Isotopes

Sr 87/86 measured 0.7051

initial 0.70508

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

(ppm)	XRF	INAA
Ag		
B		
Ba		803
Be		
Ce		62
Cd		
Co		31
Cr		75
Cs		0.8
Cu		
Dy		
Er		
Eu		1.7
Ga		
Gd		
Ge		
Hf		4.9
Ho		
La		31
Li		
Lu		0.45
Mo		
Nb	26	
Nd		
Ni		
Pb	5	
Pd		
Pr		
Rb	38	37
Rc		
Sb		0.07
Sc		22
Sm		6
Sn		
Sr	588	
Ta		1.6
Tb		0.92
Th	4	4.3
Tm		
U	1	1.1
V		
Y	30	
Yb		3.0
Zn		
Zr	203	
Others		

Sample # 76-1-9

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Socorro 7½'

Sec. 29 T. 2S R. 1W

Lat. 34°06'27"N Long. 106°58'00"W

Mtn Range, Valley, etc. Incut for abandoned irrigation ditch on No. side of Nogal

Catalogue #

Our Rock Name basalt

Formation basalt of Kelly Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 9.3 ± 0.5 m.y. (bad date!)

Sample Description: Arroyo about 2 mi SW of Kelly Ranch

Field # 76-1-9 Collected By Chapin & Chamberlin Date Collected 1/9/76

Author's Rock Name high-K basaltic andesite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted 2224 Grid 2/3 x 1/3 mm

Over area of 1 thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by: D. Bobrow

Type Counter ____ Date 6/28/83

Quartz		
K-Feldspar		
Plagioclase	5.8	
Biotite		
Amphiboles		
Pyx. clino / ortho / Olivine	2.7	
Opaques	1.3	
Groundmass	90.2	
Others		
Apatite	T	

CIPW Norms

Calculated by: Danny Bobrow

hand/program name Norm

Date:

Quartz	0.79	
Corundum	-	
Orthoclase	11.59	
Albite	31.46	
Anorthite	23.53	
Nepheline		
Diopside		
Wollastonite	5.75	
Enstatite	3.17	
Ferrosilite	2.37	
Hypersthene		
Enstatite	9.19	
Ferrosilite	6.87	
Olivine		
Forsterite	-	
Fayalite	-	
Magnetite	1.96	
Hematite	-	
Ilmenite	2.59	
Sphene	-	
Apatite	0.74	
Calcite	-	
Rutile	-	
Others		
	100.01	

COMMENTS:

D.I. = 43.8

Plagioclase Composition

Analyst: D. Bobrow

Method: universal stage

Date: 2/83

	Phenocrysts	Groundmass
Average	An_{45}	An_{56}
Range	An_{40} to An_{60}	An_{49} to An_{60}
Zoning	oscillatory to normal	
# Grains	12	6

Sample # 8-7-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	65.33	67.34		
Al_2O_3	15.93	16.42		
TiO_2	0.543	0.560		
Fe_2O_3	3.96	0.62		4.05 INAA
FeO		3.11		
MnO	0.063	0.065		
MgO	1.30	1.34		
CaO	3.85	3.97		
Na_2O	3.87	3.99		3.96 INAA
K_2O	2.36	2.43		
P_2O_5	0.153	0.158		
H_2O^+/LOI	1.60	-		
H_2O -	0.71	-		
CO_2	-	-		
Others				
FeO*				3.66
Total	99.67	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1053
Be		
Ce		56
Cd		
Co		9.4
Cr		8.7
Cs		1.5
Cu		
Dy		
Er		
Eu		1.3
Ga		
Gd		
Ge		
Hf		5.2
Ho		
La		30
Li		
Lu		0.44
Mo		
Nb	9	
Nd		
Ni		
Pb	15	
Pd		
Pr		
Rb	53	50
Rc		
Sb		0.12
Sc		8.2
Sm		4.8
Sn		
Sr	461	
Ta		0.53
Tb		0.67
Th	4	3.1
Tm		
U	1	0.8
V		
Y	26	
Yb		2.8
Zn		
Zr	193	
Others		

Sample # 8-7-4

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Magdalena 15'
Sec. 36 T. 2S R. 2W (NE¼ of SW¼)
Lat. 34°05' 32" N Long. 107°00' 01" W
Mtn Range, Valley, etc. Base of smooth dome (eastern side).

Catalogue #
Our Rock Name rhyodacite
Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric possibly correlates with 10.6 ± 1.5 m.y. old stone-wall dome.

Sample Description:

Field # 8-7-4 Collected By D. B. Date Collected 8/7/82
Author's Rock Name dacite
Description:

Reference:

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Modal Analysis (Volume %)

Single analysis
Points counted 1930 Grid 2/3 x 1/3
Over area of 1 thin sections mm

Multiple Analyses
average of ______ thin sections counted as above.

Counted by: D. Bobrow
Type Counter Swift Date 6/28/83

Quartz		
K-Feldspar	t	
Plagioclase	10.6	
Biotite	t	
Amphiboles	3.6	
Pyx. clino		
ortho		
Olivine		
Opaques	0.6	
Groundmass	85.2	
Others		
Zircon	t	
Apatite	t	

CIPW Norm		
Quartz	22.77	
Corundum	0.39	
Orthoclase	14.37	
Albite	33.75	
Anorthite	18.66	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	3.34	
Ferrosilite	4.40	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.90	
Hematite		
Ilmenite	1.06	
Sphene		
Apatite	0.36	
Calcite		
Rutile		
Others		
	100.01	

Plagioclase Composition

Analyst: D. Bobrow
Method: universal stage
Date:

	Phenocrysts	Groundmass
Average	An_{41}	An_{25}
Range	An_{36} to An_{52}	-
Zoning	oscillatory to normal	-
# Grains	16	2

COMMENTS:

D.I. = 70.9

Sample # 77-8-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	66.46	67.98		
Al_2O_3	15.60	15.96		
TiO_2	0.505	0.517		
Fe_2O_3	3.78	0.59		
FeO		2.95		
MnO	0.066	0.068		
MgO	1.22	1.25		
CaO	3.64	3.72		
Na_2O	4.08	4.17		
K_2O	2.59	2.65		
P_2O_5	0.144	0.147		
H_2O^+/LOI	2.15	-		
H_2O -	0.33	-		
CO_2	-	-		
Others				
FeO*				3.48
Total	100.57	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Re		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 77-8-1

CHEMICAL DATA FORM

Location
County Socorro
Quad. Socorro 7½'
Sec. 30 T. 25 R. 2W (SE¼ of SE¼)
Lat. 34° 05' 11" N Long. 106° 59' 32" W
Mtn Range, Valley, etc. north side of Nogal Canyon near upstream end of "Box."
Sample Description: Stonewall Dome

Formation
Catalogue #
Our Rock Name hornblende-rhyodacite
Formation Socorro Peak Rhyolite
Age: Epoch, etc: mid-Miocene
Radiometric 10.6 ± 1.5 m.y.

Field # 77-8-1 Collected By Chamberlin Date Collected 8/1/77
Author's Rock Name high-K dacite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections.

Multiple Analyses
average of ______ thin sections counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	22.35	
Corundum		
Orthoclase	15.66	
Albite	35.31	
Anorthite	16.98	
Nepheline		
Diopside		
Wollastonite	0.22	
Enstatite	0.09	
Ferrosilite	0.13	
Hypersthene		
Enstatite	3.01	
Ferrosilite	4.07	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.86	
Hematite		
Ilmenite	0.98	
Sphene		
Apatite	0.34	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 8-15-5

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	66.89	68.09		
Al_2O_3	15.85	16.13		
TiO_2	0.518	0.527		
Fe_2O_3	3.74	0.58		3.89 INAA
FeO		2.90		
MnO	0.068	0.069		
MgO	1.15	1.17		
CaO	3.63	3.70		
Na_2O	3.95	4.02		4.27 INAA
K_2O	2.62	2.67		
P_2O_5	0.145	0.148		
H_2O^+/LOI	1.52	-		
H_2O^-	0.29	-		
CO_2	-	-		
Others				
FeO*				3.46
Total	100.37	100.00		

Isotopes

			Rb (ppm)	Sr (ppm)
Sr 87/86	measured	0.7063	42.7	424.8
	initial	0.7062		

Oxygen

Others

U	Pb
0.87	15

Pb 207/204 = 15.468
206/204 = 17.339

Comments

Pb, U, & Sr data by S. Bowring (personal communication)

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1049
Be		
Ce		54
Cd		
Co		8.1
Cr		17.9
Cs		0.8
Cu		
Dy		
Er		
Eu		1.2
Ga		
Gd		
Ge		
Hf		5.0
Ho		
La		29
Li		~~0.38~~
Lu		0.38
Mo		
Nb	^9	
Nd		
Ni		
Pb	15	
Pd		
Pr		
Rb	55	56
Rc		
Sb		0.12
Sc		7.6
Sm		4.5
Sn		
Sr	432	
Ta		0.52
Tb		0.65
Th	2	3.1
Tm		
U	2	0.9
V		
Y	25	
Yb		2.7
Zn		
Zr	182	
Others		

Sample # 8-15-5

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Socorro 7½'
Sec. 31 T. 2S R.1W (SW¼ of SW¼)
Lat. 34°05' 19" N Long. 106°59' 31" W
Mtn Range, Valley, etc. Outcrop at crest of hill.

Catalogue #
Our Rock Name rhyodacite
Formation Socorro Peak Rhyolite (Stonewall dome)
Age: Epoch, etc: mid-Miocene
Radiometric 10.6 ± 1.5 m.y.

Sample Description:

Field # 8-15-5 Collected By D. B. Date Collected 8/15/82
Author's Rock Name dacite
Description:

Reference:

CIPW Norms

Calculated by: D. B.
hand/program name NORM
Date:

Mineral		
Quartz	23.38	
Corundum	0.27	
Orthoclase	15.76	
Albite	34.02	
Anorthite	17.37	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	2.92	
Ferrosilite	4.11	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.84	
Hematite		
Ilmenite	1.00	
Sphene		
Apatite	0.34	
Calcite		
Rutile		
Others		
	100.00	

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst: D. Bobrow
Method: universal stage
Date: 2/83

	Phenocrysts	Groundmass
Average	An_{41}	An_{37}
Range	An_{24} to An_{58}	-
Zoning	oscillatory to normal	-
# Grains	13	1

COMMENTS:

D.I. = 73.2

Sample # 8-19-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	66.62	68.13	
Al_2O_3	15.86	16.22	
TiO_2	0.525	0.537	
Fe_2O_3	3.30	0.52	
FeO		2.57	
MnO	0.047	0.048	
MgO	0.25	0.26	
CaO	4.19	4.29	
Na_2O	3.99	4.08	
K_2O	3.14	3.21	
P_2O_5	0.140	0.143	
H_2O^+/LOI	1.53	-	
H_2O^-	0.62	-	
CO_2	-	-	
Others			
FeO*				3.04
Total	100.21	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-19-1

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Socorro 7½'

Sec. 17 T. 3S R. 1W (SE¼ of SE¼)

Lat. 34°02' 37" N Long. 106°57' 30" W

Mtn Range, Valley, etc. On westward sloping ridge of hill "5925", approx. 150 ft below peak.

Sample Description:

Catalogue #

Our Rock Name hornblende-rhyodacite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric possibly equivalent to "6001" mesa (10.3 ± 0.8 m.y.)

Field # 8-19-1 Collected By D. B. Date Collected 8/19/82

Author's Rock Name high-K dacite

Description: gray, flow-banded, crystalline-poor, slightly vesicular; hornblende & plagioclase visible.

Reference:

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	22.19	
Corundum		
Orthoclase	18.98	
Albite	34.53	
Anorthite	16.46	
Nepheline		
Diopside		
Wollastonite	1.61	
Enstatite	0.27	
Ferrosilite	1.48	
Hypersthene		
Enstatite	0.37	
Ferrosilite	2.02	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.75	
Hematite		
Ilmenite	1.02	
Sphene		
Apatite	0.33	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 8-15-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	67.47	68.15	
Al_2O_3	16.13	16.29	
TiO_2	0.536	0.541	
Fe_2O_3	3.47	0.54	
FeO		2.67	
MnO	0.046	0.046	
MgO	0.88	0.89	
CaO	3.80	3.84	
Na_2O	4.02	4.06	
K_2O	2.80	2.83	
P_2O_5	0.151	0.153	
H_2O^+/LOI	0.60	-	
H_2O -	0.41	-	
CO_2	-	-	
Others			
FeO*			3.16
Total	100.31	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-15-4

CHEMICAL DATA FORM

Formation

Location
County Socorro
Quad. Socorro 7½'
Sec. 31 T. 2S R. 1W (SW¼ of SW¼)
Lat. 34°05' 22" N Long. 106°59' 24" W
Mtn Range, Valley, etc. Top of steep cliff that forms west wall of Nogal Canyon.

Catalogue #
Our Rock Name hornblende-rhyodacite
Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric 10.6 ± 1.5 m.y.

Sample Description:
Field # 8-15-4 Collected By D. B. Date Collected 8/15/82
Author's Rock Name high-K dacite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted' ______ Grid ______
Over area of ______ thin sections

Multiple Analyses
average of ______ thin sections
counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	22.95	
Corundum		
Orthoclase	16.71	
Albite	34.36	
Anorthite	17.87	
Nepheline		
Diopside		
Wollastonite	0.07	
Enstatite	0.03	
Ferrosilite	0.05	
Hypersthene		
Enstatite	2.19	
Ferrosilite	3.61	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.78	
Hematite		
Ilmenite	1.03	
Sphene		
Apatite	0.35	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 8-15-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	66.87	68.18		
Al_2O_3	15.87	16.18		
TiO_2	0.520	0.530		
Fe_2O_3	3.61	0.56		
FeO		2.81		
MnO	0.032	0.033		
MgO	0.81	0.83		
CaO	3.67	3.74		
Na_2O	3.93	4.01		
K_2O	2.92	2.98		
P_2O_5	0.153	0.156		
H_2O^+/LOI	1.01	-		
H_2O -	0.51	-		
CO_2	-	-		
Others				
FeO*				3.31
Total	99.91	100.01		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-15-1

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Socorro 7½'
Sec. 31 T. 2S R. 1W (SW¼ of SW¼)
Lat. 34°05' 21" N Long. 106°59' 20" W
Mtn Range, Valley, etc. Base of west wall of canyon.

Catalogue #
Our Rock Name hornblende-rhyodacite
Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric 10.6 ± 1.5 m.y.

Sample Description:

Field # 8-15-1 Collected By D. B. Date Collected 8/15/82
Author's Rock Name high-K dacite
Description: gray in color with feldspars and hornblende phenocrysts

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	22.94	
Corundum		
Orthoclase	17.59	
Albite	33.91	
Anorthite	17.37	
Nepheline		
Diopside		
Wollastonite	0.07	
Enstatite	0.03	
Ferrosilite	0.05	
Hypersthene		
Enstatite	2.03	
Ferrosilite	3.83	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.81	
Hematite		
Ilmenite	1.01	
Sphene		
Apatite	0.36	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 8-14-5

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	65.07	68.31		
Al_2O_3	15.48	16.25		
TiO_2	0.512	0.538		
Fe_2O_3	3.45	0.55		3.80 INAA
FeO		2.76		
MnO	0.057	0.060		
MgO	1.14	1.20		
CaO	3.57	3.75		
Na_2O	3.29	3.45		3.74 INAA
K_2O	2.84	2.98		
P_2O_5	0.137	0.144		
H_2O^+/LOI	4.34	-		
H_2O -	0.34	-		
CO_2	-	-		
Others				
FeO*				3.34
Total	100.23	99.99		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1130
Be		
Ce		54
Cd		
Co		8.5
Cr		7.2
Cs		5.4
Cu		
Dy		
Er		
Eu		1.3
Ga		
Gd		
Ge		
Hf		5.1
Ho		
La		29
Li		
Lu		0.37
Mo		
Nb	8	
Nd		
Ni		
Pb	15	
Pd		
Pr		
Rb	78	79
Rc		
Sb		0.07
Sc		8.0
Sm		4.6
Sn		
Sr	435	
Ta		0.49
Tb		0.64
Th	3	3.0
Tm		
U	2	1.1
V		
Y	24	
Yb		2.5
Zn		
Zr	181	
Others		

CHEMICAL DATA FORM

Sample # 8-14-5

Formation

Location

County Socorro

Quad. Socorro 7½'

Sec. 20 T. 3S R. 1W (SE¼ of SE¼)

Lat. 34°01' 52" N Long. 106°57" 29" W

Mtn Range, Valley, etc. Outcrop of vitrophyre on SW side of "6001" mesa at contact with gypsum beds.

Sample Description:

Catalogue #

Our Rock Name rhyodacite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 10.3 ± 0.8 m.y.

Field # 8-14-5 Collected By D. B. Date Collected 8/14/82

Author's Rock Name high-K dacite

Description:

Reference:

CIPW Norms

Calculated by: D. B.

hand/program name Norm

Date:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Quartz	25.65	
Corundum	0.87	
Orthoclase	17.62	
Albite	29.23	
Anorthite	17.65	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	2.98	
Ferrosilite	3.84	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.80	
Hematite		
Ilmenite	1.02	
Sphene		
Apatite	0.33	
Calcite		
Rutile		
Others		

COMMENTS: 99.99

Plagioclase Composition

Analyst: D. Bobrow

Method: universal stage

Date: 2/83

	Phenocrysts	Groundmass
Average	An_{42}	
Range	An_{36} to An_{48}	
Zoning	oscillatory to	
# Grains	5 normal	

Sample # 8-19-2

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	67.68	68.33		
Al_2O_3	16.14	16.30		
TiO_2	0.543	0.548		
Fe_2O_3	3.37	0.52		3.29 INAA
FeO		2.60		
MnO	0.035	0.035		
MgO	0.66	0.67		
CaO	3.48	3.51		
Na_2O	4.03	4.10		3.65 INAA
K_2O	3.25	3.28		
P_2O_5	0.149	0.150		
H_2O^+/LOI	0.47	-		
H_2O^-	0.20	-		
CO_2	-	-		
Others				
FeO*				3.01
Total	100.01	100.04		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		987
Be		
Ce		50
Cd		
Co		6.6
Cr		7.8
Cs		1.5
Cu		
Dy		
Er		
Eu		1.1
Ga		
Gd		
Ge		
Hf		4.6
Ho		
La		24
Li		
Lu		0.31
Mo		
Nb	9	
Nd		
Ni		
Pb	17	
Pd		
Pr		
Rb	68	65
Rc		
Sb		0.12
Sc		6.8
Sm		4.1
Sn		
Sr	430	
Ta		0.51
Tb		0.59
Th	3	2.7
Tm		
U	1	1.0
V		
Y	22	
Yb		2.1
Zn		
Zr	185	
Others		

Sample # 8-19-2

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Socorro 7½'
Sec. 17 T. 3S R. 1W (SE¼ of SE¼)
Lat. 34°02' 36" N Long. 106°57' 32" W
Mtn Range, Valley, etc. Outcrop on eastern side of Pyramid Peak, approx. 25 ft below peak of hill.
Sample Description:

Catalogue #
Our Rock Name rhyodacite
Formation Socorro Peak rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric possibly correlates with "6001" mesa (10.3 ± 0.8 m.y.)

Field # 8-19-2 Collected By D. B. Date Collected 8/19/82
Author's Rock Name high-K dacite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ___ Grid ___
Over area of ___ thin sections

Multiple Analyses
average of ___ thin sections counted as above.

Counted by:
Type Counter ___ Date ___

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	22.42	
Corundum	0.02	
Orthoclase	19.39	
Albite	34.43	
Anorthite	16.45	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.66	
Ferrosilite	3.50	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.75	
Hematite		
Ilmenite	1.04	
Sphene		
Apatite	0.35	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

D.I. = 76.2

Plagioclase Composition

Analyst: D. Bobrow
Method: universal stage
Date: 2/83

	Phenocrysts	Groundmass
Average	An_{43}	
Range	$An_{\cancel{23 (rim)}}$ to $An_{\cancel{54 (core)}}$	
Zoning	~~oscillatory~~ to normal	
# Grains	10	

Sample # 8-7-5

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	67.56	68.42		
Al_2O_3	16.05	16.25		
TiO_2	0.526	0.533		
Fe_2O_3	3.38	0.52		3.30 INAA
FeO		2.61		
MnO	0.034	0.034		
MgO	0.56	0.57		
CaO	3.88	3.93		
Na_2O	3.95	4.00		3.96 INAA
K_2O	2.94	2.98		
P_2O_5	0.149	0.151		
H_2O^+/LOI	0.61	-		
H_2O -	0.55	-		
CO_2	-	-		
Others				
FeO*				3.02
Total	100.19	100.01		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		996
Be		
Ce		52
Cd		
Co		6.7
Cr		10.1
Cs		0.9
Cu		
Dy		
Er		
Eu		1.2
Ga		
Gd		
Ge		
Hf		4.9
Ho		
La		27
Li		
Lu		0.35
Mo		
Nb	8	
Nd		
Ni		
Pb	14	
Pd		
Pr		
Rb	55	56
Rc		
Sb		0.07
Sc		7.7
Sm		4.4
Sn		
Sr	457	
Ta		0.49
Tb		0.64
Th	2	2.9
Tm		
U	<2	1.1
V		
Y	23	
Yb		2.3
Zn		
Zr	190	
Others		

Sample # 8-7-5

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Magdalena 15'
Sec. 36 T. 2S R. 2W (NE¼ of SW¼)
Lat. 34° 05' 31" N Long. 107° 00' 11" W
Mtn Range, Valley, etc. Peak of Smooth dome.

Catalogue #
Our Rock Name rhyodacite
Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric possibly correlates with 10.6 ± 1.5 m.y. old Stonewall dome.

Sample Description:

Field # 8-7-2 Collected By D. B. Date Collected 8/7/82
Author's Rock Name dacite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	23.50	
Corundum		
Orthoclase	17.60	
Albite	33.85	
Anorthite	17.60	
Nepheline		
Diopside		
Wollastonite	0.38	
Enstatite	0.11	
Ferrosilite	0.28	
Hypersthene		
Enstatite	1.30	
Ferrosilite	3.26	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.76	
Hematite		
Ilmenite	1.01	
Sphene		
Apatite	0.35	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 8-15-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	67.48	68.42	
Al_2O_3	15.84	16.06	
TiO_2	0.524	0.531	
Fe_2O_3	3.65	0.56	
FeO		2.82	
MnO	0.034	0.034	
MgO	0.89	0.90	
CaO	3.61	3.66	
Na_2O	3.87	3.92	
K_2O	2.90	2.94	
P_2O_5	0.143	0.145	
H_2O^+/LOI	0.66	-	
H_2O -	0.34	-	
CO_2	-	-	
Others			
FeO*			3.32
Total	99.94	99.99	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-15-3

CHEMICAL DATA FORM

Location

County Socorro

Quad. Socorro 7½'

Sec. 31 T. 2S R. 1W (SW¼ of SW¼)

Lat. 34°05' 22" N Long. 106°59' 23" W

Mtn Range, Valley, etc. Approx. 80 ft below top of cliff that forms west wall of Nogal Canyon.

Sample Description:

Field # 8-15-3 Collected By D. B. Date Collected 8/15/82

Author's Rock Name high-K dacite

Description:

Formation

Catalogue #

Our Rock Name hornblende-rhyodacite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 10.6 ± 1.5 m.y.

Reference:

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	23.78	
Corundum	0.12	
Orthoclase	17.38	
Albite	33.20	
Anorthite	17.21	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	2.25	
Ferrosilite	3.90	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.82	
Hematite		
Ilmenite	1.01	
Sphene		
Apatite	0.34	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 8-10-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	67.59	69.01	
Al_2O_3	15.59	15.92	
TiO_2	0.423	0.432	
Fe_2O_3	3.08	0.48	
FeO		2.40	
MnO	0.055	0.056	
MgO	1.07	1.09	
CaO	3.14	3.21	
Na_2O	3.94	4.02	
K_2O	3.17	3.24	
P_2O_5	0.142	0.145	
H_2O^+/LOI	0.51	-	
H_2O -	0.44	-	
CO_2	-	-	
Others			
FeO*			2.83
Total	99.15	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-10-3

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Socorro 7½'

Sec. 5 T. 3S R. 1W (SW¼ of SW¼)

Lat. 34°04' 15" N Long. 106°57' 44" W

Mtn Range, Valley, etc. Contact of two flows approx. 80 ft below radio towers.

Catalogue #

Our Rock Name (Tsd) hornblende-rhyodacite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 10.7 ± 1.5 m.y.

Sample Description:

Field # 8-10-3 Collected By D. B. Date Collected 8/10/82

Author's Rock Name high-K rhyolite

Description: gray, massive flow; biotite-rich; contains clots

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	23.58	
Corundum	0.32	
Orthoclase	19.13	
Albite	34.04	
Anorthite	14.96	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	2.72	
Ferrosilite	3.40	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.70	
Hematite		
Ilmenite	0.82	
Sphene		
Apatite	0.34	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 8-19-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	68.26	69.29	
Al_2O_3	16.33	16.58	
TiO_2	0.536	0.544	
Fe_2O_3	2.56	0.40	
FeO		1.98	
MnO	0.022	0.022	
MgO	0.18	0.18	
CaO	3.41	3.46	
Na_2O	4.03	4.09	
K_2O	3.25	3.30	
P_2O_5	0.151	0.153	
H_2O^+/LOI	0.68	-	
H_2O -	0.47	-	
CO_2	-	-	
Others			
FeO*			2.34
Total	99.88	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-19-4

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Socorro 7½'

Sec. 17 T. 3S R. 1W

Lat. 34° 02' 40" N Long. 106° 57' 33" W

Mtn Range, Valley, etc. Northward dipping outcrop; near base of hill "5925."

Catalogue #

Our Rock Name Hornblende-rhyodacite (dellenite)

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric possibly equivalent to "6001" mesa

Sample Description:

Field # 8-19-4 Collected By D. B. Date Collected 8/19/82

Author's Rock Name high-K dacite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	24.50	
Corundum	0.35	
Orthoclase	19.50	
Albite	34.61	
Anorthite	16.16	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.46	
Ferrosilite	2.46	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.58	
Hematite		
Ilmenite	1.03	
Sphene		
Apatite	0.36	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

Sample # 8-14-7

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	68.23	69.54	
Al_2O_3	16.13	16.44	
TiO_2	0.544	0.544	
Fe_2O_3	3.04	0.47	
FeO		2.36	
MnO	0.024	0.024	
MgO	0.29	0.30	
CaO	3.25	3.31	
Na_2O	3.60	3.67	
K_2O	3.13	3.19	
P_2O_5	0.139	0.142	
H_2O^+/LOI	1.16	-	
H_2O -	1.05	-	
CO_2	-	-	
Others			
FeO*			2.78
Total	100.59	99.99	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-14-7

CHEMICAL DATA FORM

Location

County Socorro
Quad. Socorro 7½'
Sec. 21 T. 3S R. 1W (SW¼ of NW¼)
Lat. 34° 02' 13" N Long. 106° 57' 18" W
Mtn Range, Valley, etc. Base of columnar outcrop, (approx. 60 ft above small-pink shed) on "6001" mesa.
Sample Description:

Formation
Catalogue #
Our Rock Name hornblende-rhyodacite
Formation Socorro Peak Rhyolite
Age: Epoch, etc: mid-Miocene
Radiometric 10.3 ± 0.8 m.y.

Field # 8-14-7 Collected By D. B. Date Collected 8/14/82
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections
Multiple Analyses
average of thin sections
counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	27.45	
Corundum	1.27	
Orthoclase	18.85	
Albite	31.05	
Anorthite	15.50	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.74	
Ferrosilite	3.08	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.69	
Hematite		
Ilmenite	1.05	
Sphene		
Apatite	0.33	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

Sample # 8-5-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	68.43	69.65	
Al_2O_3	15.90	16.18	
TiO_2	0.540	0.550	
Fe_2O_3	2.47	0.38	
FeO		1.92	
MnO	0.021	0.022	
MgO	0.29	0.29	
CaO	3.14	3.20	
Na_2O	3.99	4.06	
K_2O	3.53	3.59	
P_2O_5	0.152	0.155	
H_2O^+/LOI	0.87	-	
H_2O -	0.48	-	
CO_2	-	-	
Others			
FeO*			2.26
Total	99.81	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-5-1

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Socorro 7½'
Sec. 21 T. 3S R. 1W (NE¼ of SW¼)
Lat. 34°02' 02" N Long. 106°56' 55" W
Mtn Range, Valley, etc. Approx. 40 ft above stream channel, on hill NE of "6001" mesa.

Sample Description:

Catalogue #
Our Rock Name hornblende-rhyodacite
Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric 10.3 ± 0.8 m.y.

Field # 8-5-1 Collected By D. B. Date Collected 8/5/82
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	24.36	
Corundum	0.17	
Orthoclase	21.23	
Albite	34.36	
Anorthite	14.84	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.74	
Ferrosilite	2.34	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.56	
Hematite		
Ilmenite	1.04	
Sphene		
Apatite	0.36	
Calcite		
Rutile		
Others		

COMMENTS: 100.00

Sample # 8-7-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	68.58	69.78	
Al_2O_3	14.94	15.20	
TiO_2	0.372	0.379	
Fe_2O_3	2.89	0.45	
FeO		2.24	
MnO	0.049	0.050	
MgO	0.71	0.72	
CaO	3.21	3.27	
Na_2O	3.97	4.04	
K_2O	3.65	3.71	
P_2O_5	0.149	0.152	
H_2O^+/LOI	0.80	-	
H_2O -	0.09	-	
CO_2	-	-	
Others			
FeO*			2.64
Total	99.41	99.99	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-7-1

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 26 T. 2S R. 2W (SE¼ of SE¼)

Lat. 34°06' 05" N Long. 107°00' 38" W

Mtn Range, Valley, etc. Steeply dipping outcrop at crest of small hill, approx. 0.5 mi SW of Strawberry Peak

Catalogue #

Our Rock Name hornblende-rhyodacite

Formation Socorro Peak rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 12.1 ± 0.5 m.y.

Sample Description:

Field # 8-7-1 Collected By D. B. Date Collected 8/7/82

Author's Rock Name high-K rhyolite

Description:

Reference:

CIPW Norms

Calculated by: D.B.

hand/program name Fortran: NORM

Date:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Quartz	23.55	
Corundum		
Orthoclase	21.92	
Albite	34.16	
Anorthite	12.38	
Nepheline		
Diopside		
Wollastonite	1.18	
Enstatite	0.43	
Ferrosilite	0.78	
Hypersthene		
Enstatite	1.37	
Ferrosilite	2.44	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.72	
Hematite		
Ilmenite	0.72	
Sphene		
Apatite	0.35	
Calcite		
Rutile		
Others		

COMMENTS: 100.00

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 8-7-2

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	68.48	70.04	
Al_2O_3	14.74	15.08	
TiO_2	0.387	0.396	
Fe_2O_3	2.88	0.45	
FeO		2.25	
MnO	0.044	0.045	
MgO	0.64	0.66	
CaO	3.23	3.30	
Na_2O	3.86	3.95	
K_2O	3.61	3.69	
P_2O_5	0.140	0.143	
H_2O^+/LOI	1.16	-	
H_2O -	0.40	-	
CO_2	-	-	
Others			
FeO*			2.65
Total	99.57	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-7-2

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 25 T. 2S R. 2W (NW¼ of SW¼)

Lat. 34°06' 20" N Long. 107°00' 22" W

Mtn Range, Valley, etc. Approx. one-half way to top on NW side of Strawberry Peak

Catalogue #

Our Rock Name hornblende-rhyodacite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 12.1 ± 0.5 m.y.

Sample Description: (SW edge of columnar-jointed outcrop).

Field # 8-7-2 Collected By D. B. Date Collected 8/7/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	24.48	
Corundum		
Orthoclase	21.82	
Albite	33.41	
Anorthite	12.51	
Nepheline		
Diopside		
Wollastonite	1.23	
Enstatite	0.43	
Ferrosilite	0.84	
Hypersthene		
Enstatite	1.20	
Ferrosilite	2.35	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.65	
Hematite		
Ilmenite	0.75	
Sphene		
Apatite	0.33	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Plagioclase Composition

Analyst: D. Bobrow

Method: Michel-Levy

Date: 3/18/83

	Phenocrysts	Groundmass
Average	An_{33}	
Range	An_{25} to An_{43}	
Zoning	normal to oscill-atory	
# Grains	6	

Sample # 8-10-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	69.33	70.18		
Al_2O_3	15.08	15.27		
TiO_2	0.408	0.413		
Fe_2O_3	2.93	0.45		3.00 INAA
FeO		2.26		
MnO	0.050	0.051		
MgO	0.67	0.68		
CaO	2.74	2.77		
Na_2O	3.88	3.93		4.00 INAA
K_2O	3.80	3.85		
P_2O_5	0.145	0.147		
H_2O^+/LOI	0.51	-		
H_2O -	0.27	-		
CO_2	-	-		
Others				
FeO*				2.68
Total	99.81	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1430
Be		
Ce		62
Cd		
Co		5.8
Cr		9.0
Cs		0.7
Cu		
Dy		
Er		
Eu		1.2
Ga		
Gd		
Ge		
Hf		4.5
Ho		
La		35
Li		
Lu		0.31
Mo		
Nb	11	
Nd		
Ni		
Pb	16	
Pd		
Pr		
Rb	64	62
Rc		
Sb		0.08
Sc		5.9
Sm		4.3
Sn		
Sr	479	
Ta		0.73
Tb		0.57
Th	4	4.8
Tm		
U	2	1.4
V		
Y	20	
Yb		1.9
Zn		
Zr	160	
Others		

Sample # 8-10-4

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Socorro 7½'
Sec. 5 T. 3S R. 1W (SW¼ of SE¼)
Lat. 34° 04' 17" N Long. 106° 57' 46" W
Mtn Range, Valley, etc. Fresh talus pile at radio towers.

Catalogue #
Our Rock Name rhyodacite
Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric 10.7 ± 1.5 m.y.

Sample Description:

Field # 8-10-4 Collected By D. B. Date Collected 8/10/82
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections
counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	24.65	
Corundum		
Orthoclase	22.73	
Albite	33.24	
Anorthite	12.66	
Nepheline		
Diopside		
Wollastonite	0.06	
Enstatite	0.02	
Ferrosilite	0.04	
Hypersthene		
Enstatite	1.67	
Ferrosilite	3.15	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.66	
Hematite		
Ilmenite	0.78	
Sphene		
Apatite	0.34	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 80.6

Sample # 76-4-1B

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	69.16	70.38		
Al_2O_3	15.12	15.39		
TiO_2	0.384	0.391		
Fe_2O_3	2.79	0.43		2.80 INAA
FeO		2.17		
MnO	0.048	0.049		
MgO	0.88	0.90		
CaO	2.79	2.84		
Na_2O	3.86	3.93		4.16 INAA
K_2O	3.34	3.40		
P_2O_5	0.132	0.134		
H_2O^+/LOI	1.10	-		
H_2O^-	0.31	-		
CO_2	-	-		
Others				
FeO*				2.54
Total	99.90	100.01		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF	(ppm) INAA
Ag		
B		
Ba		1453
Be		
Ce		60
Cd		
Co		5.6
Cr		12.7
Cs		0.8
Cu		
Dy		
Er		
Eu		1.1
Ga		
Gd		
Ge		
Hf		4.6
Ho		
La		35
Li		
Lu		0.32
Mo		
Nb	10	
Nd		
Ni		
Pb	17	
Pd		
Pr		
Rb	70	69
Rc		
Sb		0.15
Sc		5.3
Sm		4.3
Sn		
Sr	477	
Ta		0.69
Tb		0.54
Th	6	4.6
Tm		
U	2	1.4
V		
Y	20	
Yb		2.1
Zn		
Zr	155	
Others		

Sample # 76-4-1B

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Socorro 7½'
Sec. 5 T. 3S R. 1W (SE¼ of SW¼)
Lat. 34°04' 30" N Long. 106°58' 06" W
Mtn Range, Valley, etc. highest point of Socorro Peak

Catalogue #
Our Rock Name rhyodacite
Formation Socorro Peak Rhyolite
Age: Epoch, etc: mid-Miocene
Radiometric 10.7 ± 1.5 m.y.

Sample Description:

Field # 76-4-1B Collected By Chapin & Chamberlin Date Collected 4/1/76
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections

Multiple Analyses
average of ______ thin sections counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	26.09	
Corundum	0.41	
Orthoclase	20.09	
Albite	33.24	
Anorthite	13.21	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	2.23	
Ferrosilite	3.06	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.63	
Hematite		
Ilmenite	0.74	
Sphene		
Apatite	0.31	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

D.I. = 79.4

Sample # 8-7-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	69.75	70.50	
Al_2O_3	15.03	15.18	
TiO_2	0.382	0.386	
Fe_2O_3	2.89	0.45	
FeO		2.23	
MnO	0.052	0.053	
MgO	0.84	0.85	
CaO	2.72	2.75	
Na_2O	3.84	3.88	
K_2O	3.55	3.59	
P_2O_5	0.135	0.136	
H_2O^+/LOI	0.39	-	
H_2O -	0.08	-	
CO_2	-	-	
Others			
FeO*			2.63
Total	99.66	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-7-3

CHEMICAL DATA FORM

Formation

Location
County Socorro
Quad. Magdalena 15'
Sec. 25 T. 2S R. 2W (NE¼ of SW¼)
Lat. 34°06' 20" N Long. 107°00' 20" W
Mtn Range, Valley, etc. Edge of columnar-jointed outcrop at top of dome.

Catalogue #
Our Rock Name hornblende-rhyodacite
Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric 12.1 ± 0.5 m.y.

Sample Description:
Field # 8-7-3 Collected By D. B. Date Collected 8/7/82
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections
counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	25.97	
Corundum	0.25	
Orthoclase	21.20	
Albite	32.84	
Anorthite	12.75	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	2.12	
Ferrosilite	3.18	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.65	
Hematite		
Ilmenite	0.73	
Sphene		
Apatite	0.32	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Sample # 76-4-1A

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	69.63	70.53		
Al_2O_3	15.16	15.36		
TiO_2	0.389	0.394		
Fe_2O_3	2.75	0.43		2.55 INAA
FeO		2.12		
MnO	0.047	0.048		
MgO	0.61	0.62		
CaO	2.76	2.80		
Na_2O	3.69	3.74		3.38 INAA
K_2O	3.79	3.84		
P_2O_5	0.137	0.139		
H_2O^+/LOI	0.52	-		
H_2O -	0.27	-		
CO_2	-	-		
Others				
FeO*				2.40
Total	99.75	100.02		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF	(ppm) INAA
Ag		
B		
Ba		1375
Be		
Ce		54
Cd		
Co		5.1
Cr		10.5
Cs		0.7
Cu		
Dy		
Er		
Eu		1.0
Ga		
Gd		
Ge		
Hf		4.1
Ho		
La		30
Li		
Lu		0.29
Mo		
Nb	10	
Nd		
Ni		
Pb	17	
Pd		
Pr		
Rb	66	59
Rc		
Sb		0.07
Sc		4.7
Sm		3.7
Sn		
Sr	484	
Ta		0.73
Tb		0.52
Th	5	4.3
Tm		
U	2	1.4
V		
Y	20	
Yb		1.9
Zn		
Zr	154	
Others		

Sample # 76-4-1A

CHEMICAL DATA FORM

Location

County: Socorro
Quad.: Socorro 7½'
Sec. 5 T. 3S R. 1W (SW¼ of SE¼)
Lat. 34° 4' 17" N Long. 106° 57' 46" W
Mtn Range, Valley, etc. On Socorro Peak at radio station

Formation

Catalogue #
Our Rock Name: rhyodacite
Formation: Socorro Peak Rhyolite
Age: Epoch, etc: mid-Miocene
Radiometric: 10.7 ± 1.5 m.y.

Sample Description:

Field # 76-4-1A Collected By Chamberlin Date Collected 4/1/76
Author's Rock Name: high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted 2008 Grid 2/3 x 1/3
Over area of 1 thin sections mm

Multiple Analyses
average of ___ thin sections
counted as above.

Counted by: D. Bobrow
Type Counter Swift Date 6/28/83

Quartz	t	
K-Feldspar	t	
Plagioclase	10.4	
Biotite	1.5	
Amphiboles	1.5	
Pyx. clino		
ortho		
Olivine		
Opaques	0.3	
Groundmass	86.3	
Others		
Zircon	t	
Apatite	t	

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name: Fortran: NORM
Date:

Quartz	26.21	
Corundum	0.30	
Orthoclase	22.68	
Albite	31.63	
Anorthite	12.96	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.54	
Ferrosilite	2.99	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.62	
Hematite		
Ilmenite	0.75	
Sphene		
Apatite	0.32	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

D.I. = 80.5

Sample # 8-14-6

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	69.53	70.61		
Al_2O_3	15.34	15.58		
TiO_2	0.499	0.507		
Fe_2O_3	3.18	0.49		3.18 INAA
FeO		2.46		
MnO	0.011	0.011		
MgO	0.23	0.23		
CaO	3.14	3.19		
Na_2O	3.67	3.73		3.52 INAA
K_2O	3.00	3.05		
P_2O_5	0.135	0.137		
H_2O^+/LOI	0.84	-		
H_2O^-	0.51	-		
CO_2	-	-		
Others				
FeO*				2.88
Total	100.09	100.00		

Isotopes

Sr 87/86 measured
initial

Oxygen
Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1060
Be		
Ce		51
Cd		
Co		6.1
Cr		8.9
Cs		13.4
Cu		
Dy		
Er		
Eu		1.1
Ga		
Gd		
Ge		
Hf		4.8
Ho		
La		25
Li		
Lu		0.34
Mo		
Nb	8	
Nd		
Ni		
Pb	17	
Pd		
Pr		
Rb	85	86
Rc		
Sb		0.4
Sc		7.3
Sm		4.2
Sn		
Sr	413	
Ta		0.47
Tb		0.59
Th	2	2.8
Tm		
U	1	1.1
V		
Y	21	
Yb		2.1
Zn		
Zr	172	
Others		

Sample # 8-14-6

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Socorro 7½'
Sec. 21 T. 3S R. 1W (SW¼ of NW¼)
Lat. 34°02' 09" N Long. 106°57' 18" W
Mtn Range, Valley, etc. Columnar jointed outcrop facing S, near peak of "6001" mesa.
Sample Description:

Catalogue #
Our Rock Name rhyodacite
Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric 10.3 ± 0.8 m.y.

Field # 8-14-6 Collected By D. B. Date Collected 8/14/82
Author's Rock Name high-K dacite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections
counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		
Zeolites	5%	-in groundmass & around phenocrysts

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	28.98	
Corundum	0.68	
Orthoclase	18.00	
Albite	31.54	
Anorthite	14.93	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.58	
Ferrosilite	3.30	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.71	
Hematite		
Ilmenite	0.96	
Sphene		
Apatite	0.32	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 78.5

Sample # 8-15-7

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	70.46	70.94		
Al_2O_3	14.97	15.07		
TiO_2	0.359	0.361		
Fe_2O_3	2.68	0.41		2.77 INAA
FeO		2.06		
MnO	0.061	0.061		
MgO	0.59	0.59		
CaO	2.76	2.78		
Na_2O	3.89	3.92		4.25 INAA
K_2O	3.68	3.71		
P_2O_5	0.105	0.106		
H_2O^+/LOI	0.17	-		
H_2O -	0.39	-		
CO_2	-	-		
Others				
FeO*				2.46
Total	100.12	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		876
Be		
Ce		47
Cd		
Co		6.0
Cr		7.5
Cs		1.0
Cu		
Dy		
Er		
Eu		1.0
Ga		
Gd		
Ge		
Hf		4.1
Ho		
La		29
Li		
Lu		0.32
Mo		
Nb	11	
Nd		
Ni		
Pb	18	
Pd		
Pr		
Rb	79	78
Rc		
Sb		0.08
Sc		6.0
Sm		3.8
Sn		
Sr	338	
Ta		0.79
Tb		0.48
Th	6	5.5
Tm		
U	1	1.7
V		
Y	19	
Yb		2.1
Zn		
Zr	135	
Others		

Sample # 8-15-7

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 11 T. 2S R. 2W (SW¼ of NE¼)

Lat. 34°03' 58" N Long. 107°00' 32" W

Mtn Range, Valley, etc. Outcrop at peak of Jejenes hill.

Catalogue #

Our Rock Name rhyolite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric possibly correlates with 9.2 ± 0.4 m.y. rhyolite of R.R. Quarry.

Sample Description:

Field # 8-15-7 Collected By D. B. Date Collected 8/15/82

Author's Rock Name High-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	26.20	
Corundum		
Orthoclase	21.89	
Albite	33.14	
Anorthite	12.60	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.41	
Ferrosilite	2.82	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.60	
Hematite		
Ilmenite	0.69	
Sphene		
Apatite	0.25	
Calcite		
Rutile		
Others		
	99.60	

COMMENTS:

Sample # 76-6-1A

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	69.08	71.10		
Al_2O_3	14.55	14.98		
TiO_2	0.347	0.357		
Fe_2O_3	2.63	0.41		2.82 INAA
FeO		2.06		
MnO	0.050	0.051		
MgO	0.75	0.77		
CaO	2.42	2.49		
Na_2O	3.46	3.56		3.80 INAA
K_2O	3.97	4.09		
P_2O_5	0.125	0.129		
H_2O^+/LOI	2.20	-		
H_2O -	0.28	-		
CO_2	-	-		
Others				
FeO*			2.48	
Total	99.86	100.00		

Isotopes

Sr 87/86 measured 0.7050

initial 0.7049

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

(ppm)	XRF	INAA
Ag		
B		
Ba		1532
Be		
Ce		61
Cd		
Co		5.7
Cr		10.7
Cs		0.7
Cu		
Dy		
Er		
Eu		1.1
Ga		
Gd		
Ge		
Hf		4.7
Ho		
La		35
Li		
Lu		0.31
Mo		
Nb	10	
Nd		
Ni		
Pb	18	
Pd		
Pr		
Rb	62	64
Rc		
Sb		0.06
Sc		5.2
Sm		4.2
Sn		
Sr	434	
Ta		0.62
Tb		0.53
Th	6	4.5
Tm		
U	2	1.3
V		
Y	19	
Yb		2.0
Zn		
Zr	159	
Others		

Sample # 76-6-1A

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Socorro 7½'

Sec. 25 T. 2S R. 2W (NE¼ of SW¼)

Lat. 34°06' 24" N Long. 106°59'41" W

Mtn Range, Valley, etc. Crest of large slump block due E. of Strawberry Peak

Catalogue #

Our Rock Name rhyodacite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 12.1 ± 0.5 m.y.

Sample Description:

Field # 76-6-1 Collected By Chapin & Chamberlin Date Collected 6/1/76

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	27.27	
Corundum	0.47	
Orthoclase	24.15	
Albite	30.13	
Anorthite	11.52	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.92	
Ferrosilite	2.96	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.60	
Hematite		
Ilmenite	0.68	
Sphene		
Apatite	0.30	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

D.I. = 81.6

Sample # 8-15-6

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.52	71.43	
Al_2O_3	14.52	14.71	
TiO_2	0.308	0.312	
Fe_2O_3	2.38	0.37	
FeO		1.84	
MnO	0.049	0.050	
MgO	0.54	0.55	
CaO	2.99	3.03	
Na_2O	3.77	3.82	
K_2O	3.75	3.80	
P_2O_5	0.098	0.099	
H_2O^+/LOI	0.82	-	
H_2O^-	0.10	-	
CO_2	-	-	
Others			
FeO*			2.17
Total	99.85	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-15-6

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Magdalena 15'
Sec. 11 T. 2S R. 2W ($NE\frac{1}{4}$ of $NE\frac{1}{4}$)
Lat. 34°04' 00" N Long. 107°00' 39" W
Mtn Range, Valley, etc. Outcrop on westward sloping hill, approx. 130 ft below peak of hill" 6842."
Sample Description:

Catalogue #
Our Rock Name rhyolite
Formation Socorro Peak Rhyolite
Age: Epoch, etc: mid-Miocene
Radiometric possibly correlates with 9.2 ± 0.4 m.y. R.R. Quarry rhyolite.

Field # 8-15-6 Collected By D. B. Date Collected 8/15/82
Author's Rock Name high-K rhyolite
Description: crystalline-rich--sanidine, plagioclase, quartz, biotite, and amphibole

Reference:

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	27.01	
Corundum		
Orthoclase	22.45	
Albite	32.31	
Anorthite	11.77	
Nepheline		
Diopside		
Wollastonite	1.09	
Enstatite	0.38	
Ferrosilite	0.74	
Hypersthene		
Enstatite	0.98	
Ferrosilite	1.91	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.53	
Hematite		
Ilmenite	0.59	
Sphene		
Apatite	0.23	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections
Multiple Analyses
average of thin sections counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 8-10-7

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	71.36	71.74		
Al_2O_3	14.32	14.40		
TiO_2	0.355	0.357		
Fe_2O_3	2.45	0.38		
FeO		1.88		
MnO	0.054	0.054		
MgO	0.61	0.61		
CaO	2.09	2.10		
Na_2O	3.82	3.84		
K_2O	4.51	4.53		
P_2O_5	0.107	0.108		
H_2O^+/LOI	0.35	-		
H_2O -	0.06	-		
CO_2	-	-		
Others				
FeO*				2.22
Total	100.09	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

CHEMICAL DATA FORM

Sample # 8-10-7

Formation

Location

County Socorro

Quad. Socorro 7½'

Sec. 18 T. 3S R. 1W (NE¼ of NE¼)

Lat. 34°03' 24" N Long. 106° 58' 42" W

Mtn Range, Valley, etc. Small outcrop above gentle slope which is above steep

Sample Description: columnar outcrop

Catalogue #

Our Rock Name rhyolite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric possible equivalent to 10.8 ± 0.4 m.y. old rhyolite at Signal Flag.

Field # 8-10-7 Collected By D. B. Date Collected 8/10/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description: Crystalline-rich: sanidine, plagioclase quartz, biotite, and amphibole.

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	25.95	
Corundum		
Orthoclase	26.79	
Albite	32.50	
Anorthite	8.65	
Nepheline		
Diopside		
Wollastonite	0.45	
Enstatite	0.17	
Ferrosilite	0.29	
Hypersthene		
Enstatite	1.36	
Ferrosilite	2.36	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.55	
Hematite		
Ilmenite	0.68	
Sphene		
Apatite	0.25	
Calcite		
Rutile		
Others		

COMMENTS: 100.00

Sample # 8-15-8

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	69.62	71.87	
Al_2O_3	14.13	14.59	
TiO_2	0.326	0.337	
Fe_2O_3	2.36	0.37	
FeO		1.86	
MnO	0.053	0.055	
MgO	0.69	0.71	
CaO	2.37	2.45	
Na_2O	3.55	3.67	
K_2O	3.87	4.00	
P_2O_5	0.092	0.095	
H_2O^+/LOI	2.61	-	
H_2O^-	0.16	-	
CO_2	-	-	
Others			
FeO*				2.19
Total	99.83	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-15-8

CHEMICAL DATA FORM

Location

County Socorro

Quad. Magdalena 15'

Sec. 11 T. 2S R. 2W (SW¼ of SW¼)

Lat. 34°03' 34" N Long. 107°00' 40" W

Mtn Range, Valley, etc. In stream channel, approx. 100 ft above base of hill "6842" (vitrophyre).

Sample Description:

Formation

Catalogue #

Our Rock Name rhyolite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric possibly correlates with 9.2 ± 0.4 m.y. R.R. Quarry

Field # 8-15-8 Collected By D. B. Date Collected 8/15/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	28.02	
Corundum	0.01	
Orthoclase	23.61	
Albite	31.01	
Anorthite	11.52	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.77	
Ferrosilite	2.65	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.54	
Hematite		
Ilmenite	0.64	
Sphene		
Apatite	0.22	
Calcite		
Rutile		
Others		
	99.99	

COMMENTS:

Sample # 8-22-5

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	71.44	72.08	
Al_2O_3	14.35	14.48	
TiO_2	0.311	0.314	
Fe_2O_3	2.26	0.35	
FeO		1.74	
MnO	0.052	0.052	
MgO	0.59	0.60	
CaO	2.55	2.57	
Na_2O	3.63	3.66	
K_2O	4.04	4.08	
P_2O_5	0.084	0.085	
H_2O^+/LOI	0.61	-	
H_2O -	0.05	-	
CO_2	-	-	
Others			
FeO*			2.05
Total	99.97	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-22-5

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Magdalena 15'
Sec. 1 T. 3S R.2W (SW¼ of SW¼)
Lat. 34°04' 26" N Long 107°00' 31" W
Mtn Range, Valley, etc. In stream depression, SW side looking up stream (below fault chasm).

Sample Description:

Catalogue #
Our Rock Name rhyolite
Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric possibly correlates with 9.2 m.y. R.R. Quarry rhyolite

Field # 8-22-5 Collected By D. B. Date Collected 8/22/82
Author's Rock Name high-K, high-SiO_2 rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	28.13	
Corundum		
Orthoclase	24.09	
Albite	30.99	
Anorthite	11.03	
Nepheline		
Diopside		
Wollastonite	0.49	
Enstatite	0.19	
Ferrosilite	0.32	
Hypersthene		
Enstatite	1.30	
Ferrosilite	2.17	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.50	
Hematite		
Ilmenite	0.60	
Sphene		
Apatite	0.20	
Calcite		
Rutile		
Others		

COMMENTS: 100.00

Sample # 8-10-9

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	71.65	72.15	
Al_2O_3	14.31	14.41	
TiO_2	0.326	0.328	
Fe_2O_3	2.38	0.37	
FeO		1.83	
MnO	0.036	0.036	
MgO	0.48	0.48	
CaO	2.06	2.07	
Na_2O	3.59	3.62	
K_2O	4.57	4.60	
P_2O_5	0.112	0.113	
H_2O^+/LOI	0.40	-	
H_2O -	0.08	-	
CO_2	-	-	
Others			
FeO*			2.16
Total	99.99	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-10-9

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Socorro 7½'

Sec. 7 T. 3S R. 1W (SE¼ of SE¼)

Lat. 34°03' 35" N Long. 106°58' 37" W

Mtn Range, Valley, etc. Base of lowest outcrop of hill "7036."

Catalogue #

Our Rock Name rhyolite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric possibly correlates with 10.8 ± 0.4 m.y. rhyolite at Signal Flag.

Sample Description:

Field # 8-10-9 Collected By D. B. Date Collected 8/10/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Quartz	27.50	
Corundum		
Orthoclase	27.19	
Albite	30.59	
Anorthite	9.50	
Nepheline		
Diopside		
Wollastonite	0.01	
Enstatite	0.02	
Ferrosilite	0.02	
Hypersthene		
Enstatite	1.20	
Ferrosilite	2.56	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.53	
Hematite		
Ilmenite	0.62	
Sphene		
Apatite	0.26	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 8-10-6

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	71.77	72.29	
Al_2O_3	14.36	14.46	
TiO_2	0.331	0.333	
Fe_2O_3	2.25	0.35	
FeO		1.73	
MnO	0.030	0.030	
MgO	0.50	0.50	
CaO	2.11	2.13	
Na_2O	3.52	3.55	
K_2O	4.50	4.53	
P_2O_5	0.098	0.099	
H_2O^+/LOI	0.42	-	
H_2O -	0.05	-	
CO_2	-	-	
Others			
FeO*			2.04
Total	99.94	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-10-6

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Socorro 7½'

Sec. 18 T. 3S R. 1W (NE¼ of NE¼)

Lat. 34°03' 22" N Long. 106°58' 38" W

Mtn Range, Valley, etc. Approx. 10 ft below top of steep columnar outcrop, before break in slope.

Sample Description:

Field # 8-10-6 Collected By D. B. Date Collected 8/10/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Catalogue #

Our Rock Name rhyolite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric possibly correlateable with 10.8 ± 0.4 m.y. rhyolite at Signal Flag

Reference:

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	28.21	
Corundum	0.10	
Orthoclase	26.79	
Albite	30.00	
Anorthite	9.90	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.25	
Ferrosilite	2.39	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.50	
Hematite		
Ilmenite	0.63	
Sphene		
Apatite	0.23	
Calcite		
Rutile		
Others		

COMMENTS: 100.00

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 8-10-5

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	71.56	72.34	
Al_2O_3	14.20	14.35	
TiO_2	0.326	0.330	
Fe_2O_3	2.32	0.36	
FeO		1.79	
MnO	0.043	0.043	
MgO	0.53	0.54	
CaO	2.10	2.12	
Na_2O	3.53	3.57	
K_2O	4.50	4.55	
P_2O_5	0.104	0.104	
H_2O^+/LOI	0.44	-	
H_2O -	0.11	-	
CO_2	-	-	
Others			
FeO*			2.11
Total	99.67	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-10-5

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Socorro 7½'
Sec. 18 T. 3S R. 1W (NE¼ of NE¼)
Lat. 34°03' 22" N Long. 106°58' 37" W
Mtn Range, Valley, etc. Approx. 100 ft above base of columnar-jointed outcrop that faces firing pit.

Sample Description:

Catalogue #
Our Rock Name rhyolite
Formation Socorro Peak Rhyolite
Age: Epoch, etc: mid-Miocene
Radiometric possibly correlatable with 10.3 ± 0.4 m.y. old rhyolite at Signal Flag.

Field # 8-10-5 Collected By D. B. Date Collected 8/10/82
Author's Rock Name high-K, high-SiO_2
Description: flow-banded rhyolite with biotite, quartz, plagioclase, and sanidine

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	27.86	
Corundum		
Orthoclase	26.87	
Albite	30.19	
Anorthite	9.72	
Nepheline		
Diopside		
Wollastonite	0.30	
Enstatite	0.11	
Ferrosilite	0.20	
Hypersthene		
Enstatite	1.23	
Ferrosilite	2.32	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.52	
Hematite		
Ilmenite	0.63	
Sphene		
Apatite	0.03	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Plagioclase Composition

Analyst: D. B.
Method: universal stage
Date: 2/83

	Phenocrysts	Groundmass
Average	An_{30}	
Range	An_{24} to An_{37}	
Zoning	oscillatory to normal	
# Grains	12	

Sample # 8-22-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	71.88	72.43	
Al_2O_3	14.26	14.37	
TiO_2	0.283	0.285	
Fe_2O_3	2.23	0.34	
FeO		1.71	
MnO	0.052	0.052	
MgO	0.52	0.52	
CaO	2.39	2.41	
Na_2O	3.66	3.69	
K_2O	4.07	4.10	
P_2O_5	0.084	0.085	
H_2O^+/LOI	0.42	-	
H_2O^-	0.13	-	
CO_2	-	-	
Others			
FeO*			2.05
Total	99.98	99.99	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-22-1

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Magdalena 15'
Sec. 2 T. 3S R. 2W (NW¼ of SE¼)
Lat. 34 04' 31" N Long. 107 00' 51" W
Mtn Range, Valleys, etc. At base of steep exposure on north face of hill.

Catalogue #
Our Rock Name rhyolite
Formation Socorro Peak Rhyolite
Age: Epoch, etc: mid-Miocene
Radiometric possibly correlates with (9.2 ± 0.4 m.y.) R.R. Quarry Rhyolite

Sample Description:

Field # 8-22-1 Collected By D. B. Date Collected 8/22/82
Author's Rock Name high-K, high-SiO_2 rhyolite
Description: Crystalline-rich with sanidine, plagioclase, quartz, biotite & amphibole

Reference:

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	28.62	
Corundum		
Orthoclase	24.24	
Albite	31.21	
Anorthite	10.54	
Nepheline		
Diopside		
Wollastonite	0.36	
Enstatite	0.13	
Ferrosilite	0.24	
Hypersthene		
Enstatite	1.18	
Ferrosilite	2.25	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.50	
Hematite		
Ilmenite	0.54	
Sphene		
Apatite	0.20	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 8-22-2

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	71.85	72.64	
Al_2O_3	14.29	14.45	
TiO_2	0.316	0.319	
Fe_2O_3	2.25	0.35	
FeO		1.74	
MnO	0.050	0.051	
MgO	0.59	0.60	
CaO	2.13	2.15	
Na_2O	3.47	3.51	
K_2O	4.07	4.12	
P_2O_5	0.082	0.083	
H_2O^+/LOI	0.36	-	
H_2O -	0.32	-	
CO_2	-	-	
Others			
FeO*			2.05
Total	99.78	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF	(ppm)
Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb	12	
Nd		
Ni		
Pb	19	
Pd		
Pr		
Rb	90	
Rc		
Sb		
Sc		
Sm		
Sn		
Sr	265	
Ta		
Tb		
Th	8	
Tm		
U	2	
V		
Y	18	
Yb		
Zn		
Zr	126	
Others		

Sample # 8-22-2

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 2 T. 3S R. 2W (SE¼ of SE¼)

Lat. 34°04' 22" N Long. 107°00' 49" W

Mtn Range, Valley, etc. Peak of hill, small outcrop with steep dip.

Catalogue #

Our Rock Name rhyolite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric possibly correlates with 9.2 ± 0.4 m.y. R.R. Quarry Rhyolite

Sample Description:

Field # 8-22-2 Collected By D. B. Date Collected 8/22/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Quartz	30.10	
Corundum	0.51	
Ortholase	24.32	
Albite	29.68	
Anorthite	10.14	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.49	
Ferrosilite	2.47	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.50	
Hematite		
Ilmenite	0.61	
Sphene		
Apatite	0.19	
Calcite		
Rutile		
Others		
	100.01	

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

COMMENTS:

D.I. = 84

Sample # 8-10-8

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	71.87	72.80		
Al_2O_3	14.02	14.20		
TiO_2	0.312	0.316		
Fe_2O_3	2.13	0.33		2.29 INAA
FeO		1.65		
MnO	0.041	0.042		
MgO	0.45	0.46		
CaO	1.90	1.93		
Na_2O	3.56	3.61		3.72 INAA
K_2O	4.52	4.58		
P_2O_5	0.099	0.100		
H_2O^+/LOI	0.24	-		
H_2O -	0.06	-		
CO_2	-	-		
Others				
FeO*				2.00
Total	99.20	100.02		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1175
Be		
Ce		85
Cd		
Co		4.1
Cr		8.1
Cs		0.9
Cu		
Dy		
Er		
Eu		1.3
Ga		
Gd		
Ge		
Hf		5.4
Ho		
La		43
Li		
Lu		0.53
Mo		
Nb	16	
Nd		
Ni		
Pb	20	
Pd		
Pr		
Rb	94	98
Rc		
Sb		0.11
Sc		4.5
Sm		5.7
Sn		
Sr	235	
Ta		1.3
Tb		0.83
Th	7.7	6.8
Tm		
U	2.2	1.8
V		
Y	27	
Yb		3.4
Zn		
Zr	160	
Others		

Sample # 8-10-8

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Socorro 7½'
Sec. 7 T. 3S R. 1W (SW¼ of SE¼)
Lat. 34°03' 36" N Long. 106°58' 45" W
Mtn Range, Valley, etc. Approx. 100 ft below peak.

Catalogue #
Our Rock Name rhyolite
Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric possible correlates with 9.2 ± 0.4 m.y. R.R. Quarry rhyolite

Sample Description:

Field # 8-10-7 Collected By D. B. Date Collected 8/10/82
Author's Rock Name high-K, high-SiO_2 rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections
counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	28.73	
Corundum	0.05	
Orthoclase	27.06	
Albite	30.51	
Anorthite	8.89	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.14	
Ferrosilite	2.31	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.48	
Hematite		
Ilmenite	0.60	
Sphene		
Apatite	0.23	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 86.3

Sample # 8-22-7

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	72.41	72.85	
Al_2O_3	14.26	14.35	
TiO_2	0.311	0.313	
Fe_2O_3	2.16	0.33	
FeO		1.66	
MnO	0.027	0.027	
MgO	0.48	0.48	
CaO	2.14	2.15	
Na_2O	3.61	3.63	
K_2O	4.10	4.13	
P_2O_5	0.083	0.084	
H_2O^+/LOI	0.26	-	
H_2O^-	0.18	-	
CO_2	-	-	
Others			
FeO*			1.96
Total	100.02	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-22-7

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Magdalena 15'
Sec. 2 T. 3S R. 2W (NW¼ of SE¼)
Lat. 34°04' 39" N Long. 107°00' 47" W
Mtn Range, Valley, etc. Outcrop overlying vitrophyre in N-S trending stream channel.

Sample Description:

Field # 8-22-7 Collected By D. B. Date Collected 8/22/82
Author's Rock Name high-K, high SiO_2 rhyolite
Description:

Catalogue #
Our Rock Name rhyolite
Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric possibly correlates with 9.2 ± 0.4 m.y. R.R. Quarry Rhyolite

Reference:

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	29.79	
Corundum	0.19	
Orthoclase	24.38	
Albite	30.73	
Anorthite	10.14	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.20	
Ferrosilite	2.30	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.48	
Hematite		
Ilmenite	0.59	
Sphene		
Apatite	0.19	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 76-6-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.90	72.88	
Al_2O_3	13.86	14.25	
TiO_2	0.297	0.305	
Fe_2O_3	2.04	0.32	
FeO		1.60	
MnO	0.046	0.047	
MgO	0.53	0.55	
CaO	1.84	1.89	
Na_2O	3.34	3.43	
K_2O	4.52	4.65	
P_2O_5	0.081	0.083	
H_2O^+/LOI	2.41	-	
H_2O -	0.15	-	
CO_2	-	-	
Others			
FeO*			1.89
Total	100.01	100.01	

Isotopes

Sr 87/86	measured	0.7065
	initial	0.70635

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF	(ppm)
Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb	16	
Nd		
Ni		
Pb	19	
Pd		
Pr		
Rb	90	
Rc		
Sb		
Sc		
Sm		
Sn		
Sr	225	
Ta		
Tb		
Th	6	
Tm		
U		
V		
Y	26	
Yb		
Zn		
Zr	155	
Others		

CHEMICAL DATA FORM

Sample # 76-6-3

Location

County Socorro

Quad. Magdalena 15'

Sec. 13 T. 3S R. 2W (NW¼ of SW¼)

Lat. 34°02' 46" N Long. 107°00' 27" W

Mtn Range, Valley, etc. On old abandoned railroad quarry

Formation

Catalogue #

Our Rock Name rhyolite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 9.2 ± 0.4 m.y.

Sample Description:

Field # 76-6-3 Collected By Chapin & Chamberlin Date Collected 6/3/76

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections.

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	29.47	
Corundum	0.33	
Orthoclase	27.46	
Albite	29.05	
Anorthite	8.80	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.36	
Ferrosilite	2.26	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.46	
Hematite		
Ilmenite	0.58	
Sphene		
Apatite	0.19	
Calcite		
Rutile		
Others		
	99.97	

COMMENTS:

D.I. = 86

Sample # 8-22-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	72.50	72.88	
Al_2O_3	14.18	14.26	
TiO_2	0.298	0.300	
Fe_2O_3	2.13	0.33	
FeO		1.63	
MnO	0.037	0.037	
MgO	0.52	0.52	
CaO	2.15	2.16	
Na_2O	3.68	3.70	
K_2O	4.08	4.10	
P_2O_5	0.081	0.081	
H_2O^+/LOI	0.34	-	
H_2O^-	0.11	-	
CO_2	-	-	
Others			
FeO*			
Total	100.11	100.00	

1.93

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-22-4

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 1 T. 3S R. 2W (SW¼ of SW¼)

Lat. 34°04' 28" N Long. 107°00' 27" W

Mtn Range, Valley, etc. Approx. 40 ft below peak of north-sloping hill.

Catalogue #

Our Rock Name rhyolite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric possibly correlates with 9.2 ± 0.4 m.y. R.R. Quarry Rhyolite

Sample Description:

Field # 8-22-4 Collected By D. B. Date Collected 8/22/82

Author's Rock Name high-K, high SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ___ Grid ___

Over area of ___ thin sections

Multiple Analyses

average of ___ thin sections counted as above.

Counted by:

Type Counter ___ Date ___

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	29.44	
Corundum		
Orthoclase	24.24	
Albite	31.30	
Anorthite	10.18	
Nepheline		
Diopside		
Wollastonite	0.006	
Enstatite	0.002	
Ferrosilite	0.004	
Hypersthene		
Enstatite	1.30	
Ferrosilite	2.30	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.47	
Hematite		
Ilmenite	0.57	
Sphene		
Apatite	0.19	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 8-22-6

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	71.45	73.02		
Al_2O_3	14.01	14.32		
TiO_2	0.285	0.291		
Fe_2O_3	2.15	0.34		2.13 INAA
FeO		1.68		
MnO	0.045	0.046		
MgO	0.61	0.62		
CaO	2.05	2.10		
Na_2O	3.69	3.77		3.55 INAA
K_2O	3.66	3.74		
P_2O_5	0.079	0.081		
H_2O^+/LOI	1.94	-		
H_2O^-	0.17	-		
CO_2	-	-		
Others				
FeO*				1.95
Total	100.14	100.01		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		887
Be		
Ce		47
Cd		
Co		4.1
Cr		6.5
Cs		1.6
Cu		
Dy		
Er		
Eu		0.7
Ga		
Gd		
Ge		
Hf		4.1
Ho		
La		26
Li		
Lu		0.31
Mo		
Nb	12	
Nd		
Ni		
Pb	20	
Pd		
Pr		
Rb	92	92
Re		
Sb		0.12
Sc		4.4
Sm		3.0
Sn		
Sr	263	
Ta		0.89
Tb		0.44
Th	7	6.7
Tm		
U	2	1.9
V		
Y	18	
Yb		2.1
Zn		
Zr	120	
Others		

Sample # 8-22-6

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 2 T. 3S R. 2W (NE¼ of SE¼)

Lat. 34° 04' 39" N Long. 107° 00' 47" W

Mtn Range, Valley, etc. In stream channel at contact with brown & maroon Popotosa muds.

Sample Description:

Catalogue #

Our Rock Name rhyolite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric possibly correlates with 9.2 ± 0.4 m.y. R.R. Quarry Rhyolite

Field # 8-22-6 Collected By D. B. Date Collected 8/22/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description: black vitrophyre

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	30.50	
Corundum	0.45	
Orthoclase	22.10	
Albite	31.90	
Anorthite	9.86	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.55	
Ferrosilite	2.41	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.49	
Hematite		
Ilmenite	0.55	
Sphene		
Apatite	0.19	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Plagioclase Composition

Analyst: D. Bobrow

Method: universal stage

Date: 2/83

	Phenocrysts	Groundmass
Average	An_{32}	
Range	(rim) An_{26} (core) An_{35}	
Zoning	oscillatory to normal	
# Grains	1	

Sample # 8-22-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	72.70	73.08	
Al_2O_3	14.15	14.22	
TiO_2	0.268	0.269	
Fe_2O_3	2.06	0.32	
FeO		1.60	
MnO	0.041	0.041	
MgO	0.52	0.52	
CaO	1.99	2.00	
Na_2O	3.39	3.41	
K_2O	4.45	4.47	
P_2O_5	0.075	0.075	
H_2O^+/LOI	0.34	-	
H_2O -	0.10	-	
CO_2	-	-	
Others			
FeO*			1.89
Total	100.08	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-22-3

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Magdalena 15'
Sec. 1 T. 3S R. 2W (SW¼ of SW¼)
Lat. 34°04' 22" N Long. 107°00' 25" W
Mtn Range, Valley, etc. Outcrop north (approx. 100 ft) of fault (chasm)--
Sample Description: dike-like in nature.

Catalogue #
Our Rock Name rhyolite
Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric possibly correlatable with 9.2 ± 0.4 m.y. rhyolite of R.R. Quarry

Field # 8-22-3 Collected By D. B. Date Collected 8/22/82
Author's Rock Name high-K, high-SiO_2 rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted 1917 Grid 2/3 x 1/3
Over area of 1 thin sections mm

Multiple Analyses
average of ____ thin sections
counted as above.

Counted by: D. Bobrow
Type Counter swift Date 6/28/83

Quartz	3.5	
K-Feldspar	6.7	
Plagioclase	11.5	
Biotite	3.3	
Amphiboles	0.5	
Pyx. clino		
ortho		
Olivine		
Opaques	0.2	
Groundmass	74.3	
Others (Apatite)	T	
Zircon	T	
Sphene	T	

Plagioclase Composition

Analyst: D. Bobrow
Method: universal stage
Date: 2/83

	Phenocrysts	Groundmass
Average	An_{32}	An_{31}
Range	An_{32} to An_{40}	-
Zoning	oscillatory to normal	-
# Grains	5	1

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	30.26	
Corundum	0.32	
Orthoclase	26.44	
Albite	28.84	
Anorthite	9.42	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.30	
Ferrosilite	2.27	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.46	
Hematite		
Ilmenite	0.51	
Sphene		
Apatite	0.18	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

Sample # 8-23-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	74.30	76.91	
Al_2O_3	12.69	13.14	
TiO_2	0.052	0.054	
Fe_2O_3	0.49	0.08	
FeO		0.39	
MnO	0.095	0.098	
MgO	< .01	<.01	
CaO	0.50	0.52	
Na_2O	3.33	3.45	
K_2O	5.18	5.36	
P_2O_5	0.009	0.009	
H_2O^+/LOI	3.44	-	
H_2O^-	0.13	-	
CO_2	-	-	
Others			
FeO*			0.46
Total	100.22	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-23-1

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Socorro 7½'

Sec. 28 T. 3S R. 1W (NE¼ of NE¼)

Lat. 34°01' 35" N Long. 106°56' 25" W

Mtn Range, Valley, etc. Outcrop forming east wall of (active) northern pit.

Catalogue #

Our Rock Name perlitic-rhyolite

Formation Grefco Perlite dome

Age: Epoch, etc: late Miocene

Radiometric 7.4 ± 0.3 m.y.

Sample Description:

Field # 8-23-1 Collected By D. B. Date Collected 8/23/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	34.92	
Corundum	0.73	
Orthoclase	31.69	
Albite	29.17	
Anorthite	2.51	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite		
Ferrosilite	0.75	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.11	
Hematite		
Ilmenite	0.10	
Sphene		
Apatite	0.02	
Calcite		
Rutile		
Others		

COMMENTS: 100.00

Sample # 8-23-2

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	74.54	77.05	
Al_2O_3	12.64	13.06	
TiO_2	0.040	0.041	
Fe_2O_3	0.49	0.08	
FeO		0.39	
MnO	0.093	0.096	
MgO	0.01	0.01	
CaO	0.49	0.51	
Na_2O	3.31	3.42	
K_2O	5.17	5.34	
P_2O_5	0.009	0.009	
H_2O^+/LOI	3.51	-	
H_2O -	0.16	-	
CO_2	-	-	
Others			
FeO*			0.46
Total	100.49	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-23-2

CHEMICAL DATA FORM

Location

County Socorro

Quad. Socorro 7½'

Sec. 28 T. 3S R. 1W (NE¼ of NE¼)

Lat. 34°01' 35" N Long. 106°56' 25" W

Mtn Range, Valley, etc. Outcrop forming east wall of active northern pit.

Formation

Catalogue #

Our Rock Name perlitic-rhyolite

Formation Grefco Perlite dome

Age: Epoch, etc: late Miocene

Radiometric 7.4 ± 0.3 m.y.

Sample Description:

Field # 8-23-2 Collected By D. B. Date Collected 8/23/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	35.30	
Corundum	0.75	
Orthoclase	31.57	
Albite	28.94	
Anorthite	2.45	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.03	
Ferrosilite	0.76	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.11	
Hematite		
Ilmenite	0.08	
Sphene		
Apatite	0.02	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

Sample # 82-6-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	73.73	77.13	
Al_2O_3	12.47	13.05	
TiO_2	0.042	0.044	
Fe_2O_3	0.46	0.07	
FeO		0.37	
MnO	0.091	0.095	
MgO	< .01	< .01	
CaO	0.51	0.53	
Na_2O	3.28	3.43	
K_2O	5.04	5.27	
P_2O_5	0.010	0.010	
H_2O^+/LOI	3.46	-	
H_2O -	0.06	-	
CO_2	-	-	
Others			
FeO*			0.43
Total	99.15	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 82-6-1

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Socorro 7½'

Sec. 28 T. 3S R. 1W

Lat. 34° 01' 27" N Long. 106° 56' 37" W

Mtn Range, Valley, etc. northern part of Grefco open-pit mine

Catalogue #

Our Rock Name perlitic rhyolite

Formation Grefco perlite dome

Age: Epoch, etc: late Miocene

Radiometric 7.4 ± 0.3 m.y.

Sample Description:

Field # 82-6-1 Collected By Chapin & Osburn Date Collected 6/1/82

Author's Rock Name high-K, high SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	35.55	
Corundum	0.75	
Orthoclase	31.16	
Albite	29.03	
Anorthite	2.58	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite		
Ferrosilite	0.72	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.11	
Hematite		
Ilmenite	0.08	
Sphene		
Apatite	0.02	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 8-23-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	74.83	77.13		
Al_2O_3	12.60	12.99		
TiO_2	0.045	0.046		
Fe_2O_3	0.49	0.08		0.53 INAA
FeO		0.39		
MnO	0.088	0.091		
MgO	$<.01$	$<.01$		
CaO	0.50	0.52		
Na_2O	3.38	3.48		3.56 INAA
K_2O	5.12	5.28		
P_2O_5	0.010	0.010		
H_2O^+/LOI	3.44	-		
H_2O -	0.18	-		
CO_2	-	-		
Others				
FeO*				0.46
Total	100.68	100.02		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		76
Be		
Ce		24
Cd		
Co		1.7
Cr		3.8
Cs		5.1
Cu		
Dy		
Er		
Eu		0.13
Ga		
Gd		
Ge		
Hf		5.0
Ho		
La		10.6
Li		
Lu		0.68
Mo		
Nb	34	
Nd		
Ni		
Pb	35	
Pd		
Pr		
Rb	256	266
Rc		
Sb		0.43
Sc		5.4
Sm		3.3
Sn		
Sr	2	
Ta		2.7
Tb		0.46
Th	21	16.9
Tm		
U	5	6.5
V		
Y	37	
Yb		4.4
Zn		
Zr	76	
Others		

Sample # 8-23-3

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Socorro 7½'

Sec. 28 T. 3S R. 1W (NE¼ of NE¼)

Lat. 34°01' 23" N Long. 106°56' 32" W

Mtn Range, Valley, etc. Southeast corner of largest active pit.

Catalogue #

Our Rock Name rhyolite

Formation Grefco dome rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 7.4 ± 0.3 m.y.

Sample Description:

Field # 8-23-3 Collected By D. B. Date Collected 8/23/82

Author's Rock Name high-K, high-SiO_2 (phenocryst-poor) rhyolite

Description: perlitic rhyolite

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted 2196 Grid 2/3 x 1/3

Over area of 1 thin sections mm

Multiple Analyses

average of ____ thin sections counted as above.

Counted by: D. Bobrow

Type Counter Swift Date 6/28/83

Quartz	0.5	
K-Feldspar	1.4	
Plagioclase	1.1	
Biotite	t	
Amphiboles	t	
Pyx. clino		
ortho		
Olivine		
Opaques	t	
Groundmass	97.0	
Others		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	35.26	
Corundum	0.63	
Orthoclase	31.18	
Albite	29.48	
Anorthite	2.49	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite		
Ferrosilite	0.74	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.11	
Hematite		
Ilmenite	0.09	
Sphene		
Apatite	0.02	
Calcite		
Rutile		
Others		
	100.00	

Plagioclase Composition

Analyst: D. Bobrow

Method: universal stage

Date: 2/83

	Phenocrysts	Groundmass
Average	An_{26}	
Range	~~An_{25} to An_{30}~~	
Zoning	normal	
# Grains	3	

COMMENTS:

D.I. = 95.9

ALTERED

Sample # 8-10-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	66.87	68.13	
Al_2O_3	14.74	15.02	
TiO_2	0.406	0.414	
Fe_2O_3	2.87	0.45	
FeO		2.23	
MnO	0.049	0.050	
MgO	0.02	0.02	
CaO	1.99	2.03	
Na_2O	1.55	1.58	
K_2O	9.77	9.95	
P_2O_5	0.133	0.136	
H_2O^+/LOI	1.39	-	
H_2O -	0.03	-	
CO_2	-	-	
Others			
FeO*			2.63
Total	99.82	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF	(ppm)
Ag		
B		
Ba		900 (A.A.)
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb	10	
Nd		
Ni		
Pb	28	
Pd		
Pr		
Rb	324	
Rc		
Sb		
Sc		
Sm		
Sn		
Sr	272	
Ta		
Tb		
Th	5	
Tm		
U		
V		
Y	24	
Yb		
Zn		
Zr	152	
Others		

Sample # 8-10-1

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Socorro 7½'

Sec. 3 T. 3S R. 1W (NE¼ of NE¼)

Lat. 34° 04' 13" N Long. 106° 57' 42" W

Mtn Range, Valley, etc. Base of outcrop approx. 100 ft west of confluence of 2 stream channels.

Sample Description:

Catalogue #

Our Rock Name hornblende-rhyodacite

Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 10.7 ± 1.5 m.y.

Field # 8-10-1 Collected By D. B. Date Collected 8/10/82

Author's Rock Name K-metasomatized

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	16.43	
Corundum		
Orthoclase	58.82	
Albite	13.36	
Anorthite	4.49	
Nepheline		
Diopside		
Wollastonite	1.96	
Enstatite	0.04	
Ferrosilite	2.17	
Hypersthene		
Enstatite	0.02	
Ferrosilite	0.96	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.65	
Hematite		
Ilmenite	0.79	
Sphene		
Apatite	0.31	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

ALTERED

Sample # 8-10-2

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	66.92	68.71	
Al_2O_3	14.51	14.90	
TiO_2	0.380	0.432	
Fe_2O_3	2.76	0.43	
FeO		2.16	
MnO	0.102	0.105	
MgO	0.06	0.06	
CaO	3.72	3.82	
Na_2O	2.63	2.70	
K_2O	6.42	6.54	
P_2O_5	0.127	0.130	
H_2O^+/LOI	2.09	-	
H_2O -	0.03	-	
CO_2	-	-	
Others			
FeO*			2.55
Total	99.75	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-10-2

CHEMICAL DATA FORM

Formation

Location
County Socorro
Quad. Socorro 7½'
Sec. 8 T. 3S R. 1W (NE¼ of NE¼)
Lat. 34°04' 14" N Long. 106°57' 44" W
Mtn Range, Valley, etc. Approx. 150 ft below radio towers at contact of two flows.

Catalogue #
Our Rock Name hornblende-rhyodacite
Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric 10.7 ± 1.5 m.y.

Sample Description:
Field # 8-10-2 Collected By D. B. Date Collected 8/10/82
Author's Rock Name (altered) high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections
counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition
Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	20.27	
Corundum		
Orthoclase	39.41	
Albite	22.41	
Anorthite	9.06	
Nepheline		
Diopside		
Wollastonite	2.96	
Enstatite	0.15	
Ferrosilite	3.16	
Hypersthene		
Enstatite		
Ferrosilite		
Olivine		
Forsterite		
Fayalite		
Magnetite	0.63	
Hematite		
Ilmenite	0.74	
Sphene		
Apatite	0.30	
Calcite		
Rutile		
Others		
Wollastonite	0.81	

COMMENTS: 100.01

ALTERED

Sample # 8-14-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	68.23	68.95	
Al_2O_3	15.06	15.22	
TiO_2	0.510	0.515	
Fe_2O_3	3.11	0.48	
FeO		2.40	
MnO	0.007	0.007	
MgO	0.08	0.08	
CaO	0.26	0.26	
Na_2O	0.43	0.44	
K_2O	11.39	11.51	
P_2O_5	0.140	0.140	
H_2O^+/LOI	0.98	-	
H_2O -	0.16	-	
CO_2			
Others			
FeO*			2.83
Total	100.36	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF	(ppm)
Ag		
B		
Ba		500 (A.A.)
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb	8	
Nd		
Ni		
Pb	29	
Pd		
Pr		
Rb	386	
Rc		
Sb		
Sc		
Sm		
Sn		
Sr	52	
Ta		
Tb		
Th	2	
Tm		
U		
V		
Y	29	
Yb		
Zn		
Zr	176	
Others		

Sample # 8-14-3

CHEMICAL DATA FORM

Location
County Socorro
Quad. Socorro 7½'
Sec. 16 T. 3S R. 1W (NW¼ of SE¼)
Lat. 34°02' 53" N Long. 106°56' 37" W
Mtn Range, Valley, etc. Below break in slope approx. 150 ft above exploration pit.
Sample Description:

Formation
Catalogue #
Our Rock Name hornblende-rhyodacite
Formation Socorro Peak Rhyolite
Age: Epoch, etc: mid-Miocene
Radiometric possibly correlates with 10.3 ± 0.8 m.y. "6001" mesa.

Field # 8-14-3 Collected By D. B. Date Collected 8/14/82
Author's Rock Name K-metasomatized
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections

Multiple Analyses
average of ______ thin sections counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	20.64	
Corundum	1.91	
Orthoclase	68.02	
Albite	3.68	
Anorthite	0.38	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.20	
Ferrosilite	3.17	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.69	
Hematite		
Ilmenite	0.98	
Sphene		
Apatite	0.33	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

ALTERED

Sample # 8-14-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	83.48		
Al_2O_3	8.42		
TiO_2	0.056		
Fe_2O_3	0.47		
FeO			
MnO	0.015		
MgO	0.01		
CaO	0.13		
Na_2O	0.67		
K_2O	6.17		
P_2O_5	0.015		
H_2O^+/LOI	0.64		
H_2O -	0.05		
CO_2			
Others			
FeO*			0.42
Total	100.13		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 8-14-4

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Socorro 7½'
Sec. 16 T. 3S R. 1W (NW¼ of SE¼)
Lat. 34° 02' 53" N Long. 106° 56' 37" W
Mtn Range, Valley, etc. Small outcrop on northeast side of hill "5647."

Catalogue #
Our Rock Name rhyolite
Formation Socorro Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric possibly correlates with 10.3 ± 0.8 m.y. "6001" mesa.

Sample Description:

Field # 8-14-4 Collected By D. B. Date Collected 8/14/82
Author's Rock Name altered rhyolite
Description: plagioclase look "shot."

Reference:

CIPW Norms

Calculated by:
hand/program name
Date:

Quartz		
Corundum		
Orthoclase		
Albite		
Anorthite		
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite		
Ferrosilite		
Olivine		
Forsterite		
Fayalite		
Magnetite		
Hematite		
Ilmenite		
Sphene		
Apatite		
Calcite		
Rutile		
Others		

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

COMMENTS:

POUND RANCH

CENTER

Sample # PR2-77

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	47.60	48.60		
Al_2O_3	17.21	17.57		
TiO_2	1.689	1.725		
Fe_2O_3	10.81	1.68		10.02 INAA
FeO		8.42		
MnO	0.161	0.164		
MgO	7.30	7.45		
CaO	9.16	9.35		
Na_2O	3.72	3.80		3.28 INAA
K_2O	0.82	0.84		
P_2O_5	0.386	0.394		
H_2O^+/LOI	1.23	-		
H_2O -	0.32	-		
CO_2	-	-		
Others				
FeO*				9.47
Total	100.41	99.99		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		376
Be		
Ce		42
Cd		
Co		40
Cr		53
Cs		
Cu		
Dy		
Er		
Eu		1.9
Ga		
Gd		
Ge		
Hf		3.0
Ho		
La		20
Li		
Lu		0.28
Mo		
Nb	26	
Nd		
Ni		
Pb	0.7	
Pd		
Pr		
Rb	87	66
Rc		
Sb		0.07
Sc		22
Sm		4.3
Sn		
Sr	738	
Ta		1.4
Tb		0.70
Th	2.5	1.7
Tm		
U	1	0.4
V		
Y	24	
Yb		1.9
Zn		
Zr	143	
Others		

Sample # PR2-77

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Molino 7½'
Sec. 9 T. 4S R. 2W (NW¼ of NW¼)
Lat. Long.
Mtn Range, Valley, etc.

Catalogue #
Our Rock Name basalt
Formation baslat of Madera Canyon

Age: Epoch, etc: Miocene (?)
Radiometric

Sample Description:

Field # PR-2-77 Collected By G.R. Osburn Date Collected
Author's Rock Name alkalic basalt
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections
counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz		
Corundum		
Orthoclase	4.95	
Albite	27.47	
Anorthite	28.43	
Nepheline	2.53	
Diopside		
Wollastonite	6.43	
Enstatite	3.77	
Ferrosilite	2.34	
Hypersthene		
Enstatite		
Ferrosilite		
Olivine		
Forsterite	10.36	
Fayalite	7.09	
Magnetite	2.44	
Hematite		
Ilmenite	3.28	
Sphene		
Apatite	0.91	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 34.9

Sample # 7-28-6

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	47.45	49.71	
Al_2O_3	16.61	17.40	
TiO_2	1.420	1.488	
Fe_2O_3	10.38	1.66	
FeO		8.29	
MnO	0.156	0.163	
MgO	6.53	6.84	
CaO	7.40	7.75	
Na_2O	4.67	4.89	
K_2O	1.33	1.39	
P_2O_5	0.381	0.399	
H_2O^+/LOI	3.09	-	
H_2O -	0.42	-	
CO_2	-	-	
Others			
FeO*			9.78
Total	99.84	99.98	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	(ppm)	
Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni	75 (A.A.)	
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-28-6

CHEMICAL DATA FORM

Location

County Socorro
Quad. Molino Peak 7½'
Sec. 2 T. 4S R. 2W (SE¼ of SE¼)
Lat. 33° 59' 05" N Long. 107° 00' 36" W
Mtn Range, Valley, etc. Next to fence in stream cut; from small hill in SE corner of sec. 2

Formation
Catalogue #
Our Rock Name basalt
Formation basalt of Bear Canyon
Age: Epoch, etc: late-Miocene
Radiometric

Sample Description:

Field # 7-28-6 Collected By D. B. Date Collected 7/28/82
Author's Rock Name alkalic basalt
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections
Multiple Analyses
average of thin sections
counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz		
Corundum		
Orthoclase	8.23	
Albite	28.81	
Anorthite	21.41	
Nepheline	6.82	
Diopside		
Wollastonite	6.03	
Enstatite	2.35	
Ferrosilite	3.42	
Hypersthene		
Enstatite		
Ferrosilite		
Olivine		
Forsterite	9.54	
Fayalite	7.22	
Magnetite	2.405	
Hematite		
Ilmenite	2.826	
Sphene		
Apatite	0.925	
Calcite		
Rutile		
Others		
	99.99	

COMMENTS:

Sample # 79-10-5

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	47.79	49.83		
Al_2O_3	16.35	17.05		
TiO_2	1.448	1.510		
Fe_2O_3	10.38	1.65		10.66 INAA
FeO		8.25		
MnO	0.150	0.156		
MgO	7.03	7.33		
CaO	7.49	7.81		
Na_2O	4.55	4.75		4.68 INAA
K_2O	1.21	1.26		
P_2O_5	0.382	0.398		
H_2O^+/LOI	2.70	-		
H_2O -	0.41	-		
CO_2	-	-		
Others				
FeO*				9.66
Total	99.89	99.99		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF	(ppm) INAA
Ag		
B		
Ba		431
Be		
Ce		48
Cd		
Co		41
Cr		111
Cs		10.5
Cu		
Dy		
Er		
Eu		1.6
Ga		
Gd		
Ge		
Hf		3.7
Ho		
La		24
Li		
Lu		0.38
Mo		
Nb	27	
Nd		
Ni		
Pb	2	
Pd		
Pr		
Rb	34	28
Rc		
Sb		0.07
Sc		26
Sm		5.1
Sn		
Sr	697	
Ta		1.5
Tb		0.77
Th	3	2.9
Tm		
U	2	0.9
V		
Y	27	
Yb		2.5
Zn		
Zr	152	
Others		

Sample # 79-10-5

CHEMICAL DATA FORM

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 12 T. 4S R. 2W (NW¼ of NW¼)

Lat. ____ Long. ____

Mtn Range, Valley, etc. wall of arroyo approx. 100 yds. west of windmill.

Formation ____

Catalogue # ____

Our Rock Name basalt

Formation baslat of Bear Canyon

Age: Epoch, etc: ____

Radiometric ____

Sample Description:

Field # 79-10-5 Collected By Osburn & Eggleston Date Collected 10/5/79

Author's Rock Name alkalic basalt

Description:

Reference: ____

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections.

Multiple Analyses

average of ____ thin sections counted as above.

Counted by: ____

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date: ____

Quartz		
Corundum		
Orthoclase	7.46	
Albite	29.83	
Anorthite	21.50	
Nepheline	5.59	
Diopside		
Wollastonite	6.12	
Enstatite	3.56	
Ferrosilite	2.26	
Hypersthene		
Enstatite		
Ferrosilite		
Olivine		
Forsterite	10.30	
Fayalite	7.20	
Magnetite	2.39	
Hematite		
Ilmenite	2.86	
Sphene		
Apatite	0.92	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

D.I. = 42.9

Plagioclase Composition

Analyst: ____

Method: ____

Date: ____

	Phenocrysts	Groundmass
Average		
Range	An_{52} to An_{58} (Chamberlin, 1980)	
Zoning		
# Grains		

Sample # 7-28-7

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	47.95	49.85	
Al_2O_3	16.47	17.12	
TiO_2	1.466	1.524	
Fe_2O_3	10.50	1.67	
FeO		8.32	
MnO	0.154	0.160	
MgO	6.61	6.87	
CaO	7.80	8.11	
Na_2O	4.53	4.71	
K_2O	1.21	1.26	
P_2O_5	0.396	0.412	
H_2O^+/LOI	2.45	-	
H_2O -	0.410	-	
CO_2			
Others			
FeO*			9.82
Total	99.95	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-28-7

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 12 T. 4S R. 2W (NW¼ of NW¼)

Lat. 33°58' 47" N Long. 107°00' 17" W

Mtn Range, Valley, etc. Northeastern face of peak, approx. a 40 ft climb from fence.

Sample Description:

Catalogue #

Our Rock Name basalt

Formation basalt of Bear Canyon

Age: Epoch, etc: late Miocene

Radiometric

Field # 7-28-7 Collected By D. B. Date Collected 7/28/82

Author's Rock Name alkalic basalt

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz		
Corundum		
Orthoclase	7.43	
Albite	29.68	
Anorthite	21.86	
Nepheline	5.51	
Diopside		
Wollastonite	6.54	
Enstatite	3.72	
Ferrosilite	2.54	
Hypersthene		
Enstatite		
Ferrosilite		
Olivine		
Forsterite	9.39	
Fayalite	7.07	
Magnetite	2.41	
Hematite		
Ilmenite	2.89	
Sphene		
Apatite	0.95	
Calcite		
Rutile		
Others		

COMMENTS: 99.99

Sample # 7-28-8

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	48.32	49.95	
Al_2O_3	16.48	17.04	
TiO_2	1.500	1.551	
Fe_2O_3	10.51	1.66	
FeO		8.29	
MnO	0.150	0.155	
MgO	6.50	6.72	
CaO	8.11	8.39	
Na_2O	4.29	4.44	
K_2O	1.34	1.39	
P_2O_5	0.414	0.428	
H_2O^+/LOI	1.58	-	
H_2O -	0.284	-	
CO_2	-	-	
Others			
FeO*			9.78
Total	99.48	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-28-8

CHEMICAL DATA FORM

Location
County Socorro
Quad. Molino Peak 7½'
Sec. 12 T. 4S R. 2W (SE¼ of NW¼)
Lat. 33°58' 43" N Long. 107°00' 16" W
Mtn Range, Valley, etc. Outcrop approx. 20 ft thick, on SE nose of low hill, approx. 10 ft below peak of hill.

Sample Description:

Formation
Catalogue #
Our Rock Name basalt
Formation basalt of Bear Canyon
Age: Epoch, etc: late Miocene
Radiometric

Field # 7-28-8 Collected By D. B. Date Collected 7/28/82
Author's Rock Name alkalic basalt
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections
counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz		
Corundum		
Orthoclase	8.19	
Albite	29.26	
Anorthite	22.49	
Nepheline	4.48	
Diopside		
Wollastonite	6.81	
Enstatite	3.86	
Ferrosilite	2.67	
Hypersthene		
Enstatite		
Ferrosilite		
Olivine		
Forsterite	9.03	
Fayalite	6.88	
Magnetite	2.40	
Hematite		
Ilmenite	2.96	
Sphene		
Apatite	0.99	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

Sample # 7-28-9

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	48.88	50.01	
Al_2O_3	16.89	17.28	
TiO_2	1.504	1.539	
Fe_2O_3	10.50	1.64	
FeO		8.19	
MnO	0.158	0.162	
MgO	6.51	6.66	
CaO	8.15	8.34	
Na_2O	4.36	4.46	
K_2O	1.27	1.30	
P_2O_5	0.411	0.420	
H_2O^+/LOI	1.25	-	
H_2O^-	0.20	-	
CO_2	-	-	
Others			
FeO*			9.67
Total	100.08	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-28-9

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 1 T. 4S R. 2W (NW¼ of NW¼)

Lat. 33° 59' 12" N Long. 107° 00' 06" W

Mtn Range, Valley, etc. Top of small hill approx. 1,000 ft north of road.

Catalogue #

Our Rock Name basalt

Formation basalt of Bear Canyon

Age: Epoch, etc: late Miocene

Radiometric

Sample Description:

Field # 7-28-9 Collected By D. B. Date Collected 7/28/82

Author's Rock Name alkalic basalt

Description: greenish-black rock spotted with white flecks.

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz		
Corundum		
Orthoclase	7.68	
Albite	30.09	
Anorthite	23.29	
Nepheline	4.15	
Diopside		
Wollastonite	6.40	
Enstatite	3.63	
Ferrosilite	2.50	
Hypersthene		
Enstatite		
Ferrosilite		
Olivine		
Forsterite	9.08	
Fayalite	6.91	
Magnetite	2.38	
Hematite		
Ilmenite	2.92	
Sphene		
Apatite	0.94	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 7-26-8

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	50.96	52.08	
Al_2O_3	16.85	17.22	
TiO_2	1.927	1.969	
Fe_2O_3	11.23	1.75	
FeO		8.75	
MnO	0.152	0.155	
MgO	4.24	4.33	
CaO	7.43	7.59	
Na_2O	3.87	3.96	
K_2O	1.71	1.75	
P_2O_5	0.442	0.452	
H_2O^+/LOI	0.69	-	
H_2O -	0.35	-	
CO_2	-	-	
Others			
FeO*			10.32
Total	99.85	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-26-8

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Molino Peak 7½'
Sec. 3 T. 5S R. 2W (SW¼ of SW¼)
Lat. 33°53' 57" N Long. 107°02' 33" W
Mtn Range, Valley, etc. Outcrop at western end of top of low hill approx. 2,000 ft north of road.

Catalogue #
Our Rock Name basalt
Formation basalt of Madera Canyon
Age: Epoch, etc: Miocene
Radiometric

Sample Description:

Field # 7-26-3 Collected By D. B. Date Collected 7/26/82
Author's Rock Name high-K basaltic andesite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections
counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz		
Corundum		
Orthoclase	10.33	
Albite	33.46	
Anorthite	24.07	
Nepheline		
Diopside		
Wollastonite	4.45	
Enstatite	2.11	
Ferrosilite	2.28	
Hypersthene		
Enstatite	4.86	
Ferrosilite	5.25	
Olivine		
Forsterite	2.68	
Fayalite	3.19	
Magnetite	2.54	
Hematite		
Ilmenite	3.74	
Sphene		
Apatite	1.05	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

Sample # 7-26-7

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	51.74	52.48		
Al_2O_3	16.74	16.98		
TiO_2	1.950	1.978		
Fe_2O_3	11.13	11.72		10.93 INAA
FeO		8.61		
MnO	0.151	0.153		
MgO	4.60	4.67		
CaO	7.27	7.37		
Na_2O	3.69	3.74		3.59 INAA
K_2O	1.80	1.83		
P_2O_5	0.465	0.472		
H_2O^+/LOI	0.10	-		
H_2O -	0.45	-		
CO_2	-	-		
Others				
FeO*				10.00
Total	99.89	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		787
Be		
Ce		71
Cd		
Co		36
Cr		35
Cs		0.7
Cu		
Dy		
Er		
Eu		2.0
Ga		
Gd		
Ge		
Hf		5.5
Ho		
La		33
Li		
Lu		0.38
Mo		
Nb	21	
Nd		
Ni	15 (A.A.)	
Pb	10	
Pd		
Pr		
Rb	30	25
Rc		
Sb		0.08
Sc		19
Sm		7.5
Sn		
Sr	851	
Ta		1.1
Tb		1.05
Th	5	5.8
Tm		
U	1	1.4
V		
Y	33	
Yb		3.0
Zn		
Zr	225	
Others		

Sample # 7-26-7

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 9 T. 5S R. 2W (SE¼ of NE¼)

Lat. 33°53' 37"N Long. 107°02' 47" N

Mtn Range, Valley, etc. Approx. 50 ft below top of hill that is north of road.

Sample Description:

Catalogue #

Our Rock Name basalt

Formation basalt of Madera Canyon

Age: Epoch, etc: Miocene

Radiometric

Field # 7-26-7 Collected By D. B. Date Collected 7/26/82

Author's Rock Name high-K basaltic andesite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz		
Corundum		
Orthoclase	10.79	
Albite	31.66	
Anorthite	24.14	
Nepheline		
Diopside		
Wollastonite	3.91	
Enstatite	1.93	
Ferrosilite	1.90	
Hypersthene		
Enstatite	8.01	
Ferrosilite	7.86	
Olivine		
Forsterite	1.17	
Fayalite	1.27	
Magnetite	2.50	
Hematite		
Ilmenite	3.76	
Sphene		
Apatite	1.09	
Calcite		
Rutile		
Others		

COMMENTS: 100.00

D.I. = 42.5

Sample # 7-26-6

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	57.08	58.50		
Al_2O_3	16.32	16.73		
TiO_2	1.039	1.065		
Fe_2O_3	6.76	1.06		6.43 INAA
FeO		5.28		
MnO	0.100	0.102		
MgO	3.71	3.80		
CaO	5.82	5.96		
Na_2O	3.63	3.72		3.46 INAA
K_2O	3.22	3.30		
P_2O_5	0.475	0.487		
H_2O^+/LOI	1.10	-		
H_2O -	0.56	-		
CO_2	-	-		
Others				
FeO*				6.01
Total	99.81	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF	(ppm) INAA
Ag		
B		
Ba		1275
Be		
Ce		92
Cd		
Co		21
Cr		51
Cs		0.7
Cu		
Dy		
Er		
Eu		2.0
Ga		
Gd		
Ge		
Hf		6.7
Ho		
La		47
Li		
Lu		0.29
Mo		
Nb	15	
Nd		
Ni		
Pb	12	
Pd		
Pr		
Rb	70	62
Rc		
Sb		0.08
Sc		13.0
Sm		8.0
Sn		
Sr	968	
Ta		0.7
Tb		0.88
Th	3	4.8
Tm		
U	1	1.1
V		
Y	28	
Yb		2.3
Zn		
Zr	294	
Others		

Sample # 7-26-6

CHEMICAL DATA FORM

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 28 T. 4S R. 2W (NE¼ of NW¼)

Lat. 33°56' 23" N Long. 107°03' 19" W

Mtn Range, Valley, etc. Bold outcrop at top of hill that trends east-west.

Formation

Catalogue #

Our Rock Name basalt

Formation basalt of Madera Canyon

Age: Epoch, etc: Miocene

Radiometric

Sample Description:

Field # 7-26-6 Collected By D. B. Date Collected 7/26/82

Author's Rock Name high-K andesite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections
counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	5.41	
Corundum		
Orthoclase	19.50	
Albite	31.48	
Anorthite	19.19	
Nepheline		
Diopside		
Wollastonite	3.01	
Enstatite	1.65	
Ferrosilite	1.26	
Hypersthene		
Enstatite	7.83	
Ferrosilite	6.00	
Olivine		
Forsterite		
Fayalite		
Magnetite	1.53	
Hematite		
Ilmenite	2.02	
Sphene		
Apatite	1.13	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

D.I. = 56.4

Sample # 7-26-1A

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O % Vol Free	Mole %
SiO_2	56.64	58.29	
Al_2O_3	16.20	16.67	
TiO_2	1.027	1.057	
Fe_2O_3	6.77	1.06	
FeO		5.31	
MnO	0.102	0.105	
MgO	3.84	3.95	
CaO	6.24	6.42	
Na_2O	3.46	3.56	
K_2O	3.00	3.09	
P_2O_5	0.467	0.481	
H_2O^+/LOI	1.85	-	
H_2O -	0.37	-	
CO_2	-	-	
Others			
FeO*			6.26
Total	99.97	99.99	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	(ppm)	
Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni	31-35 (A.A.)	
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-26-1A

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 21 T. 4S R. 2W (NE¼ of SW¼)

Lat. 33°56' 45" N Long. 107°03' 16" W

Mtn Range, Valley, etc. Collected at peak of east-west-trending hill.

Catalogue #

Our Rock Name basalt

Formation basalt of Madera Canyon

Age: Epoch, etc: Miocene

Radiometric

Sample Description:

Field # 7-26-1A Collected By D. B. Date Collected 7/26/82

Author's Rock Name high-K andesite

Description:

Reference:

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	5.93	
Corundum		
Orthoclase	18.24	
Albite	30.13	
Anorthite	20.39	
Nepheline		
Diopside		
Wollastonite	3.48	
Enstatite	1.92	
Ferrosilite	1.43	
Hypersthene		
Enstatite	7.92	
Ferrosilite	5.90	
Olivine		
Forsterite		
Fayalite		
Magnetite	1.54	
Hematite		
Ilmenite	2.01	
Sphene		
Apatite	1.11	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 7-26-5

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	58.33	59.23		
Al_2O_3	16.71	16.97		
TiO_2	1.040	1.056		
Fe_2O_3	6.75	1.05		
FeO		5.23		
MnO	0.095	0.096		
MgO	3.22	3.27		
CaO	5.65	5.74		
Na_2O	3.93	3.99		
K_2O	2.88	2.92		
P_2O_5	0.450	0.457		
H_2O^+/LOI	0.63	-		
H_2O -	0.20	-		
CO_2	-	-		
Others				
FeO*				6.17
Total	99.89	100.01		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-26-5

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 21 T. 4S R. 2W (SW¼ of NW¼)

Lat. 33°57' 04" N Long. 107°03' 34" W

Mtn Range, Valley, etc. Outcrop on small knoll west of stream channel.

Catalogue #

Our Rock Name basalt

Formation basalt of Madera Canyon

Age: Epoch, etc: Miocene

Radiometric

Sample Description:

Field # 7-26-5 Collected By D. B. Date Collected 7/26/82

Author's Rock Name high-K andesite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	6.92	
Corundum		
Orthoclase	17.28	
Albite	33.77	
Anorthite	19.75	
Nepheline		
Diopside		
Wollastonite	2.39	
Enstatite	1.24	
Ferrosilite	1.09	
Hypersthene		
Enstatite	6.91	
Ferrosilite	6.08	
Olivine		
Forsterite		
Fayalite		
Magnetite	1.52	
Hematite		
Ilmenite	2.01	
Sphene		
Apatite	1.05	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

Sample # 7-26-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	58.52	59.95	
Al_2O_3	16.58	16.99	
TiO_2	0.895	0.917	
Fe_2O_3	6.03	0.94	
FeO		4.71	
MnO	0.091	0.093	
MgO	2.87	2.94	
CaO	5.78	5.92	
Na_2O	4.01	4.11	
K_2O	2.92	2.99	
P_2O_5	0.433	0.444	
H_2O^+/LOI	1.04	-	
H_2O -	0.22	-	
CO_2	-	-	
Others			
FeO*			5.56
Total	99.39	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	(ppm)	
Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni	31-35 (A.A.)	
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-26-1

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 21 T. 4S R.2W (NE¼ of SW¼)

Lat. 33°56' 45" N Long. 107°03' 16" W

Mtn Range, Valley, etc. Outcrop occurs as rounded boulders at crest of peak which trends east-west.

Catalogue #

Our Rock Name basalt

Formation basalt of Madera Canyon

Age: Epoch, etc: Miocene

Radiometric

Sample Description:

Field # 7-26-1 Collected By D. B. Date Collected 7/26/82

Author's Rock Name high-K andesite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	7.40	
Corundum		
Orthoclase	17.68	
Albite	34.76	
Anorthite	19.07	
Nepheline		
Diopside		
Wollastonite	3.09	
Enstatite	1.59	
Ferrosilite	1.42	
Hypersthene		
Enstatite	5.73	
Ferrosilite	5.11	
Olivine		
Forsterite		
Fayalite		
Magnetite	1.37	
Hematite		
Ilmenite	1.74	
Sphene		
Apatite	1.03	
Calcite		
Rutile		
Others		

COMMENTS: 100.00

Sample # 26-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	67.55	69.93	
Al_2O_3	14.70	15.22	
TiO_2	0.483	0.500	
Fe_2O_3	2.62	0.41	
FeO		2.07	
MnO	0.051	0.053	
MgO	0.73	0.76	
CaO	2.40	2.49	
Na_2O	3.43	3.55	
K_2O	4.72	4.89	
P_2O_5	0.128	0.133	
H_2O^+/LOI	3.37	-	
H_2O -	0.11	-	
CO_2	-	-	
Others			
FeO*				2.44
Total	100.30	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Re		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 26-4

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Molino Peak 7½'

Sec. T. R.

Lat. Long.

Mtn Range, Valley, etc.

Catalogue #

Our Rock Name rhyolite

Formation upper rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 10.8 ± 0.4 m.y.

Sample Description:

Field # 26-4 Collected By D.B. Date Collected 6/26/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	23.33	
Corundum		
Orthoclase	28.88	
Albite	30.05	
Anorthite	11.15	
Nepheline		
Diopside		
Wollastonite	0.13	
Enstatite	0.05	
Ferrosilite	0.08	
Hypersthene		
Enstatite	1.83	
Ferrosilite	2.65	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.60	
Hematite		
Ilmenite	0.95	
Sphene		
Apatite	0.31	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Sample # 7-24-7

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	68.39	71.22	
Al_2O_3	14.31	14.90	
TiO_2	0.431	0.449	
Fe_2O_3	2.44	0.39	
FeO		1.94	
MnO	0.051	0.053	
MgO	0.69	0.72	
CaO	2.10	2.19	
Na_2O	3.24	3.37	
K_2O	4.47	4.66	
P_2O_5	0.116	0.121	
H_2O^+/LOI	3.22	-	
H_2O -	0.18	-	
CO_2	-	-	
Others			
FeO*			2.29
Total	99.74	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-24-7

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 15 T. 4S R. 2W (NE¼ of NW¼)

Lat. 33°58'06" N Long. 107°[illegible]' 54" W

Mtn Range, Valley, etc. Vitrophyre interval overlying saddle which in turn overlies lower rhyolite

Sample Description:

Catalogue #

Our Rock Name rhyolite

Formation upper rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 10.8 ± 0.4 m.y.

Field # 7-24-7 Collected By D. B. Date Collected 7/24/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections

counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst: D. Bobrow

Method: universal stage

Date: 2/83

	Phenocrysts	Groundmass
Average	An_{40}	
Range	An_{35} to An_{50}	
Zoning	normal	
# Grains	3	

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	27.18	
Corundum	0.63	
Orthoclase	27.51	
Albite	28.55	
Anorthite	10.06	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.79	
Ferrosilite	2.60	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.56	
Hematite		
Ilmenite	0.85	
Sphene		
Apatite	0.28	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

Sample # 7-18-3

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Squaw Peak 7½'

Sec. 32 T. 4S R.4W (NE¼ of NE¼)

Lat. 33°55'21" N Long. 107°16' 22" W

Mtn Range, Valley, etc. Top of first prominent ledge on southwest side of Squaw Peak

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of Squaw Peak

Age: Epoch, etc: Mid-Miocene

Radiometric

Sample Description:

Field # 7-18-3 Collected By D. B. Date Collected 7/18/82

Author's Rock Name High-K, high-SiO_2, rhyolite

Description: crystal-rich, large (>1mm) sanidine, quartz, plagioclase phenocrysts in a glassy matrix

Reference:

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Quartz	37.03	
Corundum	0.56	
Orthoclase	27.33	
Albite	31.91	
Anorthite	1.98	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.03	
Ferrosilite	0.83	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.15	
Hematite		
Ilmenite	0.15	
Sphene		
Apatite	0.04	
Calcite		
Rutile		
Others		
	100.01	

Plagioclase Composition

Analyst:

Method:

Date:

COMMENTS:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 7-18-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	77.67	77.91	
Al_2O_3	12.46	12.50	
TiO_2	0.081	0.081	
Fe_2O_3	0.66	0.10	
FeO		0.51	
MnO	0.063	0.063	
MgO	0.01	0.01	
CaO	0.42	0.42	
Na_2O	3.76	3.77	
K_2O	4.61	4.62	
P_2O_5	0.017	0.017	
H_2O^+/LOI	0.39	-	
H_2O -	0.05	-	
CO_2	-	-	
Others			
FeO*				0.60
Total	100.19	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-18-4

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Squaw Peak 7½'
Sec. 32 T. 4S R. 4W (NE¼ of NE¼)
Lat. 33°55' 22" N Long. 107°16' 23" W
Mtn Range, Valley, etc. steeply dipping outcrop below first break in slope

Catalogue #
Our Rock Name rhyolite
Formation rhyolite of Squaw Peak
Age: Epoch, etc: Mid-Miocene
Radiometric

Sample Description:

Field # 7-18-4 Collected By D. B. Date Collected 7/18/82
Author's Rock Name High-K, high-SiO_2 rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections.

Multiple Analyses
average of ______ thin sections counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	35.98	
Corundum	0.26	
Orthoclase	26.72	
Albite	33.34	
Anorthite	2.32	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.20	
Ferrosilite	0.79	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.14	
Hematite		
Ilmenite	0.17	
Sphene		
Apatite	0.08	
Calcite		
Rutile		
Others		
	100.00	

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

COMMENTS:

Sample # 7-18-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	77.49	77.70		
Al_2O_3	12.45	12.48		
TiO_2	0.088	0.088		
Fe_2O_3	0.62	0.10		
FeO		0.47		
MnO	0.075	0.075		
MgO	0.08	0.08		
CaO	0.51	0.51		
Na_2O	3.93	3.94		
K_2O	4.51	4.52		
P_2O_5	0.033	0.033		
H_2O^+/LOI	0.36	-		
H_2O -	0.06	-		
CO_2	-	-		
Others				
FeO*				0.56
Total	100.21	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 79-10-6

CHEMICAL DATA FORM

Location

County Socorro

Quad. Squaw Peak 7½'

Sec NE4 20 T. 4S R. 4W

Lat. Long.

Mtn Range, Valley, etc. 100 ft upslope on east side of creek (vitrophyre) approx. 2 mi due no. of Squaw Peak

Sample Description:

Formation

Catalogue #

Our Rock Name rhyolite

Formation rhyolite intrusive into popotosa

Age: Epoch, etc: mid-Miocene

Radiometric

Field # 79-10-6 Collected By Donze Date Collected 10/6/79

Author's Rock Name high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	37.66	
Corundum	0.50	
Orthoclase	19.15	
Albite	36.05	
Anorthite	5.47	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.11	
Ferrosilite	0.80	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.13	
Hematite		
Ilmenite	0.11	
Sphene		
Apatite	0.03	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Sample # 79-10-6

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	73.08	77.64	
Al_2O_3	12.25	13.01	
TiO_2	0.056	0.059	
Fe_2O_3	0.57	0.09	
FeO		0.46	
MnO	0.062	0.066	
MgO	0.04	0.04	
CaO	1.05	1.12	
Na_2O	4.01	4.26	
K_2O	3.05	3.24	
P_2O_5	0.010	0.011	
H_2O^+/LOI	5.20	-	
H_2O -	0.96	-	
CO_2	-	-	
Others			
FeO*			0.54
Total	100.34	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-18-6

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Squaw Peak 7½'
Sec. 32 T. 4S R. 4W (NW¼ of NE¼)
Lat. 33°55' 28" N Long. 107°16' 28" W
Mtn Range, Valley, etc. Top of peak, approx. 10 ft north of wooden marker.

Catalogue #
Our Rock Name rhyolite
Formation rhyolite of Squaw Peak
Age: Epoch, etc: Mid-Miocene
Radiometric

Sample Description:

Field # 7-18-6 Collected By D. B. Date Collected 7/18/82
Author's Rock Name High-K, high-SiO_2 rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted 2074 Grid 1/3 x 2/3
Over area of 1 thin sections/ mm

Multiple Analyses
average of ____ thin sections
counted as above.

Counted by: D. Bobrow
Type Counter swift Date 6/28/83

Quartz	8.1	
K-Feldspar	7.2	
Plagioclase	4.3	
Biotite	1.3	
Amphiboles	0.1	
Pyx. clino		
ortho		
Olivine		
Opaques	0.1	
Groundmass	78.9	
Others		
Zircon	T	

Plagioclase Composition

Analyst: D. Bobrow
Method: universal stage
Date: 2/83

	Phenocrysts	Groundmass
Average	An_{24}	
Range	An_{21} to An_{26}	
Zoning	nörmal	
# Grains	6	

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	36.01	
Corundum	0.70	
Orthoclase	27.21	
Albite	33.27	
Anorthite	1.71	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.05	
Ferrosilite	0.83	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.14	
Hematite		
Ilmenite	0.16	
Sphene		
Apatite	0.03	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 7-18-6

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	77.17	77.58		
Al_2O_3	12.69	12.76		
TiO_2	0.081	0.081		
Fe_2O_3	0.64	0.10		
FeO		0.49		
MnO	0.075	0.075		
MgO	0.02	0.02		
CaO	0.36	0.36		
Na_2O	3.90	3.92		
K_2O	4.58	4.60		
P_2O_5	0.013	0.013		
H_2O^+/LOI	0.43	-		
H_2O^-	0.07	-		
CO_2	-	-		
Others				
FeO*				0.58
Total	100.03	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-18-5

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Squaw Peak 7½'
Sec. 32 T. 4S R. 4W (NE¼ of NE¼)
Lat. 33°55' 25" N Long. 107°16' 24" W
Mtn Range, Valley, etc. base of last major outcrop on eastern side of dome.

Sample Description:

Catalogue #
Our Rock Name rhyolite
Formation rhyolite of Squaw Peak
Age: Epoch, etc: mid-Miocene
Radiometric

Field # 7-18-5 Collected By D.B. Date Collected 7/18/82
Author's Rock Name high-K, high-SiO_2 rhyolite
Description:

Reference:

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	35.51	
Corundum	0.43	
Orthoclase	26.82	
Albite	34.16	
Anorthite	1.92	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite		
Ferrosilite	0.83	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.14	
Hematite		
Ilmenite	0.14	
Sphene		
Apatite	0.04	
Calcite		
Rutile		
Others		
	99.85	

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections

Multiple Analyses
average of ______ thin sections counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

COMMENTS:

D.I. = 96.5

Sample # 7-18-5

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	77.25	77.57		
Al_2O_3	12.64	12.69		
TiO_2	0.076	0.076		
Fe_2O_3	0.64	0.10		0.60 INAA
FeO		0.49		
MnO	0.072	0.072		
MgO	<.01	<.01		
CaO	0.41	0.41		
Na_2O	4.02	4.04		4.07 INAA
K_2O	4.52	4.54		
P_2O_5	0.018	0.018		
H_2O^+/LOI	0.21	-		
H_2O^-	0.07	-		
CO_2	-	-		
Others				
FeO*				0.56
Total	99.93	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

U	Pb
11.29	29.9

Pb 207/204 15.487

Pb 206/204 17.530

Comments

U & Pb data by S. Bowring (personal communication)

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		86
Be		
Ce		53
Cd		
Co		0.3
Cr		4.5
Cs		5.6
Cu		
Dy		
Er		
Eu		0.15
Ga		
Gd		
Ge		
Hf		4.3
Ho		
La		30
Li		
Lu		1.1
Mo		
Nb	77	
Nd		
Ni		
Pb	30	
Pd		
Pr		
Rb	380	385
Re		
Sb		0.27
Sc		5.0
Sm		4.3
Sn		
Sr	4	
Ta		7.2
Tb		0.59
Th	39	38.8
Tm		
U	9	12.3
V		
Y	53	
Yb		6.9
Zn		
Zr	73	
Others		

Sample # 79-9-1

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Squaw Peak 7½'
Sec. 29 T. 4S R. 4W (SW¼ of SE¼)
Lat. 33°55'26" N Long. 107°16'25" W
Mtn Range, Valley, etc. Glassy, perlitic vitrophyre approx. 1/3 up No. side from big slabs at first set of cliffs.
Sample Description:

Catalogue #
Our Rock Name rhyolite
Formation Squaw Peak Dome
Age: Epoch, etc: mid-Miocene
Radiometric

Field # 79-9-1 Collected By Chapin & Osburn Date Collected 9/1/79
Author's Rock Name high-K, high-SiO_2 rhyolite
Description: Very clear glassy rock with perlitic, bubbly look. Approx. 0.5% fresh black biotite.

Reference:

CIPW Norms

Calculated by: D.B.
hand/program name Fortran: NORM
Date:

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections

Multiple Analyses
average of ______ thin sections counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Quartz	35.30	
Corundum	0.34	
Orthoclase	27.16	
Albite	33.79	
Anorthite	2.24	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite		
Ferrosilite	0.85	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.15	
Hematite		
Ilmenite	0.15	
Sphene		
Apatite	0.02	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 79-9-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	75.48	77.47	
Al_2O_3	12.39	12.72	
TiO_2	0.075	0.077	
Fe_2O_3	0.64	0.10	
FeO		0.50	
MnO	0.072	0.074	
MgO	<0.01	<0.01	
CaO	0.45	0.46	
Na_2O	3.89	3.99	
K_2O	4.48	4.60	
P_2O_5	0.007	0.007	
H_2O^+/LOI	2.58	-	
H_2O -	0.11	-	
CO_2	-	-	
Others			
FeO*				0.59
Total	100.17	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-22-2

CHEMICAL DATA FORM

Location

County Socorro

Quad. Squaw Peak 7½'

Sec. 6 T. 5S R. 4W (SW¼ of SE¼)

Lat. 33°53' 47" N Long. 107°17' 34" W

Mtn Range, Valley, etc. outcrop at southern end of north-south-striking peak.

Formation

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of B.O. Ranch dome

Age: Epoch, etc: mid-Miocene

Radiometric

Sample Description:

Field # 7-22-2 Collected By D. B. Date Collected 7/22/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	35.30	
Corundum	0.48	
Orthoclase	27.89	
Albite	33.06	
Anorthite	2.18	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite		
Ferrosilite	0.80	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.14	
Hematite		
Ilmenite	0.14	
Sphene		
Apatite	0.02	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Sample # 7-22-2

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	77.24	77.39	
Al_2O_3	12.79	12.82	
TiO_2	0.072	0.072	
Fe_2O_3	0.63	0.10	
FeO		0.48	
MnO	0.061	0.061	
MgO	< .01	< .01	
CaO	0.45	0.45	
Na_2O	3.90	3.91	
K_2O	4.71	4.72	
P_2O_5	0.009	0.009	
H_2O^+/LOI	0.46	-	
H_2O -	0.01	-	
CO_2	-	-	
Others			
FeO*			0.57
Total	100.33	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-22-4

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Squaw Peak 7½'
Sec. 6 T. 5S R. 4W (SW¼ of SE¼)
Lat. 33° 53' 47" N Long. 107° 17' 37" W
Mtn Range, Valley, etc. approximately 10 ft above saddle between east and west peaks.

Catalogue #
Our Rock Name rhyolite
Formation rhyolite of B.O. Ranch dome
Age: Epoch, etc: mid-Miocene
Radiometric

Sample Description:

Field # 7-22-4 Collected By D. B. Date Collected 7/22/82
Author's Rock Name high-K, high-SiO_2 rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections

Multiple Analyses
average of ______ thin sections
counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	35.08	
Corundum	0.48	
Orthoclase	27.51	
Albite	33.80	
Anorthite	2.07	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite		
Ferrosilite	0.75	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.13	
Hematite		
Ilmenite	0.15	
Sphene		
Apatite	0.02	
Calcite		
Rutile		
Others		
	99.99	

COMMENTS:

D.I. = 96.4

Sample # 7-22-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	77.28	77.38		
Al_2O_3	12.83	12.85		
TiO_2	0.076	0.076		
Fe_2O_3	0.60	0.09		0.64 INAA
FeO		0.46		
MnO	0.061	0.061		
MgO	< .01	< .01		
CaO	0.43	0.43		
Na_2O	3.99	4.00		4.42 INAA
K_2O	4.65	4.66		
P_2O_5	0.010	0.010		
H_2O^+/LOI	0.34	-		
H_2O -	0.03	-		
CO_2	-	-		
Others				
FeO*				0.56
Total	100.30	100.02		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		85
Be		
Ce		47
Cd		
Co		0.2
Cr		0.7
Cs		5.0
Cu		
Dy		
Er		
Eu		0.13
Ga		
Gd		
Ge		
Hf		4.6
Ho		
La		26
Li		
Lu		1.3
Mo		
Nb	66	
Nd		
Ni		
Pb	33	
Pd		
Pr		
Rb	364	388
Rc		
Sb		0.4
Sc		4.5
Sm		3.3
Sn		
Sr	3	
Ta		6.0
Tb		0.3
Th	44	40.0
Tm		
U	9	12.7
V		
Y	37	
Yb		5.1
Zn		
Zr	81	
Others		

Sample # 7-22-1

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Squaw Peak 7½'

Sec. 6 T. 5S R. 4W (SW¼ of SE¼)

Lat. 33°53' 48" N Long. 107°17' 32" W

Mtn Range, Valley, etc outcrop at northern end of north-south-trending peak.

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of B. O. Ranch dome

Age: Epoch, etc: mid-Miocene

Radiometric

Sample Description:

Field # 7-22-1 Collected By D. B. Date Collected 7/22/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	34.63	
Corundum	0.20	
Orthoclase	28.19	
Albite	33.73	
Anorthite	2.16	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite		
Ferrosilite	0.77	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.14	
Hematite		
Ilmenite	0.14	
Sphene		
Apatite	0.03	
Calcite		
Rutile		
Others		
	99.99	

COMMENTS:

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 7-22-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	77.05	77.37	
Al_2O_3	12.66	12.71	
TiO_2	0.074	0.074	
Fe_2O_3	0.61	0.09	
FeO		0.47	
MnO	0.060	0.060	
MgO	< .01	< .01	
CaO	0.45	0.45	
Na_2O	3.97	3.99	
K_2O	4.75	4.77	
P_2O_5	0.012	0.012	
H_2O^+/LOI	0.53	-	
H_2O^-	0.06	-	
CO_2	-	-	
Others			
FeO*			0.55
Total	100.23	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-22-6

CHEMICAL DATA FORM

Location

County Socorro

Quad. Squaw Peak 7½'

Sec. 6 T. 5S R. 4W (NW¼ of SE¼)

Lat. 33°53' 58" N Long. 107°17' 42" W

Mtn Range, Valley, etc. Vitropyric clast in welded tuff at base of B.O. Ranch dome.

Formation

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of B.O. Ranch dome

Age: Epoch, etc: mid-Miocene

Radiometric

Sample Description:

Field # 7-22-6 Collected By D. B. Date Collected 7/22/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections.

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	35.55	
Corundum	0.52	
Orthoclase	31.93	
Albite	28.50	
Anorthite	2.33	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite		
Ferrosilite	0.81	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.14	
Hematite		
Ilmenite	0.14	
Sphene		
Apatite	0.08	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

D.I. = 96

Sample # 7-22-6

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O Vol Free	Mole %
SiO_2	74.73	77.20	
Al_2O_3	12.35	12.76	
TiO_2	0.069	0.071	
Fe_2O_3	0.61	0.10	
FeO		0.48	
MnO	0.065	0.067	
MgO	< .01	< .01	
CaO	0.50	0.52	
Na_2O	3.26	3.27	
K_2O	5.23	5.40	
P_2O_5	0.034	0.035	
H_2O^+/LOI	2.97	-	
H_2O -	0.20	-	
CO_2	-	-	
Others			
FeO*			0.57
Total	100.02	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 79-10-10

CHEMICAL DATA FORM

Location

County Socorro

Quad. Squaw Peak 7½'

Sec. 7 T. 5S R. 4W (NE¼ of NW¼)

Lat. ________ Long. ________

Mtn Range, Valley, etc. ________

Formation ________

Catalogue # ________

Our Rock Name rhyolite

Formation Large dome in M. Donze's area

Age: Epoch, etc: mid-Miocene

Radiometric ________

Sample Description:

Field # 79-10-10 Collected By Donze Date Collected 10/10/79

Author's Rock Name high-K, high-SiO_2 rhyolite

Description: perlite glass in basal glassy tuff breccia

Reference: ________

Modal Analysis (Volume %)

Single analysis

Points counted ________ Grid ________

Over area of ________ thin sections

Multiple Analyses

average of ________ thin sections counted as above.

Counted by: ________

Type Counter ________ Date ________

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst: ________

Method: ________

Date: ________

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date: ________

Quartz	33.78	
Corundum	0.01	
Orthoclase	27.72	
Albite	34.79	
Anorthite	2.46	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.18	
Ferrosilite	0.78	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.13	
Hematite		
Ilmenite	0.13	
Sphene		
Apatite	0.02	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 79-10-10

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	H_2O Wt.%	Vol Free	Mole %
SiO_2	74.70	77.18	
Al_2O_3	12.34	12.75	
TiO_2	0.067	0.069	
Fe_2O_3	0.58	0.09	
FeO		0.46	
MnO	0.067	0.069	
MgO	0.07	0.07	
CaO	0.49	0.51	
Na_2O	3.98	4.11	
K_2O	4.54	4.69	
P_2O_5	0.008	0.008	
H_2O^+/LOI	3.33	-	
H_2O -	0.01	-	
CO_2	-	-	
Others			
FeO*			0.54
Total	100.18	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-18-2

CHEMICAL DATA FORM

Location
County Socorro
Quad. Squaw Peak 7½'
Sec. 30 T. 4S R. 4W (NE¼ of NE¼)
Lat. 33°55' 18" N Long. 107°16' 18" W
Mtn Range, Valley, etc. Small outcrop at base of Squaw Peak on southeast side

Formation

Catalogue #
Our Rock Name rhyolite
Formation rhyolite of Squaw Peak

Age: Epoch, etc: Mid-Miocene
Radiometric

Sample Description:

Field # 7-18-2 Collected By D. B. Date Collected 7/18/82
Author's Rock Name High-K, high-SiO_2, rhyolite
Description: Glassy looking rock, phenocrysts of quartz, sanidine, and plagioclase

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections

Multiple Analyses
average of ______ thin sections counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	31.40	
Corundum		
Orthoclase	26.74	
Albite	32.85	
Anorthite	3.24	
Nepheline		
Diopside		
Wollastonite	0.82	
Enstatite	0.11	
Ferrosilite	0.79	
Hypersthene		
Enstatite		
Ferrosilite		
Olivine		
Forsterite		
Fayalite		
Magnetite	0.13	
Hematite		
Ilmenite	0.14	
Sphene		
Apatite	0.08	
Calcite		
Rutile		
Others		
Wollastonite	3.70	
	100.01	

COMMENTS:

Sample # 7-18-2

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	73.86	75.46	
Al_2O_3	12.21	12.47	
TiO_2	0.073	0.075	
Fe_2O_3	0.59	0.09	
FeO		0.46	
MnO	0.074	0.076	
MgO	0.04	0.04	
CaO	2.82	2.88	
Na_2O	3.80	3.88	
K_2O	4.43	4.53	
P_2O_5	0.035	0.036	
H_2O^+/LOI	2.16	-	
H_2O -	0.36	-	
CO_2	-	-	
Others			
FeO*			0.54
Total	100.46	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-18-1

CHEMICAL DATA FORM

Location

County Socorro
Quad. Squaw Peak 7½'
Sec. 4 T. 4S R. 4W (SW¼ of SW¼)
Lat. 33°59'02" N Long. 107°16' 05" W
Mtn Range, Valley, etc. At top of hill approx. 1 mile SE of McDaniel Tank

Formation
Catalogue #
Our Rock Name Rhyolite
Formation rhyolite of McDaniel Tank
Age: Epoch, etc: Mid-Miocene
Radiometric 18.3 ± 0.7 m.y.

Sample Description:

Field # 7-18-1 Collected By D. B. Date Collected 7/18/82
Author's Rock Name High-K, high-SiO_2 rhyolite
Description: Finely flow banded, with quartz filling of vugs.

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	27.85	
Corundum	0.71	
Orthoclase	28.56	
Albite	36.97	
Anorthite	3.29	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.30	
Ferrosilite	1.46	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.30	
Hematite		
Ilmenite	0.47	
Sphene		
Apatite	0.09	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 7-18-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	73.53	74.02	
Al_2O_3	14.24	14.34	
TiO_2	0.245	0.247	
Fe_2O_3	1.36	0.21	
FeO		1.04	
MnO	0.066	0.066	
MgO	0.12	0.12	
CaO	0.71	0.72	
Na_2O	4.34	4.37	
K_2O	4.80	4.83	
P_2O_5	0.039	0.039	
H_2O^+/LOI	0.34	-	
H_2O -	0.09	-	
CO_2	-	-	
Others			
FeO*			1.23
Total	99.88	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-23-4

CHEMICAL DATA FORM

Location

County Socorro

Quad. Squaw Peak 7½'

Sec. 30 T. 4S R. 4W (NW¼ OF NW¼)

Lat. 33°56' 19" N Long. 107°17' 13" W

Mtn Range, Valley, etc. Above fence near contact with rhyolite of Alameda Springs

Sample Description:

Formation

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of McDaniel Tank

Age: Epoch, etc: mid-Miocene

Radiometric 18.3 ± 0.7 m.y.

Field # 7-23-4 Collected By D. B. Date Collected 7/23/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted 1918 Grid 2/3 x 1/3

Over area of 1 thin sections mm

Multiple Analyses

average of ______ thin sections counted as above.

Counted by: D. Bobrow

Type Counter swift Date 6/28/83

Quartz	t	
K-Feldspar	0.7	
Plagioclase	1.6	
Biotite	0.5	
Amphiboles		
Pyx. clino	t	
ortho		
Olivine		
Opaques	t	
Groundmass	97.2	
Others		
Zircon	t	

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	27.54	
Corundum	0.24	
Orthoclase	27.88	
Albite	37.36	
Anorthite	4.05	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.45	
Ferrosilite	1.51	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.31	
Hematite		
Ilmenite	0.49	
Sphene		
Apatite	0.16	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 92.8

Sample # 7-23-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	73.23	73.99		
Al_2O_3	13.95	14.09		
TiO_2	0.256	0.259		
Fe_2O_3	1.39	0.21		1.56 INAA
FeO		1.07		
MnO	0.077	0.078		
MgO	0.18	0.18		
CaO	0.90	0.91		
Na_2O	4.37	4.42		4.73 INAA
K_2O	4.67	4.72		
P_2O_5	0.070	0.071		
H_2O^+/LOI	0.29	-		
H_2O -	0.11	-		
CO_2	-	-		
Others				
FeO*				1.33
Total	99.49	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

(ppm)	XRF	INAA
Ag		
B		
Ba		953
Be		
Ce		112
Cd		
Co		0.8
Cr		3.3
Cs		2.3
Cu		
Dy		
Er		
Eu		1.4
Ga		
Gd		
Ge		
Hf		8.0
Ho		
La		58
Li		
Lu		0.62
Mo		
Nb	41	
Nd		
Ni		
Pb	22	
Pd		
Pr		
Rb	167	170
Rc		
Sb		0.08
Sc		3.6
Sm		8.2
Sn		
Sr	145	
Ta		2.8
Tb		1.2
Th	23	20.5
Tm		
U	5	5.2
V		
Y	43	
Yb		4.3
Zn		
Zr	256	
Others		

Sample # 7-23-3

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Squaw Peak 7½'
Sec. 20 T. 4S R. 4W (NW¼ of SW¼)
Lat. 33°56' 44" N Long. 107°17' 03" W
Mtn Range, Valley, etc. vitrophyre interval on southwest face of hill.

Catalogue #
Our Rock Name rhyolite
Formation rhyolite of McDaniel Tank
Age: Epoch, etc: mid-Miocene
Radiometric 18.3 ± 0.7 m.y.

Sample Description:

Field # 7-23-3 Collected By D. B. Date Collected 7/23/82
Author's Rock Name high-K, high-SiO_2 rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections

Multiple Analyses
average of ______ thin sections counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	27.51	
Corundum	0.55	
Orthoclase	25.87	
Albite	38.98	
Anorthite	4.14	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.67	
Ferrosilite	1.43	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.29	
Hematite		
Ilmenite	0.46	
Sphene		
Apatite	0.09	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 92.4

Sample # 7-23-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	71.07	73.91		
Al_2O_3	13.83	14.38		
TiO_2	0.234	0.243		
Fe_2O_3	1.27	0.20		1.20 INAA
FeO		1.01		
MnO	0.077	0.080		
MgO	0.26	0.27		
CaO	0.85	0.88		
Na_2O	4.43	4.61		4.14 INAA
K_2O	4.21	4.38		
P_2O_5	0.036	0.037		
H_2O^+/LOI	3.38	-		
H_2O -	0.26	-		
CO_2	-	-		
Others				
FeO*				1.13
Total	99.91	99.99		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		818
Be		
Ce		96
Cd		
Co		0.7
Cr		2.8
Cs		3.7
Cu		
Dy		
Er		
Eu		1.1
Ga		
Gd		
Ge		
Hf		7.1
Ho		
La		49
Li		
Lu		0.55
Mo		
Nb	44	
Nd		
Ni		
Pb	25	
Pd		
Pr		
Rb	172	161
Rc		
Sb		0.13
Sc		3.5
Sm		7.4
Sn		
Sr	123	
Ta		2.9
Tb		0.91
Th	24	20
Tm		
U	5	5.1
V		
Y	43	
Yb		4.0
Zn		
Zr	253	
Others		

Sample # 7-23-2

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Squaw Peak 7½'
Sec. 20 T. 4S R. 4W (NW¼ of SW¼)
Lat. 33°56' 43" N Long. 107°16' 57" W
Mtn Range, Valley, etc. Dense flow-banded outcrop on southern face of hill "7216"
Sample Description: (approx. 50 ft below top of hill).

Catalogue #
Our Rock Name rhyolite
Formation rhyolite of McDaniel Tank
Age: Epoch, etc: mid-Miocene
Radiometric 18.3 ± 0.7 m.y.

Field # 7-23-2 Collected By D. B. Date Collected 7/23/82
Author's Rock Name high-K, high-SiO_2 rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections

Multiple Analyses
average of ______ thin sections
counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	25.92	
Corundum	0.20	
Orthoclase	28.19	
Albite	38.15	
Anorthite	4.49	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.58	
Ferrosilite	1.53	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.31	
Hematite		
Ilmenite	0.48	
Sphene		
Apatite	0.15	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Sample # 7-23-2

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	72.60	73.38	
Al_2O_3	14.27	14.42	
TiO_2	0.251	0.254	
Fe_2O_3	1.40	0.22	
FeO		1.08	
MnO	0.075	0.076	
MgO	0.23	0.23	
CaO	0.98	0.99	
Na_2O	4.46	4.51	
K_2O	4.72	4.77	
P_2O_5	0.065	0.066	
H_2O^+/LOI	0.33	-	
H_2O -	0.10	-	
CO_2	-	-	
Others			
FeO*			1.38
Total	99.48	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-17-6

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Squaw Peak 7½-min

Sec. 6 T. 4S R. 4W (SE¼ of NE¼)

Lat. 33° 59' 29"N Long. 107° 17' 14"W

Mtn Range, Valley, etc. Vertically foliated outcrop, southeast of stream channel and road

Sample Description:

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of McDaniel Tank

Age: Epoch, etc: Mid-Miocene

Radiometric 18.3 + 0.7 m.y.

Field # 7-17-6 Collected By D.B. Date Collected 7/17/82

Author's Rock Name High-K, high-SiO_2, rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D.B.

hand/program name Fortran: NORM

Date:

Quartz	25.66	
Corundum	0.38	
Orthoclase	27.56	
Albite	39.03	
Anorthite	4.50	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.30	
Ferrosilite	1.59	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.33	
Hematite		
Ilmenite	0.52	
Sphene		
Apatite	0.13	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 7-17-6

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	72.98	73.19	
Al_2O_3	14.62	14.66	
TiO_2	0.274	0.275	
Fe_2O_3	1.49	0.23	
FeO		1.14	
MnO	0.073	0.073	
MgO	0.12	0.12	
CaO	0.98	0.98	
Na_2O	4.60	4.61	
K_2O	4.65	4.66	
P_2O_5	0.057	0.057	
H_2O^+/LOI	0.19	-	
H_2O -	0.13	-	
CO_2	-	-	
Others			
FeO*			1.35
Total	100.16	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag
B
Ba
Be
Ce
Cd
Co
Cr
Cs
Cu
Dy
Er
Eu
Ga
Gd
Ge
Hf
Ho
La
Li
Lu
Mo
Nb
Nd
Ni
Pb
Pd
Pr
Rb
Rc
Sb
Sc
Sm
Sn
Sr
Ta
Tb
Th
Tm
U
V
Y
Yb
Zn
Zr
Others

CHEMICAL DATA FORM

Sample # 5-24-1

Formation

Location

County Socorro

Quad. Squaw Peak 7½'

Sec. 6 T. 4S R. 4W (SW¼ of NW¼)

Lat. 33°58' 55"N Long. 107°17' 00"W

Mtn Range, Valley, etc. steeply dipping outcrop approx. 1000 ft NW of McDaniel Tank

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of McDaniel Tank

Age: Epoch, etc: mid-Miocene

Radiometric 18.3 ± 0.7 m.y.

Sample Description:

Field # 5-24-1 Collected By D.B., P.K., & G.R.O. Date Collected 5/24/82

Author's Rock Name high-K rhyolite

Description: dense, stony, gray, with dark & light flow banding (crystal poor) elongate biotite phenocrysts

Reference:

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	22.76	
Corundum		
Orthoclase	27.73	
Albite	42.86	
Anorthite	3.00	
Nepheline		
Diopside		
Wollastonite	0.63	
Enstatite	0.16	
Ferrosilite	0.50	
Hypersthene		
Enstatite	0.34	
Ferrosilite	1.05	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.32	
Hematite		
Ilmenite	0.53	
Sphene		
Apatite	0.12	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 5-24-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	72.16	72.81	
Al_2O_3	14.38	14.51	
TiO_2	0.275	0.277	
Fe_2O_3	1.45	0.22	
FeO		1.12	
MnO	0.076	0.077	
MgO	0.20	0.20	
CaO	0.97	0.98	
Na_2O	5.02	5.07	
K_2O	4.65	4.69	
P_2O_5	0.052	0.052	
H_2O^+/LOI	0.29	-	
H_2O -	0.01	-	
CO_2	-	-	
Others			
FeO*			1.32
Total	99.53	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-23-1

CHEMICAL DATA FORM

Location

County Socorro
Quad. Squaw Peak 7½'
Sec. 21 T. 4S R.4W (SW¼ of SW¼)
Lat. 33°56' 24" N Long. 107°16' 06" W
Mtn Range, Valley, etc. vertical outcrop of reddish intrusive that strikes N-S
Sample Description: (north of Squaw Peak approx. 1 mi)

Formation

Catalogue #
Our Rock Name
Formation intrusive
Age: Epoch, etc: mid-Miocene
Radiometric

Field # 7-23-3 Collected By D. B. Date Collected 7/23/82
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections

Multiple Analyses
average of ______ thin sections counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	28.67	
Corundum	1.30	
Orthoclase	18.90	
Albite	33.03	
Anorthite	12.08	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.20	
Ferrosilite	3.08	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.65	
Hematite		
Ilmenite	0.79	
Sphene		
Apatite	0.30	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 7-23-1 (intrusive)

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	69.44	70.95	
Al_2O_3	15.28	15.61	
TiO_2	0.408	0.417	
Fe_2O_3	2.86	0.45	
FeO		2.23	
MnO	0.025	0.026	
MgO	0.47	0.48	
CaO	2.55	2.61	
Na_2O	3.82	3.90	
K_2O	3.13	3.20	
P_2O_5	0.127	0.130	
H_2O^+/LOI	0.90	-	
H_2O -	0.93	-	
CO_2	-	-	
Others			
FeO*			2.63
Total	99.94	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF	(ppm)
Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb	11	
Nd		
Ni		
Pb	16	
Pd		
Pr		
Rb	60	
Rc		
Sb		
Sc		
Sm		
Sn		
Sr	600	
Ta		
Tb		
Th	4	
Tm		
U	2	
V		
Y	19	
Yb		
Zn		
Zr	150	
Others		

SQUAW PEAK

CENTER

Sample # 7-9-16

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Arroyo Landavaso 7½'

Sec. 4 T. 3S R. 4W (NW¼ of NE¼)

Lat. 34°04' 56"N Long. 107°15' 50" W

Mtn Range, Valley, etc. Fourth(?) lithoidal lave flow, approx. 20 ft above and NE of stream channel

Sample Description:

Catalogue #

Our Rock Name andesite

Formation andesite of Landavaso Reservoir

Age: Epoch, etc: Oligocene

Radiometric

Field # 7-9-16 Collected By D. B. Date Collected 7/9/82

Author's Rock Name K-altered andesite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by:

hand/program name

Date:

Quartz		
Corundum		
Orthoclase		
Albite		
Anorthite		
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite		
Ferrosilite		
Olivine		
Forsterite		
Fayalite		
Magnetite		
Hematite		
Ilmenite		
Sphene		
Apatite		
Calcite		
Rutile		
Others		

COMMENTS:

ALTERED

Sample # 7-9-16

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.66		
Al_2O_3	13.91		
TiO_2	0.316		
Fe_2O_3	2.27		
FeO			
MnO	0.025		
MgO	0.23		
CaO	0.93		
Na_2O	2.53		
K_2O	7.29		
P_2O_5	0.124		
H_2O^+/LOI	0.58		
H_2O -	0.36		
CO_2			
Others			
Total	99.23		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-9-15

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Arroyo Landavaso 7½'
Sec. 4 T. 3S R. 4W (NW¼ of NE¼)
Lat. 34°04' 58" N Long. 107°15' 52" W
Mtn Range, Valley, etc. Third black vitrophyre interval, overlying prominent saddle

Sample Description:

Catalogue #
Our Rock Name andesite
Formation andesite of Landavaso Reservoir
Age: Epoch, etc: Oligocene
Radiometric

Field # 7-9-15 Collected By D. B. Date Collected 7/9/82
Author's Rock Name K-altered andesite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections

Multiple Analyses
average of ______ thin sections
counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	26.91	
Corundum	0.93	
Orthoclase	30.34	
Albite	26.93	
Anorthite	8.91	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	2.00	
Ferrosilite	2.49	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.52	
Hematite		
Ilmenite	0.66	
Sphene		
Apatite	0.29	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Sample # 7-9-15

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	67.60	71.26	
Al_2O_3	14.24	15.01	
TiO_2	0.329	0.347	
Fe_2O_3	2.21	0.36	
FeO		1.78	
MnO	0.047	0.050	
MgO	0.76	0.80	
CaO	1.86	1.96	
Na_2O	3.02	3.18	
K_2O	4.87	5.13	
P_2O_5	0.118	0.124	
H_2O^+/LOI	4.05	-	
H_2O -	0.17	-	
CO_2	-	-	
Others			
Total	99.27	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-9-14

CHEMICAL DATA FORM

Formation

Location
County Socorro
Quad. Arroyo Landavaso 7½'
Sec. 4 T. 3S R. 4W (NW¼ of NE¼)
Lat. 34°04' 58" N Long. 107°15' 54" W
Mtn Range, Valley, etc. Third thin outcrop of lithoidal lava, approx. 10 ft below saddle

Catalogue #
Our Rock Name andesite
Formation andesite of Landavaso Reservoir
Age: Epoch, etc: Oligocene
Radiometric

Sample Description:

Field # 7-9-14 Collected By D. B. Date Collected 7/9/82
Author's Rock Name K-metasomatized andesite
Description:

Reference:

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Quartz	26.03	
Corundum	0.82	
Orthoclase	42.03	
Albite	22.62	
Anorthite	4.15	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.64	
Ferrosilite	2.30	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.49	
Hematite		
Ilmenite	0.63	
Sphene		
Apatite	0.29	
Calcite		
Rutile		
Others		
	100.00	

Plagioclase Composition

Analyst:
Method:
Date:

COMMENTS:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

ALTERED

Sample # 7-9-14

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.59	72.03	
Al_2O_3	14.15	14.44	
TiO_2	0.324	0.331	
Fe_2O_3	2.16	0.34	
FeO		1.68	
MnO	0.019	0.019	
MgO	0.25	0.25	
CaO	0.98	1.00	
Na_2O	2.62	2.67	
K_2O	6.97	7.11	
P_2O_5	0.121	0.123	
H_2O^+/LOI	0.88	-	
H_2O^-	0.40	-	
CO_2	-	-	
Others			
Total	99.46	99.99	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-9-13

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Arroyo Landavaso 7½'
Sec. 4 T. 3S R. 4W
Lat. 34°05'00" N Long. 107°15' 54" N
Mtn Range, Valley, etc. black vitrophyre rubble, approx. 10 ft above saddle

Catalogue #
Our Rock Name andesite
Formation andesite of Landavaso Reservoir
Age: Epoch, etc: Oligocene
Radiometric

Sample Description:

Field # 7-9-13 Collected By D. B. Date Collected 7/9/82
Author's Rock Name K-altered andesite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections
counted as above.

Counted by:
Type Counter Date

Quartz
K-Feldspar
Plagioclase
Biotite
Amphiboles

Pyx. clino
ortho
Olivine
Opaques
Groundmass
Others

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by:
hand/program name
Date:

Quartz
Corundum
Orthoclase
Albite
Anorthite

Nepheline
Diopside
Wollastonite
Enstatite
Ferrosilite

Hypersthene
Enstatite
Ferrosilite

Olivine
Forsterite
Fayalite

Magnetite
Hematite
Ilmenite
Sphene
Apatite
Calcite
Rutile

Others

COMMENTS:

Sample # 7-9-13

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O % Vol Free	Mole %
SiO_2	67.60		
Al_2O_3	14.23		
TiO_2	0.322		
Fe_2O_3	2.27		
FeO			
MnO	0.038		
MgO	0.73		
CaO	1.87		
Na_2O	2.98		
K_2O	4.75		
P_2O_5	0.123		
H_2O^+/LOI	4.18		
H_2O^-	0.23		
CO_2			
Others			
Total	99.32		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-9-12

CHEMICAL DATA FORM

Location

County Socorro

Quad. Arroyo Landavaso 7½'

Sec. 4 T. 3S R. 4W (SW¼ of SE¼)

Lat. 34°05' 02" N Long. 107°15' 56" W

Mtn Range, Valley, etc. Second lithoidal lava flow, as moving up-section this is before saddle

Sample Description:

Formation

Catalogue #

Our Rock Name andesite

Formation andesite of Landavaso Reservoir

Age: Epoch, etc: Oligocene

Radiometric

Field # 7-9-12 Collected By D. B. Date Collected 7/9/82

Author's Rock Name

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by:

hand/program name

Date:

Quartz		
Corundum		
Orthoclase		
Albite		
Anorthite		
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite		
Ferrosilite		
Olivine		
Forsterite		
Fayalite		
Magnetite		
Hematite		
Ilmenite		
Sphene		
Apatite		
Calcite		
Rutile		
Others		

COMMENTS:

ALTERED

Sample # 7-9-12

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.40		
Al_2O_3	14.56		
TiO_2	0.323		
Fe_2O_3	1.99		
FeO			
MnO	0.012		
MgO	0.30		
CaO	1.25		
Na_2O	2.87		
K_2O	6.22		
P_2O_5	0.123		
H_2O^+/LOI	0.95		
H_2O -	0.35		
CO_2			
Others			
Total	99.35		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-9-11

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. ~~Arroyo Landavaso 7½'~~

Sec. 4 T. 3S R. 4W (SW¼ of SE¼)

Lat. 34°05' 02" N Long. 107°15' 57" W

Mtn Range, Valley, etc. Second black vitrophyre outcrop at base of second small hill, approx. 6940 ft elevation.

Sample Description:

Catalogue #

Our Rock Name andesite

Formation andesite of Landavaso Reservoir

Age: Epoch, etc: Oligocene

Radiometric

Field # 7-9-11 Collected By D.B. Date Collected 7/9/82

Author's Rock Name k-altered andesite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by:

hand/program name

Date:

Quartz		
Corundum		
Orthoclase		
Albite		
Anorthite		
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite		
Ferrosilite		
Olivine		
Forsterite		
Fayalite		
Magnetite		
Hematite		
Ilmenite		
Sphene		
Apatite		
Calcite		
Rutile		
Others		

COMMENTS:

Sample # 7-9-11

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	67.19		
Al_2O_3	14.14		
TiO_2	0.316		
Fe_2O_3	2.21		
FeO			
MnO	0.045		
MgO	0.72		
CaO	1.86		
Na_2O	3.29		
K_2O	4.19		
P_2O_5	0.117		
H_2O^+/LOI	4.48		
H_2O -	0.16		
CO_2			
Others			
Total	98.72		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample #7-9-10

CHEMICAL DATA FORM

Formation

Location
County Socorro
Quad. Arroyo Landavaso 7½'
Sec. 4 T. 3S R.4W (NW¼ of NW¼)
Lat. 34°05' 02" N Long. 107°16' 02" W
Mtn Range, Valley, etc. Lowermost of 4(?) thin outcrops of andesite, approx. 100 ft above end of road.
Sample Description:

Catalogue #
Our Rock Name andesite
Formation andesite of Landavaso Reservoir
Age: Epoch, etc: Oligocene
Radiometric

Field # 7-9-10 Collected By D. B. Date Collected 7/9/82
Author's Rock Name K-metasomatized (andesite)
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	26.37	
Corundum	0.87	
Orthoclase	39.44	
Albite	23.45	
Anorthite	5.16	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.66	
Ferrosilite	2.56	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.54	
Hematite		
Ilmenite	0.67	
Sphene		
Apatite	0.27	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

ALTERED

Sample # 7-9-10

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.40	71.83	
Al_2O_3	14.28	14.55	
TiO_2	0.344	0.351	
Fe_2O_3	2.39	0.37	
FeO		1.86	
MnO	0.020	0.020	
MgO	0.26	0.27	
CaO	1.17	1.19	
Na_2O	2.72	2.77	
K_2O	6.55	6.67	
P_2O_5	0.114	0.116	
H_2O^+/LOI	0.81	-	
H_2O -	0.42	-	
CO_2	-	-	
Others			
Total	99.58	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-9-4

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Arroyo Landavaso 7½'

Sec. 33 T. 2S R. 4W (SW¼ of NE¼)

Lat. 34°05' 38" N Long. 107°15' 08" W

Mtn Range, Valley, etc. vitrophyre at base of lower flow, sample taken at NW

Sample Description: nose of "M" Mountain

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 13.5 ± 0.5 m.y.

Field # 7-9-4 Collected By D. B. Date Collected 7/9/82

Author's Rock Name high-K, high SiO_2 rhyolite

Description:

Reference:

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Quartz	35.74	
Corundum	0.48	
Orthoclase	29.45	
Albite	28.14	
Anorthite	4.28	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.34	
Ferrosilite	1.05	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.21	
Hematite		
Ilmenite	0.26	
Sphene		
Apatite	0.05	
Calcite		
Rutile		
Others		
	100.01	

Plagioclase Composition

Analyst:

Method:

Date:

COMMENTS:

D.I. = 93.3

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 7-9-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	74.03	76.69	
Al_2O_3	12.47	12.92	
TiO_2	0.131	0.136	
Fe_2O_3	0.90	0.14	
FeO		0.71	
MnO	0.043	0.045	
MgO	0.13	0.14	
CaO	0.86	0.89	
Na_2O	3.21	3.33	
K_2O	4.81	4.98	
P_2O_5	0.021	0.022	
H_2O^+/LOI	3.21	-	
H_2O -	0.28	-	
CO_2	-	-	
Others			
FeO*				0.84
Total	100.10	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	X-R-F (ppm)	
Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb	17	
Nd		
Ni		
Pb	27	
Pd		
Pr		
Rb	151	
Rc		
Sb		
Sc		
Sm		
Sn		
Sr	82	
Ta		
Tb		
Th	15	
Tm		
U	4	
V		
Y	21	
Yb		
Zn		
Zr	89	
Others		

Sample # 7-3-1

CHEMICAL DATA FORM

Formation Stendel Perlite

Location

County Socorro

Quad. Magdalena 15'

Sec. 14 T. 3S R. 4W (NE¼ of SW¼)

Lat. 34°02' 53" N Long. 107°13' 48" W

Mtn Range, Valley, etc. wall of perlite facing north in main pit.

Catalogue #

Our Rock Name perlitic rhyolite

Formation Stendel Perlite

Age: Epoch, etc: mid-Miocene

Radiometric 14.7 ± 1.0 m.y.

Sample Description:

Field # 7-3-1 Collected By D. B. Date Collected 7/3/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted 2014 Grid 2/3 x 1/3

Over area of 1 thin sections mm

Multiple Analyses

average of ___ thin sections counted as above.

Counted by: D. Bobrow

Type Counter Swift Date 6/28/83

Quartz	4.4	
K-Feldspar	6.3	
Plagioclase	5.2	
Biotite	1.9	
Amphiboles	0.1	
Pyx. clino		
ortho		
Olivine		
Opaques	0.1	
Groundmass	82.0	
Others		
Zircon	t	

Plagioclase Composition

Analyst: D. Bobrow

Method: universal stage

Date: 2/83

	Phenocrysts	Groundmass
Average	An_{28}	
Range	An_{21} to An_{32}	
Zoning	normal with some oscillatory	
# Grains	10	

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	34.77	
Corundum		
Orthoclase	28.96	
Albite	29.67	
Anorthite	4.68	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.33	
Ferrosilite	1.00	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.20	
Hematite		
Ilmenite	0.24	
Sphene		
Apatite	0.06	
Calcite		
Rutile		
Others		
	99.91	

COMMENTS:

D. I. = 93.4

Sample # 7-3-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	73.66	76.64		
Al_2O_3	12.29	12.79		
TiO_2	0.120	0.125		
Fe_2O_3	0.88	0.14		0.98 INAA
FeO		0.70		
MnO	0.041	0.043		
MgO	0.13	0.14		
CaO	0.96	1.00		
Na_2O	3.37	3.51		3.54 INAA
K_2O	4.71	4.90		
P_2O_5	0.025	0.026		
H_2O^+/LOI	3.45	-		
H_2O -	0.132	-		
CO_2	-	-		
Others				
FeO*				0.85
Total	99.90	99.99		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		387
Be		
Ce		48
Cd		
Co		0.9
Cr		3.4
Cs		3.5
Cu		
Dy		
Er		
Eu		0.4
Ga		
Gd		
Ge		
Hf		3.7
Ho		
La		28
Li		
Lu		0.37
Mo		
Nb	14	
Nd		
Ni		
Pb	29	
Pd		
Pr		
Rb	155	157
Rc		
Sb		0.21
Sc		2.8
Sm		2.7
Sn		
Sr	106	
Ta		1.05
Tb		0.28
Th	18	15.4
Tm		
U	5	5.3
V		
Y	17	
Yb		2.2
Zn		
Zr	83	
Others		

Sample # 7-17-2B

CHEMICAL DATA FORM

Location

County Socorro

Quad. Magdalena 15'

Sec. 25 T. 3S R. 4W (SE¼ of SW¼)

Lat. 34°00'45" N Long. 107°12' 25" W

Mtn Range, Valley, etc. outcrop on nose of hill 9205' in southern Magdalena Mtns.

Formation

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of Stendel deposit

Age: Epoch, etc: Mid-Miocene

Radiometric 14.7 ± 1.0 m.y.

Sample Description:

Field # 7-17-2B Collected By D.B. Date Collected 7/17/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by:

hand/program name

Date:

Quartz	37.50	
Corundum	1.11	
Orthoclase	27.31	
Albite	26.98	
Anorthite	4.89	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.35	
Ferrosilite	1.23	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.25	
Hematite		
Ilmenite	0.29	
Sphene		
Apatite	0.08	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 7-17-2B

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	75.94	76.63	
Al_2O_3	13.03	13.15	
TiO_2	0.153	0.154	
Fe_2O_3	1.10	0.17	
FeO		0.85	
MnO	0.038	0.038	
MgO	0.14	0.14	
CaO	1.02	1.03	
Na_2O	3.16	3.19	
K_2O	4.58	4.62	
P_2O_5	0.033	0.033	
H_2O^+/LOI	0.61		
H_2O -	0.32		
CO_2			
Others			
FeO*			1.00
Total	100.12	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag
B
Ba
Be
Ce
Cd
Co
Cr
Cs
Cu
Dy
Er
Eu
Ga
Gd
Ge
Hf
Ho
La
Li
Lu
Mo
Nb
Nd
Ni
Pb
Pd
Pr
Rb
Rc
Sb
Sc
Sm
Sn
Sr
Ta
Tb
Th
Tm
U
V
Y
Yb
Zn
Zr
Others

Sample # 7-9-8

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Arroyo Landavaso 7½'

Sec. 34 T. 2S R. 4W (SW¼ of NW¼)

Lat. 34°05' 37" N Long. 107°15' 02" W

Mtn Range, Valley, etc. vitrophyre at base of lower flow on "M" Mtn. Alongside fence that runs NW-SE between "M" Mtn. & Magdalena Peak

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite "M" Mountain

Age: Epoch, etc: Mid-Miocene

Radiometric 13.5 ± 0.5 m.y.

Sample Description:

Field # 7-9-8 Collected By D.B. Date Collected 7/9/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D.B.

hand/program name Fortran: NORM

Date:

Quartz	35.87	
Corundum	0.55	
Orthoclase	28.72	
Albite	28.26	
Anorthite	4.56	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.36	
Ferrosilite	1.13	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.22	
Hematite		
Ilmenite	0.27	
Sphene		
Apatite	0.06	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Sample # 7-9-8

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	74.09	76.60	
Al_2O_3	12.55	12.98	
TiO_2	0.136	0.141	
Fe_2O_3	0.97	0.15	
FeO		0.77	
MnO	0.042	0.043	
MgO	0.14	0.15	
CaO	0.92	0.95	
Na_2O	3.23	3.34	
K_2O	4.70	4.86	
P_2O_5	0.024	0.025	
H_2O^+/LOI	2.85	-	
H_2O -	0.13	-	
CO_2	-	-	
Others			
FeO*				0.90
Total	99.78	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-17-2A

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 25 T. 3S R. 4W (SW¼ of SE¼)

Lat. 34°00' 52" N Long. 107°12' 27" W

Mtn Range, Valley, etc. outcrop approximately 60 ft below peak of south-facing hill.

Sample Description:

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of Stendel perlite deposit

Age: Epoch, etc: mid-Miocene

Radiometric 14.7 ± 1.0 m.y.

Field # 7-17-2A Collected By D. B. Date Collected 7/17/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections.

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	39.04	
Corundum	2.04	
Orthoclase	27.53	
Albite	23.48	
Anorthite	5.10	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.69	
Ferrosilite	1.40	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.28	
Hematite		
Ilmenite	0.35	
Sphene		
Apatite	0.08	
Calcite		
Rutile		
Others		
	99.99	

COMMENTS:

D.I. = 90.1

Sample # 7-17-2A

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	74.48	76.27		
Al_2O_3	13.20	13.52		
TiO_2	0.179	0.183		
Fe_2O_3	1.25	0.20		1.14 INAA
FeO		0.98		
MnO	0.037	0.038		
MgO	0.27	0.28		
CaO	1.05	1.08		
Na_2O	2.71	2.78		2.62 INAA
K_2O	4.55	4.66		
P_2O_5	0.035	0.036		
H_2O^+/LOI	1.06	-		
H_2O -	1.03	-		
CO_2	-	-		
Others				
FeO*				1.09
Total	99.85	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		634
Be		
Ce		50
Cd		
Co		1.8
Cr		4.0
Cs		1.6
Cu		
Dy		
Er		
Eu		0.5
Ga		
Gd		
Ge		
Hf		3.4
Ho		
La		29
Li		
Lu		0.32
Mo		
Nb	13	
Nd		
Ni		
Pb	29	
Pd		
Pr		
Rb	130	128
Re		
Sb		1.19
Sc		2.5
Sm		3.0
Sn		
Sr	158	
Ta		0.87
Tb		0.34
Th	15	12.2
Tm		
U	3	3.4
V		
Y	17	
Yb		1.9
Zn		
Zr	104	
Others		

Sample # 7-9-3

CHEMICAL DATA FORM

Formation ____

Location
County Socorro
Quad. Arroyo Landavaso 7½'
Sec. 34 T. 2S R. 4W (SE¼ of NW¼)
Lat. 34°05' 39" N Long. 107°15' 08" W
Mtn Range, Valley, etc. vitrophyre from base of second flow on "M" Mountain (NW edge of hill)
Sample Description:

Catalogue # ____
Our Rock Name rhyolite
Formation Magdalena Peak Rhyolite ("M" Mountain)
Age: Epoch, etc: mid-Miocene
Radiometric 13.5 ± 0.5 m.y.

Field # 7-9-3 Collected By D. B. Date Collected 7/9/82
Author's Rock Name high-K, high SiO_2 rhyolite
Description:

Reference: ____

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date: ____

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections
counted as above.

Counted by: ____
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Quartz	35.01	
Corundum	0.39	
Orthoclase	31.03	
Albite	26.13	
Anorthite	4.88	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.62	
Ferrosilite	1.28	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.26	
Hematite		
Ilmenite	0.32	
Sphene		
Apatite	0.08	
Calcite		
Rutile		
Others		
	100.00	

Plagioclase Composition

Analyst: ____
Method: ____
Date: ____

COMMENTS:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 7-9-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	73.23	76.14		
Al_2O_3	12.45	12.94		
TiO_2	0.160	0.166		
Fe_2O_3	1.11	0.18		
FeO		0.88		
MnO	0.041	0.043		
MgO	0.24	0.25		
CaO	0.99	1.03		
Na_2O	2.97	3.09		
K_2O	5.05	5.25		
P_2O_5	0.034	0.035		
H_2O^+/LOI	2.81	-		
H_2O -	0.34	-		
CO_2	-	-		
Others				
FeO*				1.04
Total	99.43	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-17-3

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Magdalena 15'
Sec. 36 T. 3S R. 4W (SW¼ of NW¼)
Lat. 34°00' 22" N Long. 107°12' 52" W
Mtn Range, Valley, etc. small hill strikes parallel to road (½ way up hill), in southern Magdalena Mtns.

Catalogue #
Our Rock Name rhyolite
Formation rhyolite of Stendel perlite deposit
Age: Epoch, etc: Mid-Miocene
Radiometric 14.7 ± 1.0 m.y.

Sample Description:

Field # 7-17-3 Collected By D.B. Date Collected 7/17/82
Author's Rock Name High-K, high-SiO_2 rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections

Multiple Analyses
average of ______ thin sections
counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D.B.
hand/program name Fortran: NORM
Date:

Quartz	40.33	
Corundum	2.89	
Orthoclase	24.65	
Albite	24.23	
Anorthite	3.88	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.05	
Ferrosilite	1.91	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.40	
Hematite		
Ilmenite	0.48	
Sphene		
Apatite	0.18	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 7-17-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	73.91	76.13	
Al_2O_3	13.14	13.53	
TiO_2	0.244	0.251	
Fe_2O_3	1.74	0.27	
FeO		1.37	
MnO	0.022	0.023	
MgO	0.41	0.42	
CaO	0.86	0.89	
Na_2O	2.78	2.86	
K_2O	4.05	4.17	
P_2O_5	0.077	0.079	
H_2O^+/LOI	1.53	-	
H_2O -	1.39	-	
CO_2	-	-	
Others			
FeO*			

FeO* 1.61

Total	100.15	99.99	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-4-5

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Magdalena 15'
Sec. 3 T. 3S R. 4W (SW¼ of SE¼)
Lat. 34° 05' N Long. 107° 14' 28" W
Mtn Range, Valley, etc. thick flow-banded interval approx. 50 ft below top of hill.
Sample Description:

Catalogue #
Our Rock Name rhyolite
Formation Magdalena Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric 13.5 ± 0.5 m.y.

Field # 7-4-5 Collected By D. B. Date Collected 7/4/82
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections
counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	31.49	
Corundum		
Orthoclase	29.58	
Albite	32.74	
Anorthite	3.45	
Nepheline		
Diopside		
Wollastonite	0.55	
Enstatite	0.12	
Ferrosilite	0.46	
Hypersthene		
Enstatite	0.20	
Ferrosilite	0.75	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.24	
Hematite		
Ilmenite	0.32	
Sphene		
Apatite	0.10	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 93.8

Sample # 7-4-5

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	75.29	75.67		
Al_2O_3	12.98	13.05		
TiO_2	0.167	0.168		
Fe_2O_3	1.10	0.17		1.00 INAA
FeO		0.84		
MnO	0.041	0.041		
MgO	0.13	0.13		
CaO	1.01	1.02		
Na_2O	3.85	3.87		3.02 INAA
K_2O	4.98	5.01		
P_2O_5	0.042	0.042		
H_2O^+/LOI	0.18	-		
H_2O -	0.119	-		
CO_2	-	-		
Others				
FeO*				0.95
Total	99.89	100.01		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		522
Be		
Ce		55
Cd		
Co		1.3
Cr		2.7
Cs		1.4
Cu		
Dy		
Er		
Eu		0.48
Ga		
Gd		
Ge		
Hf		3.1
Ho		
La		31
Li		
Lu		0.24
Mo		
Nb	16	
Nd		20
Ni		
Pb	24	
Pd		
Pr		
Rb	143	131
Rc		
Sb		0.09
Sc		2.7
Sm		3.1
Sn		
Sr	115	
Ta		1.1
Tb		0.37
Th	14	11.8
Tm		
U	3	3.0
V		
Y	23	
Yb		2.1
Zn		
Zr	101	
Others		

Sample # 7-9-6

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Arroyo Landavaso 7½'
Sec. 33 T. 2S R. 4W (SE¼ of NE¼)
Lat. 34°05' 37" N Long. 107°15' 08" W
Mtn Range, Valley, etc. Second flow of "M" Mtn. after short break in slope on
Sample Description: NW nose of hill (f.b. lower part)

Catalogue #
Our Rock Name rhyolite
Formation Magdalena Peak Rhyolite ("M" Mountain)
Age: Epoch, etc: mid-Miocene
Radiometric 13.5 ± 0.5 m.y.

Field # 7-9-6 Collected By D. B. Date Collected 7/9/82
Author's Rock Name high-K, high-SiO_2 rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections
counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	33.00	
Corundum	0.11	
Orthoclase	28.12	
Albite	27.93	
Anorthite	7.51	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.78	
Ferrosilite	1.65	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.33	
Hematite		
Ilmenite	0.42	
Sphene		
Apatite	0.12	
Calcite		
Rutile		
Others		
	99.99	

COMMENTS:

Sample # 7-9-6

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	73.96	74.89	
Al_2O_3	13.28	13.45	
TiO_2	0.218	0.221	
Fe_2O_3	1.50	0.23	
FeO		1.16	
MnO	0.044	0.045	
MgO	0.31	0.31	
CaO	1.56	1.58	
Na_2O	3.26	3.30	
K_2O	4.70	4.76	
P_2O_5	0.049	0.050	
H_2O^+/LOI	0.67	-	
H_2O -	0.29	-	
CO_2	-	-	
Others			
FeO*			1.37
Total	99.84	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

CHEMICAL DATA FORM

Sample # 7-9-7

Formation

Location

County Socorro

Quad. Arroyo Landavaso 7½'

Sec. 34 T. 2S R. 4W

Lat. 34°05' 38" N Long. 107°15' 05" W

Mtn Range, Valley, etc. dense flow-banded interval at top of "M" Mtn. (top of second flow).

Sample Description:

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite "M" Mtn.

Age: Epoch, etc: mid-Miocene

Radiometric 13.5 ± 0.5 m.y.

Field # 7-9-7 Collected By D. B. Date Collected 7/9/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections.

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date: 1/24/83

Quartz	33.35	
Corundum	0.56	
Orthoclase	27.08	
Albite	28.51	
Anorthite	6.78	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.98	
Ferrosilite	1.75	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.351	
Hematite		
Ilmenite	0.436	
Sphene		
Apatite	0.195	
Calcite		
Rutile		
Others		
	99.99	

COMMENTS:

D.I. = 88.9

Sample # 7-9-7

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	73.94	74.80		
Al_2O_3	13.39	13.55		
TiO_2	0.227	0.230		
Fe_2O_3	1.57	0.24		1.66 INAA
FeO		1.21		
MnO	0.058	0.059		
MgO	0.39	0.40		
CaO	1.46	1.48		
Na_2O	3.33	3.37		3.71 INAA
K_2O	4.53	4.58		
P_2O_5	0.083	0.084		
H_2O^+/LOI	0.56	-		
H_2O -	0.31	-		
CO_2	-	-		
Others				
FeO*				1.46
Total	99.85	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		825
Be		
Ce		66
Cd		
Co		2.8
Cr		4.5
Cs		1.8
Cu		
Dy		
Er		
Eu		0.7
Ga		
Gd		
Ge		
Hf		4.1
Ho		
La		38
Li		
Lu		0.36
Mo		
Nb	14	
Nd		
Ni		
Pb	22	
Pd		
Pr		
Rb	124	129
Rc		
Sb		0.14
Sc		3.7
Sm		3.8
Sn		
Sr	221	
Ta		1.1
Tb		0.48
Th	11	11.5
Tm		
U	3	3.1
V		
Y	22	
Yb		2.4
Zn		
Zr	116	
Others		

Sample # 7-11-1

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 3 T. 3S R. 4W (SE¼ of SW¼)

Lat. 34°04' 16" N Long. 107°14' 39" W

Mtn Range, Valley, etc. sample taken at tip of exploratory pit.

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 13.5 ± 0.5 m.y.

Sample Description: Black vitrophyre with white plagioclase specks

Field # 7-11-1 Collected By D. B. Date Collected 7/11/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	31.40	
Corundum	0.29	
Orthoclase	26.30	
Albite	29.53	
Anorthite	8.29	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.18	
Ferrosilite	1.91	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.40	
Hematite		
Ilmenite	0.53	
Sphene		
Apatite	0.17	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 87

Sample # 7-11-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	71.57	73.90		
Al_2O_3	13.45	13.89		
TiO_2	0.268	0.277		
Fe_2O_3	1.73	0.27		1.71 INAA
FeO		1.36		
MnO	0.047	0.049		
MgO	0.46	0.48		
CaO	1.71	1.76		
Na_2O	3.38	3.49		3.18 INAA
K_2O	4.31	4.45		
P_2O_5	0.069	0.071		
H_2O^+/LOI	2.98	-		
H_2O -	0.03	-		
CO_2	-	-		
Others				
FeO*				1.57
Total	100.00	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		921
Be		
Ce		64
Cd		
Co		3.0
Cr		4.1
Cs		1.8
Cu		
Dy		
Er		
Eu		0.8
Ga		
Gd		
Ge		
Hf		4.3
Ho		
La		34
Li		
Lu		0.34
Mo		
Nb	14	
Nd		
Ni		
Pb	22	
Pd		
Pr		
Rb	114	114
Rc		
Sb		0.14
Sc		3.4
Sm		3.9
Sn		
Sr	271	
Ta		1.07
Tb		0.5
Th	12	9.6
Tm		
U	3	2.7
V		
Y	22	
Yb		2.3
Zn		
Zr	129	
Others		

Sample # 7-4-7

CHEMICAL DATA FORM

Location

County Socorro

Quad. Magdalena 15'

Sec. 34 T. 2S R. 4W (SW¼ of SE¼)

Lat. 34°05' N Long. 107°14' 24" W

Mtn Range, Valley, etc. sample taken next to wooden marker on peak.

Formation

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 13.5 ± 0.5 m.y.

Sample Description:

Field # 7-4-7 Collected By D. B. Date Collected 7/4/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	32.97	
Corundum	1.34	
Orthoclase	26.08	
Albite	27.50	
Anorthite	7.85	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.91	
Ferrosilite	2.11	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.44	
Hematite		
Ilmenite	0.59	
Sphene		
Apatite	0.21	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

D.I. = 86.6

Sample # 7-4-7

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O % Vol Free	Mole %	
SiO_2	72.77	73.67		
Al_2O_3	14.16	14.33		
TiO_2	0.306	0.310		
Fe_2O_3	1.98	0.31		2.10 INAA
FeO		1.53		
MnO	0.037	0.037		
MgO	0.36	0.36		
CaO	1.68	1.70		
Na_2O	3.21	3.25		4.01 INAA
K_2O	4.36	4.40		
P_2O_5	0.089	0.090		
H_2O^+/LOI	0.57	-		
H_2O^-	0.142	-		
CO_2	-	-		
Others				
FeO*				1.85
Total	99.66	99.99		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1010
Be		
Ce		77
Cd		
Co		4.0
Cr		5.8
Cs		1.4
Cu		
Dy		
Er		
Eu		1.0
Ga		
Gd		
Ge		
Hf		4.8
Ho		
La		45
Li		
Lu		0.41
Mo		
Nb	14	
Nd		
Ni		
Pb	22	
Pd		
Pr		
Rb	114	117
Rc		
Sb		0.1
Sc		4.5
Sm		4.9
Sn		
Sr	300	
Ta		1.1
Tb		0.65
Th	12	10.3
Tm		
U	3	2.8
V		
Y	26	
Yb		2.7
Zn		
Zr	136	
Others		

CHEMICAL DATA FORM

Sample # 7-11-2

Location

County Socorro

Quad. Magdalena 15'

Sec. 3 T. 3S R. 4W (SE¼ of SW¼)

Lat. 34°04' 13" N Long. 107°14' 38" W

Mtn Range, Valley, etc. vitrophyre outcrop, south of exploration pit;

Sample Description: approx. 1.5 miles south of Magdalena Peak.

Formation

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite (vitrophyre)

Age: Epoch, etc: Mid-Miocene

Radiometric 13.5 ± 0.5 m.y.

Field # 7-11-2 Collected By D. B. Date Collected 7/11/82

Author's Rock Name High-K, rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	30.81	
Corundum	0.42	
Orthoclase	27.43	
Albite	28.11	
Anorthite	8.51	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.35	
Ferrosilite	2.16	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.45	
Hematite		
Ilmenite	0.59	
Sphene		
Apatite	0.18	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Sample # 7-11-2

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.66	73.36	
Al_2O_3	13.51	14.03	
TiO_2	0.299	0.310	
Fe_2O_3	1.95	0.31	
FeO		1.54	
MnO	0.046	0.048	
MgO	0.52	0.54	
CaO	1.75	1.82	
Na_2O	3.20	3.32	
K_2O	4.47	4.64	
P_2O_5	0.075	0.078	
H_2O^+/LOI	2.77	-	
H_2O -	0.07	-	
CO_2	-	-	
Others			
FeO*			1.82
Total	99.32	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-9-1

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Arroyo Landavaso 7½'

Sec. 33 T. 25 R. 4W (SW¼ of NE¼)

Lat. 34°06' 03" N Long. 107°15' 07" W

Mtn Range, Valley, etc. small hill of rhyolite NE of "M" Mountain (landslide deposit)

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 13.5 ± 0.5 m.y.

Sample Description:

Field # 7-9-1 Collected By D. B. Date Collected 7/9/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description: F.b. rhyolite with phenocrysts of plagioclase, coppery biotite and quartz (?)

Reference:

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	29.29	
Corundum		
Orthoclase	26.46	
Albite	30.44	
Anorthite	7.87	
Nepheline		
Diopside		
Wollastonite	1.73	
Enstatite	0.74	
Ferrosilite	1.00	
Hypersthene		
Enstatite	0.60	
Ferrosilite	0.82	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.37	
Hematite		
Ilmenite	0.50	
Sphene		
Apatite	0.18	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 7-9-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	72.32	73.28		
Al_2O_3	13.47	13.65		
TiO_2	0.261	0.264		
Fe_2O_3	1.67	0.26		
FeO		1.29		
MnO	0.051	0.052		
MgO	0.53	0.54		
CaO	2.49	2.52		
Na_2O	3.55	3.60		
K_2O	4.42	4.48		
P_2O_5	0.076	0.077		
H_2O^+/LOI	1.12	-		
H_2O -	0.076	-		
CO_2	-	-		
Others				
FeO*				1.52
Total	100.03	100.01		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-4-6

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 34 T. 2S R. 4W (SW¼ of SE¼)

Lat. 34°05' 01" N Long. 107°14' 30" W

Mtn Range, Valley, etc. outcrop of flow-banded rhyolite (top of prominent ledge)

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 13.5 ± 0.5 m.y.

Sample Description:

Field # 7-4-6 Collected By D. B. Date Collected 7/4/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	26.53	
Corundum		
Orthoclase	26.41	
Albite	35.18	
Anorthite	6.23	
Nepheline		
Diopside		
Wollastonite	0.71	
Enstatite	0.34	
Ferrosilite	0.37	
Hypersthene		
Enstatite	1.47	
Ferrosilite	1.61	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.41	
Hematite		
Ilmenite	0.53	
Sphene		
Apatite	0.21	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

D.I. = 88.1

Sample # 7-4-6

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	72.55	72.87		
Al_2O_3	13.90	13.96		
TiO_2	0.278	0.279		
Fe_2O_3	1.83	0.28		1.84 INAA
FeO		1.40		
MnO	0.050	0.050		
MgO	0.72	0.72		
CaO	1.71	1.72		
Na_2O	4.14	4.16		3.68 INAA
K_2O	4.45	4.47		
P_2O_5	0.090	0.090		
H_2O^+/LOI	0.42	-		
H_2O -	0.099	-		
CO_2	-	-		
Others				
FeO*				1.65
Total	100.24	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		898
Be		
Ce		61
Cd		
Co		3.0
Cr		3.8
Cs		1.5
Cu		
Dy		
Er		
Eu		0.85
Ga		
Gd		
Ge		
Hf		4.1
Ho		
La		
Li		
Lu		0.36
Mo		
Nb	14	
Nd		
Ni		
Pb	23	
Pd		
Pr		
Rb	120	112
Rc		
Sb		0.11
Sc		3.9
Sm		4.0
Sn		
Sr	278	
Ta		1.06
Tb		0.49
Th	12	10.5
Tm		
U	3	2.7
V		
Y	23	
Yb		2.3
Zn		
Zr	128	
Others		

Sample # 7-11-3

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Magdalena 15'
Sec. 3 T. 3S R. 4W (SE¼ of SW¼)
Lat. 34°04' 14" N Long. 107°14' 37" N
Mtn Range, Valley, etc. Lithoidal lava at top of hill above perlite exploration pit which is approx. 1.5 mi south of Magdalena Peak

Catalogue #
Our Rock Name rhyolite
Formation Magdalena Peak Rhyolite
Age: Epoch, etc: Mid-Miocene
Radiometric 13.5 ± 0.5 m.y.

Sample Description:
Field # 7-11-3 Collected By D. B. Date Collected 7/11/82
Author's Rock Name High-K rhyolite
Description:

Reference:

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	29.10	
Corundum	0.38	
Orthoclase	25.13	
Albite	30.84	
Anorthite	9.35	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.36	
Ferrosilite	2.45	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.50	
Hematite		
Ilmenite	0.65	
Sphene		
Apatite	0.23	
Calcite		
Rutile		
Others		
	99.99	

COMMENTS:
D.I. = 85

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections

Multiple Analyses
average of ______ thin sections counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 7-11-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	71.65	72.54	
Al_2O_3	14.23	14.41	
TiO_2	0.338	0.342	
Fe_2O_3	2.25	0.35	
FeO		1.74	
MnO	0.060	0.061	
MgO	0.54	0.55	
CaO	1.99	2.02	
Na_2O	3.60	3.65	
K_2O	4.20	4.25	
P_2O_5	0.097	0.098	
H_2O^+/LOI	0.43	-	
H_2O -	0.13	-	
CO_2	-	-	
Others			
FeO*				2.05
Total	99.52	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-22-12

CHEMICAL DATA FORM

Location

County Socorro

Quad. Squaw Peak 7½'

Sec. 32 T. 4S R. 4W (SE¼ of NW¼)

Lat. 33°55' 09 N Long. 107°16' 52" W

Mtn Range, Valley, etc. Vitrophyric interval at base of small hill SW of Squaw Peak

Sample Description:

Formation

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of Alameda Springs

Age: Epoch, etc: mid-Miocene

Radiometric 16.1 ± 0.6 m.y.

Field # 7-22-12 Collected By D. B. Date Collected 7/22/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	24.80	
Corundum	0.31	
Orthoclase	26.77	
Albite	38.50	
Anorthite	5.45	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.97	
Ferrosilite	1.94	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.41	
Hematite		
Ilmenite	0.67	
Sphene		
Apatite	0.17	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 90

Sample # 7-22-12

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	70.36	72.43		
Al_2O_3	14.28	14.70		
TiO_2	0.341	0.351		
Fe_2O_3	1.81	0.28		1.86 INAA
FeO		1.42		
MnO	0.076	0.078		
MgO	0.38	0.39		
CaO	1.16	1.19		
Na_2O	4.42	4.55		4.17 INAA
K_2O	4.40	4.53		
P_2O_5	0.070	0.072		
H_2O^+/LOI	2.78	-		
H_2O -	0.17	-		
CO_2	-	-		
Others				
FeO*				1.67
Total	100.25	99.99		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1045
Be		
Ce		115
Cd		
Co		0.9
Cr		2.2
Cs		3.3
Cu		
Dy		
Er		
Eu		1.5
Ga		
Gd		
Ge		
Hf		8.1
Ho		
La		55
Li		
Lu		0.50
Mo		
Nb	35	
Nd		
Ni		
Pb	24	
Pd		
Pr		
Rb	154	152
Rc		
Sb		0.21
Sc		4.2
Sm		7.6
Sn		
Sr	173	
Ta		2.5
Tb		0.98
Th	22	18.7
Tm		
U	5	4.5
V		
Y	40	
Yb		4.1
Zn		
Zr	273	
Others		

Sample # 7-22-13

CHEMICAL DATA FORM

Location
County Socorro
Quad. Squaw Peak 7½'
Sec. 32 T. 4S R. 4W (SE¼ of NW¼)
Lat. 33°55'11" N Long. 107°16' 51" W
Mtn Range, Valley, etc. approx. 80 ft below peak--lithoidal interval above
Sample Description: black vitrophyre.

Formation
Catalogue #
Our Rock Name rhyolite
Formation rhyolite of Alameda Springs

Age: Epoch, etc: mid-Miocene
Radiometric 16.1 ± 0.6 m.y.

Field # 7-22-13 Collected By D. B. Date Collected 7/22/82
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections

Multiple Analyses
average of ______ thin sections
counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	24.87	
Corundum	0.37	
Orthoclase	28.89	
Albite	36.79	
Anorthite	5.12	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.70	
Ferrosilite	1.98	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.42	
Hematite		
Ilmenite	0.66	
Sphene		
Apatite	0.19	
Calcite		
Rutile		
Others		

COMMENTS: 100.00

D.I. = 91

Sample # 7-22-13

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	72.28	72.42		
Al_2O_3	14.66	14.69		
TiO_2	0.345	0.346		
Fe_2O_3	1.89	0.29		1.85 INAA
FeO		1.44		
MnO	0.072	0.072		
MgO	0.28	0.28		
CaO	1.14	1.14		
Na_2O	4.34	4.35		4.28 INAA
K_2O	4.88	4.89		
P_2O_5	0.083	0.083		
H_2O^+/LOI	0.29	-		
H_2O -	0.14	-		
CO_2	-	-		
Others				
FeO*				1.68
Total	100.40	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1062
Be		
Ce		114
Cd		
Co		1.0
Cr		2.5
Cs		2.0
Cu		
Dy		
Er		
Eu		1.5
Ga		
Gd		
Ge		
Hf		8.8
Ho		
La		55
Li		
Lu		0.57
Mo		
Nb	35	
Nd		51
Ni		
Pb	21	
Pd		
Pr		
Rb	150	146
Rc		
Sb		0.09
Sc		4.2
Sm		7.9
Sn		
Sr	184	
Ta		2.5
Tb		1.1
Th	19	18.5
Tm		
U	3	4.2
V		
Y	39	
Yb		4.1
Zn		
Zr	269	
Others		

Sample # 7-23-5

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Squaw Peak 7½'

Sec. 29 T. 4S R. 4W (SE¼ of SW¼)

Lat. 33°55' 30" N Long. 107°16' 46" W

Mtn Range, Valley, etc. Lower part of vitrophyre interval on hill west of Squaw Peak.

Sample Description:

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of Alameda Springs

Age: Epoch, etc: mid-Miocene

Radiometric 16.1 ± 0.6 m.y.

Field # 7-23-5 Collected By D. B. Date Collected 7/23/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections
counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	24.87	
Corundum	0.24	
Orthoclase	29.14	
Albite	36.03	
Anorthite	5.59	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.90	
Ferrosilite	1.98	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.42	
Hematite		
Ilmenite	0.66	
Sphene		
Apatite	0.17	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Sample # 7-23-5

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	69.86	72.37		
Al_2O_3	14.12	14.63		
TiO_2	0.337	0.349		
Fe_2O_3	1.84	0.29		
FeO		1.45		
MnO	0.067	0.069		
MgO	0.35	0.36		
CaO	1.18	1.22		
Na_2O	4.11	4.26		
K_2O	4.76	4.93		
P_2O_5	0.070	0.073		
H_2O^+/LOI	2.77	-		
H_2O -	0.06	-		
CO_2	-	-		
Others				
Feo*				1.71
Total	99.52	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-22-9

CHEMICAL DATA FORM

Formation ____

Location

County Socorro

Quad. Squaw Peak 7½'

Sec. 31 T. 4S R. 4W (SE¼ of NW¼)

Lat. 33°55' 13" N Long. 107°17' 58"W

Mtn Range, Valley, etc. Vitrophyric interval localed approx. 100 ft E of stream gully (at base of flow).

Sample Description:

Catalogue # ____

Our Rock Name rhyolite

Formation rhyolite of Alameda Springs

Age: Epoch, etc: mid-Miocene

Radiometric 16.1 ± 0.6 m.y.

Field # 7-22-9 Collected By D. B. Date Collected 7/22/82

Author's Rock Name high-K rhyolite

Description:

Reference: ____

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by: ____

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst: ____

Method: ____

Date: ____

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date: ____

Quartz	25.39	
Corundum	0.59	
Orthoclase	28.96	
Albite	35.62	
Anorthite	5.26	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.90	
Ferrosilite	2.00	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.42	
Hematite		
Ilmenite	0.68	
Sphene		
Apatite	0.17	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 90

Sample # 7-22-9

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	70.13	72.36		
Al_2O_3	14.29	14.75		
TiO_2	0.347	0.358		
Fe_2O_3	1.86	0.29		1.80 INAA
FeO		1.46		
MnO	0.075	0.077		
MgO	0.35	0.36		
CaO	1.12	1.16		
Na_2O	4.08	4.21		3.84 INAA
K_2O	4.75	4.90		
P_2O_5	0.070	0.072		
H_2O^+/LOI	3.12	-		
H_2O -	0.10	-		
CO_2	-	-		
Others				
FeO*				1.67
Total	100.29	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		976
Be		
Ce		104
Cd		
Co		1.0
Cr		3.3
Cs		2.7
Cu		
Dy		
Er		
Eu		1.4
Ga		
Gd		
Ge		
Hf		7.8
Ho		
La		54
Li		
Lu		0.54
Mo		
Nb	35	
Nd		
Ni		
Pb	25	
Pd		
Pr		
Rb	149	142
Rc		
Sb		0.1
Sc		4.0
Sm		8.0
Sn		
Sr	172	
Ta		2.3
Tb		0.97
Th	22	17.4
Tm		
U	5	4.7
V		
Y	41	
Yb		3.8
Zn		
Zr	277	
Others		

Sample # 79-10-7

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Squaw Peak 7½'

Sec. 31 T. 4S R. 4W

Lat. 33°55' 13" N Long. 107°18' 02" W

Mtn Range, Valley, etc. vitrophyre approx. 20 ft above base on SE side of hill 7022; approx. 2200 ft NW of Alameda Spring

Sample Description:

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of Alameda Springs

Age: Epoch, etc: mid-Miocene

Radiometric 16.1 ± 0.6 m.y.

Field # 79-10-7 Collected By Osburn & Donze Date Collected 10/7/79

Author's Rock Name high-K rhyolite (vitrophyre)

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	24.47	
Corundum	0.20	
Orthoclase	29.02	
Albite	36.87	
Anorthite	5.34	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.91	
Ferrosilite	1.95	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.41	
Hematite		
Ilmenite	0.65	
Sphene		
Apatite	0.17	
Calcite		
Rutile		
Others		
	99.99	

COMMENTS:

D.I. = 90.4

Sample # 79-10-7

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	69.24	72.35		
Al_2O_3	14.01	14.64		
TiO_2	0.328	0.343		
Fe_2O_3	1.79	0.29		
FeO		1.43		
MnO	0.069	0.072		
MgO	0.35	0.37		
CaO	1.12	1.17		
Na_2O	4.17	4.36		
K_2O	4.70	4.91		
P_2O_5	0.068	0.071		
H_2O^+/LOI	3.21	-		
H_2O -	0.07	-		
CO_2	-	-		
Others				
FeO*				1.69
Total	99.12	100.01		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-3-3

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 14 T. 3S R. 4W (NE¼ of SW¼)

Lat. 34°02' 52" N Long. 107°13' 45" W

Mtn Range, Valley, etc. first wall of brecciated vitrophyre upstream from

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of Alameda Springs

Age: Epoch, etc: mid-Miocene

Radiometric 16.1 ± 0.6 m.y.

Sample Description: Stendel perlite deposit.

Field # 7-3-3 Collected By D. B. Date Collected 7/3/82

Author's Rock Name high-K rhyolite (vitrophyre)

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections

counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	24.86	
Corundum	0.31	
Orthoclase	29.82	
Albite	35.37	
Anorthite	5.52	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.94	
Ferrosilite	1.92	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.41	
Hematite		
Ilmenite	0.67	
Sphene		
Apatite	0.18	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 90.1

Sample # 7-3-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	69.36	72.31		
Al_2O_3	14.08	14.68		
TiO_2	0.340	0.354		
Fe_2O_3	1.78	0.28		
FeO		1.42		
MnO	0.074	0.077		
MgO	0.36	0.38		
CaO	1.16	1.21		
Na_2O	4.01	4.18		
K_2O	4.84	~~4~~5.05		
P_2O_5	0.069	0.072		
H_2O^+/LOI	3.62	-		
H_2O -	0.123	-		
CO_2	-	-		
Others				
FeO*				1.67
Total	99.82	100.01		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-4-4

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 3 T. 3S R. 4W (NW ¼ of NE¼)

Lat. 34° 05' 00" N Long. 107° 14' 27" W

Mtn Range, Valley, etc. thin, flow-banded interval overlying thick vitrophyre interval.

Sample Description:

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 13.5 ± 0.5 m.y.

Field # 7-4-4 Collected By D. B. Date Collected 7/4/82

Author's Rock Name high-K rhyolite

Description:

Reference:

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	29.45	
Corundum	0.64	
Orthoclase	24.84	
Albite	29.33	
Anorthite	9.50	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	2.24	
Ferrosilite	2.53	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.53	
Hematite		
Ilmenite	0.72	
Sphene		
Apatite	0.24	
Calcite		
Rutile		
Others		
	100.03	

COMMENTS:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst: D. Bobrow

Method: universal stage

Date: 2/83

	Phenocrysts	Groundmass
Average	An_{34}	
Range	An_{25} to An_{43}	
Zoning	normal to oscillatory	
# Grains	13	

Sample # 7-4-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	71.54	72.28		
Al_2O_3	14.22	14.37		
TiO_2	0.376	0.380		
Fe_2O_3	2.38	0.37		2.13 INAA
FeO		1.83		
MnO	0.047	0.047		
MgO	0.89	0.90		
CaO	2.03	2.05		
Na_2O	3.43	3.47		3.32 INAA
K_2O	4.16	4.20		
P_2O_5	0.103	0.104		
H_2O^+/LOI	0.57	-		
H_2O -	0.252	-		
CO_2	-	-		
Others				
FeO*				2.04
Total	99.99	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1175
Be		
Ce		67
Cd		
Co		4.1
Cr		4.8
Cs		1.2
Cu		
Dy		
Er		
Eu		0.93
Ga		
Gd		
Ge		
Hf		4.4
Ho		
La		38
Li		
Lu		0.32
Mo		
Nb	14	
Nd		
Ni		
Pb	21	
Pd		
Pr		
Rb	105	97
Rc		
Sb		0.12
Sc		4.2
Sm		4.9
Sn		
Sr	331	
Ta		1.0
Tb		0.61
Th	12	8.5
Tm		
U	3	2.3
V		
Y	28	
Yb		2.5
Zn		
Zr	163	
Others		

Sample # 7-17-4

CHEMICAL DATA FORM

Formation

Location
County Socorro
Quad. Arroyo Landavaso 7½'
Sec. 33 T. 3S R. 4W (SW¼ of SE¼)
Lat. 34°00' 08" N Long. 107°15' 24" W
Mtn Range, Valley, etc. vitrophyric outcrop approximately 300 ft SW of Texas well.
Sample Description:

Catalogue #
Our Rock Name rhyolite
Formation rhyolite of Alameda Springs
Age: Epoch, etc: mid-Miocene
Radiometric 16.1 ± 0.6 m.y.

Field # 7-17-4 Collected By D. B. Date Collected 7/17/82
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections.

Multiple Analyses
average of ______ thin sections counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	25.12	
Corundum	0.38	
Orthoclase	31.32	
Albite	33.53	
Anorthite	5.46	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.90	
Ferrosilite	2.03	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.43	
Hematite		
Ilmenite	0.66	
Sphene		
Apatite	0.18	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

D.I. = 90

Sample # 7-17-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	69.68	72.27		
Al_2O_3	14.11	14.64		
TiO_2	0.335	0.347		
Fe_2O_3	1.86	0.29		1.69 INAA
FeO		1.47		
MnO	0.073	0.076		
MgO	0.35	0.36		
CaO	1.16	1.20		
Na_2O	3.82	3.96		3.51 INAA
K_2O	5.11	5.30		
P_2O_5	0.075	0.078		
H_2O^+/LOI	3.26	-		
H_2O -	0.15	-		
CO_2	-	-		
Others				
FeO*				1.63
Total	99.98	99.99		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		975
Be		
Ce		100
Cd		
Co		1.0
Cr		2.7
Cs		3.0
Cu		
Dy		
Er		
Eu		1.4
Ga		
Gd		
Ge		
Hf		7.7
Ho		
La		51
Li		
Lu		0.45
Mo		
Nb	35	
Nd		
Ni		
Pb	23	
Pd		
Pr		
Rb	148	138
Rc		
Sb		0.11
Sc		4.0
Sm		7.4
Sn		
Sr	180	
Ta		2.2
Tb		0.89
Th	20	16.5
Tm		
U	4	4.1
V		
Y	39	
Yb		3.6
Zn		
Zr	280	
Others		

Sample # 7-17-5

CHEMICAL DATA FORM

Location

County Socorro

Quad. Arroyo Landavaso 7½'

Sec. 33 T. 3S R. 4W (SW¼ of SE¼)

Lat. 34°00' 07" N Long. 107°15' 25" W

Mtn Range, Valley, etc. nose of hill approximately 3,000 ft SW of Texas well.

Formation

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of Alameda Springs

Age: Epoch, etc: mid-Miocene

Radiometric 16.1 ± 0.6 m.y.

Sample Description:

Field # 7-17-5 Collected By D. B. Date Collected 7/17/82

Author's Rock Name high-K rhyolite

Description:

Reference:

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	24.71	
Corundum	0.36	
Orthoclase	27.63	
Albite	37.42	
Anorthite	5.41	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.98	
Ferrosilite	2.14	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.44	
Hematite		
Ilmenite	0.69	
Sphene		
Apatite	0.20	
Calcite		
Rutile		
Others		
	99.99	

COMMENTS:

D.I. = 90

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 7-17-5

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	71.38	72.24		
Al_2O_3	14.51	14.68		
TiO_2	0.358	0.362		
Fe_2O_3	1.98	0.31		1.85 INAA
FeO		1.53		
MnO	0.099	0.100		
MgO	0.39	0.40		
CaO	1.19	1.20		
Na_2O	4.37	4.42		4.52 INAA
K_2O	4.62	4.68		
P_2O_5	0.085	0.086		
H_2O^+/LOI	0.68	-		
H_2O -	0.27	-		
CO_2	-	-		
Others				
FeO*				1.74
Total	99.93	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF	(ppm) INAA
Ag		
B		
Ba		1080
Be		
Ce		110
Cd		
Co		1.3
Cr		3.6
Cs		2.1
Cu		
Dy		
Er		
Eu		1.5
Ga		
Gd		
Ge		
Hf		
Ho		
La		58
Li		
Lu		0.56
Mo		
Nb	34	
Nd		52
Ni		
Pb	26	
Pd		
Pr		
Rb	144	143
Rc		
Sb		0.13
Sc		4.1
Sm		8.1
Sn		
Sr	207	
Ta		
Tb		0.92
Th	20	17.6
Tm		
U	4	4.5
V		
Y	40	
Yb		3.8
Zn		
Zr	285	
Others		

Sample # 7-3-5

CHEMICAL DATA FORM

Location

County Socorro

Quad. Magdalena 15'

Sec. 14 T. 3S R. 4W (NE¼ of SW¼)

Lat. 34°02' 51"N Long. 107°13' 41" W

Mtn Range, Valley, etc. first lithoidal (flow-banded) outcrop in stream channel

Sample Description: above Stendel perlite deposit.

Formation

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of Alameda springs

Age: Epoch, etc: mid-Miocene

Radiometric 16.1 ± 0.6 m.y.

Field # 7-3-5 Collected By D. B. Date Collected 7/3/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	22.81	
Corundum		
Orthoclase	29.97	
Albite	38.49	
Anorthite	4.67	
Nepheline		
Diopside		
Wollastonite	0.05	
Enstatite	0.01	
Ferrosilite	0.04	
Hypersthene		
Enstatite	0.71	
Ferrosilite	1.94	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.43	
Hematite		
Ilmenite	0.70	
Sphene		
Apatite	0.17	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 91.3

Sample # 7-3-5

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	71.61	72.07		
Al_2O_3	14.59	14.68		
TiO_2	0.368	0.370		
Fe_2O_3	1.92	0.30		2.00 INAA
FeO		1.47		
MnO	0.067	0.067		
MgO	0.29	0.29		
CaO	1.05	1.06		
Na_2O	4.52	4.55		4.41 INAA
K_2O	5.04	5.07		
P_2O_5	0.071	0.071		
H_2O^+/LOI	0.31	-		
H_2O -	0.131	-		
CO_2	-	-		
Others				
FeO*				1.77
Total	99.97	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1100
Be		114
Ce		
Cd		
Co		1.1
Cr		3.7
Cs		1.9
Cu		
Dy		
Er		
Eu		1.6
Ga		
Gd		
Ge		
Hf		9.2
Ho		
La		61
Li		
Lu		0.58
Mo		
Nb	35	
Nd		
Ni		
Pb	24	
Pd		
Pr		
Rb	154	156
Rc		
Sb		0.12
Sc		4.6
Sm		8.5
Sn		
Sr	187	
Ta		2.4
Tb		0.96
Th	20	18.4
Tm		
U	3	4.4
V		
Y	41	
Yb		4.1
Zn		
Zr	278	
Others		

Sample # 7-22-11

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Squaw Peak 7½'
Sec. 31 T. 4S R. 4W (SE¼ of NW¼)
Lat. 33° 55' 14" N Long. 107°18' 08" W
Mtn Range, Valley, etc. Outcrop approx. 20 ft below peak of hill "7022."

Catalogue #
Our Rock Name rhyolite
Formation rhyolite of Alameda Springs
Age: Epoch, etc: mid-Miocene
Radiometric 16.1 ± 0.6 m.y.

Sample Description:

Field # 7-22-11 Collected By D. B. Date Collected 7/22/82
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted 2014 Grid 2/3 x 1/3
Over area of 1 thin sections mm

Multiple Analyses
average of ____ thin sections counted as above.

Counted by: D. Bobrow
Type Counter swift Date 6/28/83

Quartz	t
K-Feldspar	0.5
Plagioclase	9.6
Biotite	1.0
Amphiboles	1.6
Pyx. clino	t
ortho	
Olivine	
Opaques	0.4
Groundmass	86.9
Others Apatite	t
Zircon	t
Sphene	t

Plagioclase Composition

Analyst: D. Bobrow
Method: universal stage
Date: 2/83

	Phenocrysts	Groundmass
Average	An_{30}	
Range	An_{25} to An_{35}	
Zoning	oscillatory to normal	
# Grains	11	

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	23.64
Corundum	0.15
Orthoclase	28.55
Albite	38.05
Anorthite	5.38
Nepheline	
Diopside	
Wollastonite	
Enstatite	
Ferrosilite	
Hypersthene	
Enstatite	0.86
Ferrosilite	2.06
Olivine	
Forsterite	
Fayalite	
Magnetite	0.44
Hematite	
Ilmenite	0.69
Sphene	
Apatite	0.19
Calcite	
Rutile	
Others	
	100.00

COMMENTS:

D.I. = 90

Sample # 7-22-11

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	71.31	72.06		
Al_2O_3	14.59	14.74		
TiO_2	0.359	0.363		
Fe_2O_3	1.95	0.30		1.80 INAA
FeO		1.50		
MnO	0.078	0.079		
MgO	0.34	0.34		
CaO	1.18	1.19		
Na_2O	4.45	4.50		4.04 INAA
K_2O	4.78	4.83		
P_2O_5	0.082	0.083		
H_2O^+/LOI	0.26	-		
H_2O -	0.15	-		
CO_2	-	-		
Others				
FeO*				1.69
Total	99.53	99.99		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		970
Be		
Ce		102
Cd		
Co		1.1
Cr		2.8
Cs		1.8
Cu		
Dy		
Er		
Eu		1.35
Ga		
Gd		
Ge		
Hf		7.9
Ho		
La		54
Li		
Lu		0.44
Mo		
Nb	36	
Nd		
Ni		
Pb	23	
Pd		
Pr		
Rb	151	137
Rc		
Sb		0.09
Sc		4.2
Sm		7.5
Sn		
Sr	182	
Ta		2.4
Tb		0.91
Th	21	17.3
Tm		
U	5	4.1
V		
Y	40	
Yb		3.7
Zn		
Zr	311	
Others		

Sample # 7-22-10

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Squaw Peak 7½'

Sec. 31 T. 4S R. 4W (SW¼ of NW¼)

Lat. 33°55' 13" N Long. 107°18' 04" W

Mtn Range, Valley, etc. Contorted flow-banded interval, west of saddle on hill

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of Alameda Springs

Age: Epoch, etc: mid-Miocene

Radiometric 16.1 ± 0.6 m.y.

Sample Description: "7022."

Field # 7-22-10 Collected By D. B. Date Collected 7/22/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	23.63	
Corundum	0.13	
Orthoclase	28.07	
Albite	38.33	
Anorthite	5.77	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.82	
Ferrosilite	1.98	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.42	
Hematite		
Ilmenite	0.66	
Sphene		
Apatite	0.19	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 7-22-10

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	71.89	72.04	
Al_2O_3	14.81	14.84	
TiO_2	0.347	0.348	
Fe_2O_3	1.89	0.29	
FeO		1.44	
MnO	0.077	0.077	
MgO	0.33	0.33	
CaO	1.27	1.27	
Na_2O	4.52	4.53	
K_2O	4.74	4.75	
P_2O_5	0.083	0.083	
H_2O^+/LOI	0.21	-	
H_2O -	0.15	-	
CO_2	-	-	
Others			
FeO*			1.70
Total	100.32	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-23-6

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Squaw Peak 7½'

Sec. 32 T. 4S R. 4W (NE¼ of NW¼)

Lat. 33°55' 26" N Long. 107°16' 46" W

Mtn Range, Valley, etc. Steeply dipping outcrop approx. 30 ft below peak of hill west of Squaw Peak.

Sample Description:

Catalogue #

Our Rock Name rhyolite

Formation rhyolite of Alameda Springs

Age: Epoch, etc: mid-Miocene

Radiometric 16.1 ± 0.6 m.y.

Field # 7-23-6 Collected By D. B. Date Collected 7/23/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	23.43	
Corundum		
Orthoclase	28.62	
Albite	36.13	
Anorthite	5.31	
Nepheline		
Diopside		
Wollastonite	2.15	
Enstatite	0.86	
Ferrosilite	1.31	
Hypersthene		
Enstatite	0.36	
Ferrosilite	0.55	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.40	
Hematite		
Ilmenite	0.64	
Sphene		
Apatite	0.24	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 7-23-6

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.10	71.79	
Al_2O_3	13.88	14.21	
TiO_2	0.332	0.340	
Fe_2O_3	1.74	0.27	
FeO		1.36	
MnO	0.078	0.080	
MgO	0.48	0.49	
CaO	2.19	2.24	
Na_2O	4.17	4.27	
K_2O	4.73	4.84	
P_2O_5	0.099	0.101	
H_2O^+/LOI	1.24	-	
H_2O -	0.11	-	
CO_2	-	-	
Others			
FeO*			1.60
Total	99.15	99.99	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-3-7

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 14 T. 3S R. 4W (NE¼ of SW¼)

Lat. 34°02' 50" N Long. 107°13' 39" W

Mtn Range, Valley, etc. Bold outcrop approx. 40 ft below ridge top.

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 13.5 ± 0.5 m.y.

Sample Description:

Field # 7-3-7 Collected By D. B. Date Collected 7/3/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

CIPW Norms

Calculated by: D.B.

hand/program name Fortran: NORM

Date:

Quartz	27.14	
Corundum	0.57	
Orthoclase	24.17	
Albite	32.94	
Anorthite	9.94	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.57	
Ferrosilite	2.29	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.48	
Hematite		
Ilmenite	0.68	
Sphene		
Apatite	0.22	
Calcite		
Rutile		
Others		
	100.01	

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

COMMENTS:

D.I. = 84.3

Sample # 7-3-7

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	69.45	71.72		
Al_2O_3	14.57	15.05		
TiO_2	0.344	0.355		
Fe_2O_3	2.11	0.33		2.29 INAA
FeO		1.66		
MnO	0.050	0.052		
MgO	0.61	0.63		
CaO	2.06	2.13		
Na_2O	3.77	3.89		4.01 INAA
K_2O	3.96	4.09		
P_2O_5	0.091	0.094		
H_2O^+/LOI	2.88	-		
H_2O -	0.233	-		
CO_2	-	-		
Others				
FeO*				2.01
Total	100.13	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1513
Be		
Ce		76
Cd		
Co		3.7
Cr		7.0
Cs		1.2
Cu		
Dy		
Er		
Eu		1.2
Ga		
Gd		
Ge		
Hf		5.5
Ho		
La		43
Li		
Lu		0.33
Mo		
Nb	16	
Nd		
Ni		
Pb	19	
Pd		
Pr		
Rb	80	83
Rc		
Sb		0.1
Sc		4.0
Sm		5.1
Sn		
Sr	425	
Ta		1.1
Tb		0.69
Th	6	7.2
Tm		
U	2	2.2
V		
Y	22	
Yb		2.2
Zn		
Zr	182	
Others		

Sample # 7-4-3

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Magdalena 15'
Sec. 3 T. 3S R. 4W (SW¼ of NE¼)
Lat. 34° 04' 58" N Long. 107° 14' 27" W
Mtn Range, Valley, etc. Massive vitrophyre interval on nose of cliff.

Catalogue #
Our Rock Name rhyolite
Formation Magdalena Peak Rhyolite

Age: Epoch, etc: mid-Miocene
Radiometric 13.5 ± 0.5 m.y.

Sample Description:

Field # 7-4-3 Collected By D. B. Date Collected 7/4/82
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections
counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	27.35	
Corundum	0.42	
Orthoclase	24.20	
Albite	30.74	
Anorthite	10.79	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	2.33	
Ferrosilite	2.63	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.55	
Hematite		
Ilmenite	0.74	
Sphene		
Apatite	0.25	
Calcite		
Rutile		
Others		
	100.01	

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

COMMENTS:

Sample # 7-4-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	69.58	71.41		
Al_2O_3	14.40	14.78		
TiO_2	0.377	0.387		
Fe_2O_3	2.43	0.38		2.31 INAA
FeO		1.90		
MnO	0.046	0.047		
MgO	0.91	0.93		
CaO	2.26	2.32		
Na_2O	3.54	3.63		3.59 INAA
K_2O	3.99	4.10		
P_2O_5	0.107	0.110		
H_2O^+/LOI	2.65	-		
H_2O -	0.095	-		
CO_2	-	-		
Others				
FeO*				2.16
Total	100.39	99.99		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

(ppm)	XRF	INAA
Ag		
B		
Ba		1284
Be		
Ce		70
Cd		
Co		4.8
Cr		7.8
Cs		1.5
Cu		
Dy		
Er		
Eu		1.0
Ga		
Gd		
Ge		
Hf		4.8
Ho		
La		39
Li		
Lu		0.36
Mo		
Nb	13	
Nd		
Ni		
Pb	19	
Pd		
Pr		
Rb	93	93
Rc		
Sb		0.15
Sc		4.2
Sm		4.5
Sn		
Sr	392	
Ta		1.0
Tb		0.6
Th	9	8.1
Tm		
U	2	2.0
V		
Y	25	
Yb		2.5
Zn		
Zr	157	
Others		

CHEMICAL DATA FORM

Sample # 7-3-8

Formation Magdalena Peak rhyolite

Location

County Socorro

Quad. Magdalena 15'

Sec. 14 T. 3S R. 4W (NE¼ of SW¼)

Lat. 34°02' 49" N Long. 107°13' 37" N

Mtn Range, Valley, etc. Flow-banded interval overlying vitrophyre of rhyolite of Magdalena Peak at Stendel perlite exposure.

Sample Description:

Field # 7-3-8 Collected By D. B. Date Collected 7/3/82

Author's Rock Name High-K rhyolite

Description:

Reference:

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite

Age: Epoch, etc: Mid-Miocene

Radiometric 13.5 ± 0.5 m.y.

Modal Analysis (Volume %)

Single analysis
- Points counted ____ Grid ____
- Over area of ____ thin sections

Multiple Analyses
- average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	25.80	
Corundum	0.37	
Orthoclase	21.53	
Albite	36.13	
Anorthite	10.66	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.56	
Ferrosilite	2.46	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.52	
Hematite		
Ilmenite	0.72	
Sphene		
Apatite	0.25	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Plagioclase Composition

Analyst: D. Bobrow

Method: universal stage

Date: 2/83

	Phenocrysts	Groundmass
Average	An_{35}	
Range	An_{27} to An_{44}	
Zoning	oscillatory to normal	
# Grains	9	

Sample # 7-3-8

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.58	71.24	
Al_2O_3	15.11	15.25	
TiO_2	0.376	0.379	
Fe_2O_3	2.33	0.36	
FeO		1.79	
MnO	0.046	0.046	
MgO	0.62	0.63	
CaO	2.27	2.29	
Na_2O	4.23	4.27	
K_2O	3.61	3.64	
P_2O_5	0.105	0.106	
H_2O^+/LOI	0.48	-	
H_2O -	0.166	-	
CO_2	-	-	
Others			
FeO*			2.11
Total	99.92	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-3-10

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 14 T. 3S R. 4W ($SW\frac{1}{4}$ of $SW\frac{1}{4}$)

Lat. 34°02' 45" N Long. 107°13' 48" W

Mtn Range, Valley, etc. In stream channel south of Stendel perlite deposit.

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 13.4 ± 0.5 m.y.

Sample Description:

Field # 7-3-10 Collected By D. B. Date Collected 7/3/82

Author's Rock Name high-K rhyolite

Description: amphibole-rich flow

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	27.54	
Corundum	0.92	
Orthoclase	24.38	
Albite	29.98	
Anorthite	11.10	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	2.10	
Ferrosilite	2.50	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.52	
Hematite		
Ilmenite	0.71	
Sphene		
Apatite	0.24	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 81.9

Sample # 7-3-10

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	68.26	71.13		
Al_2O_3	14.67	15.29		
TiO_2	0.359	0.374		
Fe_2O_3	2.27	0.36		2.17 INAA
FeO		1.80		
MnO	0.054	0.056		
MgO	0.81	0.84		
CaO	2.28	2.38		
Na_2O	3.40	3.54		3.13 INAA
K_2O	3.96	4.13		
P_2O_5	0.101	0.105		
H_2O^+/LOI	1.39	-		
H_2O -	2.25	-		
CO_2	-	-		
Others				
FeO*				2.04
Total	99.80	100.01		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1513
Be		
Ce		65
Cd		
Co		3.8
Cr		7.7
Cs		1.3
Cu		
Dy		
Er		
Eu		1.0
Ga		
Gd		
Ge		
Hf		4.9
Ho		
La		35
Li		
Lu		0.28
Mo		
Nb	15	
Nd		
Ni		
Pb	17	
Pd		
Pr		
Rb	83	82
Rc		
Sb		0.2
Sc		3.7
Sm		4.0
Sn		
Sr	482	
Ta		1.03
Tb		0.51
Th	7	6.4
Tm		
U	2	1.9
V		
Y	20	
Yb		2.0
Zn		
Zr	178	
Others		

Sample # 7-11-7

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Magdalena 15'
Sec. 23 T. 3S R. 4W (NE¼ of NW¼)
Lat. 34°02' 27" N Long. 107°13'33" W
Mtn Range, Valley, etc. thin (approx 15') outcrop; stream channel approx. ½ mi south of Stendel deposit.
Sample Description:

Catalogue #
Our Rock Name rhyolite
Formation Magdalena Peak Rhyolite
Age: Epoch, etc: Mid-Miocene
Radiometric 13.5 ± 0.5 m.y.

Field # 7-11-7 Collected By D. B. Date Collected 7/11/82
Author's Rock Name High-K rhyolite
Description:

Reference:

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	27.00	
Corundum	0.82	
Orthoclase	21.70	
Albite	33.26	
Anorthite	11.23	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.97	
Ferrosilite	2.53	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.53	
Hematite		
Ilmenite	0.72	
Sphene		
Apatite	0.24	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections
Multiple Analyses
average of ____ thin sections counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 7-11-7

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	69.12	71.11	
Al_2O_3	14.94	15.37	
TiO_2	0.366	0.377	
Fe_2O_3	2.34	0.37	
FeO		1.84	
MnO	0.045	0.046	
MgO	0.77	0.79	
CaO	2.33	2.40	
Na_2O	3.82	3.93	
K_2O	3.57	3.67	
P_2O_5	0.099	0.102	
H_2O^+/LOI	1.84	-	
H_2O^-	0.22	-	
CO_2	-	-	
Others			
FeO*			2.17
Total	99.46	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-3-9

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Magdalena 15'
Sec. 14 T. 3S R. 4W (NE¼ of SW¼)
Lat. 34°02' 49" N Long. 107°13' 34" W
Mtn Range, Valley, etc. last cliff before top of Stendel perlite section.

Catalogue #
Our Rock Name rhyolite
Formation Magdalena Peak Rhyolite
Age: Epoch, etc: mid-Miocene
Radiometric 13.5 ± 0.5 m.y.

Sample Description:

Field # 7-3-9 Collected By D. B. Date Collected 7/3/82
Author's Rock Name high-K rhyolite
Description:

Reference:

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	25.12
Corundum	0.12
Orthoclase	21.27
Albite	36.57
Anorthite	11.07
Nepheline	
Diopside	
Wollastonite	
Enstatite	
Ferrosilite	
Hypersthene	
Enstatite	1.87
Ferrosilite	2.50
Olivine	
Forsterite	
Fayalite	
Magnetite	0.53
Hematite	
Ilmenite	0.72
Sphene	
Apatite	0.22
Calcite	
Rutile	
Others	
	100.00

COMMENTS:
D.I. = 83

Modal Analysis (Volume %)

Single analysis
Points counted 2010 Grid 2/3 x 1/3
Over area of 1 thin sections mm

Multiple Analyses
average of ____ thin sections
counted as above.

Counted by: D. Bobrow
Type Counter Swift Date 6/28/83

Quartz	t
K-Feldspar	t
Plagioclase	10.2
Biotite	1.4
Amphiboles	2.2
Pyx. clino	
ortho	
Olivine	
Opaques	0.3
Groundmass	85.9
Others	
Zircon	t
Apatite	t

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 7-3-9

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	69.89	71.08		
Al_2O_3	14.93	15.18		
TiO_2	0.375	0.381		
Fe_2O_3	2.34	0.36		2.34 INAA
FeO		1.82		
MnO	0.051	0.052		
MgO	0.74	0.75		
CaO	2.32	2.36		
Na_2O	4.25	4.32		4.03 INAA
K_2O	3.54	3.60		
P_2O_5	0.095	0.097		
H_2O^+/LOI	1.36	-		
H_2O -	0.098	-		
CO_2	-	-		
Others				
FeO*				2.12
Total	99.99	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1517
Be		
Ce		68
Cd		
Co		4.6
Cr		8.1
Cs		1.1
Cu		
Dy		
Er		
Eu		1.0
Ga		
Gd		
Ge		
Hf		5.0
Ho		
La		37
Li		
Lu		0.31
Mo		
Nb	14	
Nd		
Ni		
Pb	17	
Pd		
Pr		
Rb	76	75
Rc		
Sb		0.14
Sc		4.1
Sm		4.3
Sn		
Sr	491	
Ta		1.04
Tb		0.54
Th	7	6.5
Tm		
U	3	2.0
V		
Y	21	
Yb		2.1
Zn		
Zr	173	
Others		

CHEMICAL DATA FORM

Sample # 7-3-6

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 14 T. 3S R. 4W (NE¼ of SW¼)

Lat. 34°02' 50" N Long. 107°13' 39" W

Mtn Range, Valley, etc. second massive vitrophyre outcrop, upstream from Stendel perlite deposit.

Sample Description:

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite (perlite section)

Age: Epoch, etc: mid-Miocene

Radiometric 13.5 ± 0.5 m.y.

Field # 7-3-6 Collected By D. B. Date Collected 7/3/82

Author's Rock Name High-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	22.75	
Corundum		
Orthoclase	22.09	
Albite	39.64	
Anorthite	8.87	
Nepheline		
Diopside		
Wollastonite	0.86	
Enstatite	0.38	
Ferrosilite	0.48	
Hypersthene		
Enstatite	1.54	
Ferrosilite	1.96	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.51	
Hematite		
Ilmenite	0.68	
Sphene		
Apatite	0.23	
Calcite		
Rutile		
Others		
	99.99	

COMMENTS:

Sample # 7-3-6

MAJOR OXIDES (%)

Analyst:
Lab: MNBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	68.81	70.85	
Al_2O_3	14.57	15.00	
TiO_2	0.345	0.355	
Fe_2O_3	2.24	0.35	
FeO		1.76	
MnO	0.049	0.050	
MgO	0.75	0.77	
CaO	2.27	2.34	
Na_2O	4.55	4.69	
K_2O	3.63	3.74	
P_2O_5	0.098	0.101	
H_2O^+/LOI	2.82	-	
H_2O -	0.047	-	
CO_2	-	-	
Others			
FeO*			2.07
Total	100.18	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-4-1

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 3 T. 3S R. 4W (NW¼ OF NE¼)

Lat. 34° 04' 55" N Long. 107° 14' 34" W

Mtn Range, Valley, etc. Small outcrop about 100 ft west of bedded conglomeratic deposit.

Sample Description:

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 13.5 ± 0.5 m.y.

Field # 7-4-1 Collected By D. B. Date Collected 7/4/82

Author's Rock Name high-K dacite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst: D. Bobrow

Method: universal stage

Date: 2/83

	Phenocrysts	Groundmass
Average	An_{38}	An_{26}
Range	An_{26} to An_{48}	-
Zoning	normal to oscill-atory	-
# Grains	8	1

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	27.24	
Corundum	0.58	
Orthoclase	19.29	
Albite	30.83	
Anorthite	14.68	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	2.88	
Ferrosilite	2.95	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.60	
Hematite		
Ilmenite	0.69	
Sphene		
Apatite	0.27	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

D.I. = 77.4

Sample # 7-4-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	68.72	70.33		
Al_2O_3	15.13	15.48		
TiO_2	0.355	0.363		
Fe_2O_3	2.65	0.41		2.57 INAA
FeO		2.07		
MnO	0.048	0.049		
MgO	1.13	1.16		
CaO	3.04	3.11		
Na_2O	3.56	3.64		3.68 INAA
K_2O	3.19	3.27		
P_2O_5	0.113	0.116		
H_2O^+/LOI	1.98	-		
H_2O -	0.140	-		
CO_2	-	-		
Others				
FeO*				2.38
Total	100.06	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1499
Be		
Ce		42
Cd		
Co		6.0
Cr		14.4
Cs		1.0
Cu		
Dy		
Er		
Eu		0.84
Ga		
Gd		
Ge		
Hf		3.4
Ho		
La		24
Li		
Lu		0.22
Mo		
Nb	9	
Nd		
Ni		
Pb	13	
Pd		
Pr		
Rb	62	59
Rc		
Sb		0.10
Sc		5.3
Sm		3.4
Sn		
Sr	655	
Ta		0.63
Tb		0.42
Th	4	4.8
Tm		
U	2	1.5
V		
Y	15	
Yb		1.5
Zn		
Zr	124	
Others		

Sample # 7-11-4

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 10 T. 3S R. 4W (NE¼ of NW¼)

Lat. 34°04' 10" N Long. 107°14' 44" W

Mtn Range, Valley, etc. Hornblende-rich flow at base of hill above road (hill is south of Magdalena Peak)

Sample Description:

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite

Age: Epoch, etc: Mid-Miocene

Radiometric 13.5 ± 0.5 m.y.

Field # 7-11-4 Collected By D. B. Date Collected 7/11/82 (?)

Author's Rock Name High-K dacite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections.

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	24.00	
Corundum	0.05	
Orthoclase	20.08	
Albite	33.45	
Anorthite	14.34	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	2.85	
Ferrosilite	3.36	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.69	
Hematite		
Ilmenite	0.85	
Sphene		
Apatite	0.33	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Sample # 7-11-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	67.44	69.43	
Al_2O_3	15.04	15.48	
TiO_2	0.436	0.449	
Fe_2O_3	3.05	0.48	
FeO		2.39	
MnO	0.053	0.055	
MgO	1.11	1.14	
CaO	2.99	3.08	
Na_2O	3.84	3.95	
K_2O	3.30	3.40	
P_2O_5	0.138	0.142	
H_2O^+/LOI	2.04	-	
H_2O -	0.09	-	
CO_2	-	-	
Others			
FeO*			2.82
Total	99.53	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-11-5

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Magdalena 15'

Sec. 3 T. 3S R. 4W (SE¼ of SW¼)

Lat. 34° 04' 12" N Long. 107°14' 48" W

Mtn Range, Valley, etc. top of hill, above road leading to perlite-exploration pit.

Catalogue #

Our Rock Name rhyolite

Formation Magdalena Peak Rhyolite

Age: Epoch, etc: mid-Miocene

Radiometric 13.5 ± 0.5 m.y.

Sample Description:

Field # 7-11-5 Collected By D. B. Date Collected 7/11/82

Author's Rock Name high-K dacite

Description: abundant clear plagioclase and black amphibole

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average	An_{42}	
Range	An_{34} to An_{50}	
Zoning	normal to oscillatory	
# Grains	7	

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	23.92	
Corundum	0.23	
Orthoclase	18.92	
Albite	33.95	
Anorthite	14.87	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	2.84	
Ferrosilite	3.38	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.70	
Hematite		
Ilmenite	0.88	
Sphene		
Apatite	0.32	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

D.I. = 76.8

Sample # 7-11-5

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	67.41	69.17		
Al_2O_3	15.34	15.74		
TiO_2	0.451	0.463		
Fe_2O_3	3.09	0.48		2.80 INAA
FeO		2.42		
MnO	0.055	0.056		
MgO	1.11	1.14		
CaO	3.10	3.18		
Na_2O	3.91	4.01		3.55 INAA
K_2O	3.12	3.20		
P_2O_5	0.136	0.140		
H_2O^+/LOI	1.54	-		
H_2O -	0.09	-		
CO_2	-	-		
Others				
FeO*				2.69
Total	99.35	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1357
Be		
Ce		51
Cd		
Co		6.4
Cr		11.0
Cs		1.0
Cu		
Dy		
Er		
Eu		0.94
Ga		
Gd		
Ge		
Hf		4.0
Ho		
La		28
Li		
Lu		0.27
Mo		
Nb	14	
Nd		
Ni		
Pb	17	
Pd		
Pr		
Rb	70	71
Rc		
Sb		0.13
Sc		5.4
Sm		4.2
Sn		
Sr	610	
Ta		0.89
Tb		0.51
Th	7	5.9
Tm		
U	2	1.9
V		
Y	19	
Yb		1.8
Zn		
Zr	148	
Others		

Sample # 7-9-17

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Arroyo Landavaso 7½'
Sec. 4 T. 3S R. 4W (NW¼ of NE¼)
Lat. 34°04' 56" N Long. 107°15' 47" W
Mtn Range, Valley, etc. Outcrop in stream channel approx. 20 ft above last of

Catalogue #
Our Rock Name andesite
Formation andesite of Landavaso Reservoir
Age: Epoch, etc: Oligocene-Miocene
Radiometric

Sample Description: 4 small hills which have thin andesitic flows on them.

Field # 7-9-17 Collected By D. B. Date Collected 7/9/82
Author's Rock Name High-K dacite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections
counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	15.44	
Corundum		
Orthoclase	21.58	
Albite	32.65	
Anorthite	15.13	
Nepheline		
Diopside		
Wollastonite	1.27	
Enstatite	0.62	
Ferrosilite	0.63	
Hypersthene		
Enstatite	4.71	
Ferrosilite	4.80	
Olivine		
Forsterite		
Fayalite		
Magnetite	1.12	
Hematite		
Ilmenite	1.39	
Sphene		
Apatite	0.65	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 7-9-17

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	62.90	64.72		
Al_2O_3	15.40	15.85		
TiO_2	0.714	0.735		
Fe_2O_3	4.94	0.78		
FeO		3.88		
MnO	0.086	0.088		
MgO	2.08	2.14		
CaO	3.92	4.03		
Na_2O	3.75	3.85		
K_2O	3.55	3.65		
P_2O_5	0.273	0.281		
H_2O^+/LOI	1.37	-		
H_2O^-	0.15	-		
CO_2	-	-		
Others				
FeO*				4.58
Total	99.13	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 76-6-6

CHEMICAL DATA FORM

Formation

Location
County Socorro
Quad. Tres Montosas 7½'
Sec. 32 T. 2S R. 5W (SW¼ of SW¼)
Lat. Long.
Mtn Range, Valley, etc. approximately 150 yds. west of telephone outbuilding
Sample Description: on No. side of NM-60.

Catalogue #
Our Rock Name basalt
Formation basalt of Council Rock

Age: Epoch, etc: mid-Miocene
Radiometric

Field # 76-6-6 Collected By C. Chapin Date Collected 6/6/76
Author's Rock Name high-K basaltic andesite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections
counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D.B.
hand/program name Fortran: NORM
Date:

Quartz		
Corundum		
Orthoclase	11.29	
Albite	37.70	
Anorthite	22.46	
Nepheline		
Diopside		
Wollastonite	3.60	
Enstatite	1.85	
Ferrosilite	1.65	
Hypersthene		
Enstatite	6.07	
Ferrosilite	5.40	
Olivine		
Forsterite	1.65	
Fayalite	1.62	
Magnetite	2.01	
Hematite		
Ilmenite	3.06	
Sphene		
Apatite	1.64	
Calcite		
Rutile		
Others		

COMMENTS: 100.00

Sample # 76-6-6

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	52.52	53.92		
Al_2O_3	17.17	17.63		
TiO_2	1.570	1.612		
Fe_2O_3	8.85	1.39		7.85 INAA
FeO		6.93		
MnO	0.121	0.124		
MgO	4.02	4.13		
CaO	7.01	7.20		
Na_2O	4.34	4.46		3.84 INAA
K_2O	1.86	1.91		
P_2O_5	0.691	0.709		
H_2O^+/LOI	0.52	-		
H_2O -	0.47	-		
CO_2	-	-		
Others				
FeO*				7.62
Total	99.14	100.02		

Isotopes

Sr 87/86	measured	0.7061
	initial	0.70609

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1165
Be		
Ce		91
Cd		
Co		25
Cr		30
Cs		0.15
Cu		
Dy		
Er		
Eu		2.2
Ga		
Gd		
Ge		
Hf		5.0
Ho		
La		47
Li		
Lu		0.31
Mo		
Nb	25	
Nd		
Ni		
Pb	2	
Pd		
Pr		
Rb	26	23
Rc		
Sb		0.57
Sc		14.0
Sm		8.0
Sn		
Sr	1286	
Ta		1.1
Tb		0.90
Th	3.4	4.7
Tm		
U	1.3	1.2
V		
Y	30	
Yb		2.5
Zn		
Zr	240	
Others		

MAGDALENA PEAK

CENTER

Sample # 7-24-5

CHEMICAL DATA FORM

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 15 T. 4S R. 2W (NW¼ of NW¼)

Lat. 33° 57' 33"N Long. 107° 02' 31" W

Mtn Range, Valley, etc. Vitric-looking outcrop approx. 140 ft below peak of hill

Sample Description: "6358" (on western face of hill).

Formation

Catalogue #

Our Rock Name rhyolite

Formation lower rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 12.1 ± 0.5 m.y.

Field # 7-24-5 Collected By D. B. Date Collected 7/24/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	36.90	
Corundum	0.41	
Orthoclase	27.46	
Albite	25.53	
Anorthite	5.99	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.88	
Ferrosilite	1.80	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.37	
Hematite		
Ilmenite	0.49	
Sphene		
Apatite	0.17	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

Sample # 7-24-5

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	75.23	76.16	
Al_2O_3	12.44	12.59	
TiO_2	0.255	0.258	
Fe_2O_3	1.67	0.26	
FeO		1.29	
MnO	0.037	0.037	
MgO	0.35	0.35	
CaO	1.29	1.31	
Na_2O	2.98	3.02	
K_2O	4.59	4.65	
P_2O_5	0.074	0.075	
H_2O^+/LOI	0.47	-	
H_2O^-	0.28	-	
CO_2	-	-	
Others			
FeO*			1.52
Total	99.67	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-28-4

CHEMICAL DATA FORM

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 10 T. 4S R. 2W (NW¼ of NE¼)

Lat. 33° 58' 32" N Long. 107° 02' 08" W

Mtn Range, Valley, etc. NE face of hill, approx. half-way to peak.

Formation

Catalogue #

Our Rock Name rhyolite

Formation lower rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 12.1 ± 0.5 m.y.

Sample Description:

Field # 7-28-4 Collected By D. B. Date Collected 7/28/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	31.89	
Corundum	0.64	
Orthoclase	30.74	
Albite	27.18	
Anorthite	5.69	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.70	
Ferrosilite	2.02	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.42	
Hematite		
Ilmenite	0.54	
Sphene		
Apatite	0.19	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

D.I. = 89.8

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections.

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 7-28-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	73.55	74.29		
Al_2O_3	13.50	13.64		
TiO_2	0.279	0.282		
Fe_2O_3	1.87	0.29		1.78 INAA
FeO		1.44		
MnO	0.041	0.041		
MgO	0.28	0.28		
CaO	1.24	1.25		
Na_2O	3.18	3.21		3.08 INAA
K_2O	5.15	5.20		
P_2O_5	0.079	0.080		
H_2O^+/LOI	0.48	-		
H_2O^-	0.16	-		
CO_2	-	-		
Others				
FeO*				1.65
Total	99.81	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF	(ppm) INAA
Ag		
B		
Ba		769
Be		
Ce		87
Cd		
Co		2.5
Cr		3.8
Cs		3.6
Cu		
Dy		
Er		
Eu		1.0
Ga		
Gd		
Ge		
Hf		5.6
Ho		
La		47
Li		
Lu		0.54
Mo		
Nb	27	
Nd		
Ni		
Pb	22	
Pd		
Pr		
Rb	195	187
Rc		
Sb		0.15
Sc		3.6
Sm		5.9
Sn		
Sr	203	
Ta		2.3
Tb		0.8
Th	25	21
Tm		
U	4	4.1
V		
Y	32	
Yb		3.5
Zn		
Zr	175	
Others		

Sample # 7-28-5

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Molino Peak 7½'
Sec. 10 T. 4S R. 2W (NW¼ of NE¼)
Lat. 33°58' 30" N Long. 107°02' 06" W
Mtn Range, Valley, etc. Approx. 120 ft uphill from stream channel, on western side of hill.

Catalogue #
Our Rock Name rhyolite
Formation lower rhyolite of Pound Ranch
Age: Epoch, etc: mid-Miocene
Radiometric 12.1 ± 0.5 m.y.

Sample Description:

Field # 7-28-5 Collected By D. B. Date Collected 7/28/82
Author's Rock Name high-K, high-SiO_2 rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections
counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	31.53	
Corundum	0.63	
Orthoclase	33.68	
Albite	25.22	
Anorthite	5.21	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.78	
Ferrosilite	1.87	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.39	
Hematite		
Ilmenite	0.52	
Sphene		
Apatite	0.17	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Sample # 7-28-5

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	73.75	74.25	
Al_2O_3	13.52	13.61	
TiO_2	0.272	0.274	
Fe_2O_3	1.74	0.27	
FeO		1.34	
MnO	0.045	0.045	
MgO	0.31	0.31	
CaO	1.14	1.15	
Na_2O	2.96	2.98	
K_2O	5.66	5.70	
P_2O_5	0.073	0.073	
H_2O^+/LOI	0.53	-	
H_2O -	0.20	-	
CO_2	-	-	
Others			
FeO*			1.58
Total	100.20	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 26-3

CHEMICAL DATA FORM

Location

County Socorro
Quad. Molino Peak 7½'
Sec. 15 T. 4S R. 2W (NE¼ of NW¼)
Lat. 33°58' 05" N Long. 107°02' 17 " W
Mtn Range, Valley, etc. approx. 120 ft below saddle and peak of this hill

Formation
Catalogue #
Our Rock Name rhyolite
Formation lower rhyolite of Pound Ranch
Age: Epoch, etc: mid-Miocene
Radiometric 12.1 ± 0.5 m.y.

Sample Description:

Field # 26-3 Collected By D. Bobrow Date Collected 6/26/82
Author's Rock Name high-K, high-SiO_2 rhyolite
Description:

Reference:

CIPW Norms

Calculated by: D.B.
hand/program name Fortran: NORM
Date:

Quartz	30.93	
Corundum	0.23	
Orthoclase	30.05	
Albite	28.80	
Anorthite	6.12	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.91	
Ferrosilite	1.88	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.39	
Hematite		
Ilmenite	0.52	
Sphene		
Apatite	0.18	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 26-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	73.28	74.23	
Al_2O_3	13.40	13.57	
TiO_2	0.272	0.276	
Fe_2O_3	1.74	0.27	
FeO		1.34	
MnO	0.046	0.047	
MgO	0.36	0.37	
CaO	1.32	1.34	
Na_2O	3.36	3.40	
K_2O	5.02	5.09	
P_2O_5	0.077	0.078	
H_2O^+/LOI	0.36	-	
H_2O -	0.16	-	
CO_2	-	-	
Others			
FeO*				1.58
Total	99.40	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # C-Pd

CHEMICAL DATA FORM

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 10 T. 4S R. 2W (NE¼ of NW¼)

Lat. 33°58'53" N Long. 107°2' 16" W

Mtn Range, Valley, etc. approx. 40 ft up from stream channel (stream bends to west)

Formation

Catalogue #

Our Rock Name rhyolite

Formation lower rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 12.1± 0.5 m.y.

Sample Description:

Field # C-Pd Collected By D. Bobrow Date Collected 6/16/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description: Dense, pinkish Xal-rich with large clear quartz, plagioclase; well formed sanidines; few biotites

Reference:

CIPW Norms

Calculated by: D.B.

hand/program name Fortran: NORM

Date:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Quartz	30.34	
Corundum	0.03	
Orthoclase	33.21	
Albite	27.08	
Anorthite	5.54	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.78	
Ferrosilite	1.90	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.40	
Hematite		
Ilmenite	0.52	
Sphene		
Apatite	0.19	
Calcite		
Rutile		
Others		
	99.99	

Plagioclase Composition

Analyst:

Method:

Date:

COMMENTS:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # C-Pd

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	73.26	74.19		
Al_2O_3	13.24	13.41		
TiO_2	0.272	0.275		
Fe_2O_3	1.78	0.28		
FeO		1.38		
MnO	0.030	0.030		
MgO	0.31	0.31		
CaO	1.21	1.23		
Na_2O	3.16	3.20		
K_2O	5.55	5.62		
P_2O_5	0.081	0.082		
H_2O^+/LOI	0.22	-		
H_2O -	0.148	-		
CO_2	-	-		
Others				
FeO*				1.63
Total	99.29	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-24-2

CHEMICAL DATA FORM

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 15 T. 4S R. 2W (SW¼ of SW¼)

Lat. 33°57' 30" N Long. 107°02' 28" W

Mtn Range, Valley, etc. Columnar-like outcrop approx. 15 ft below peak of

Sample Description: hill "6358" (approx. at same elevation as saddle).

Field # 7-24-2 Collected By D. B. Date Collected 7/24/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Formation

Catalogue #

Our Rock Name rhyolite

Formation lower rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 12.1 ± 0.5 m.y.

Modal Analysis (Volume %)

Single analysis

Points counted ________ Grid ________

Over area of ________ thin sections

Multiple Analyses

average of ________ thin sections counted as above.

Counted by:

Type Counter ________ Date ________

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	30.90	
Corundum	0.35	
Orthoclase	29.08	
Albite	29.41	
Anorthite	6.03	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.01	
Ferrosilite	2.07	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.43	
Hematite		
Ilmenite	0.56	
Sphene		
Apatite	0.17	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 7-24-2

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	73.34	74.10	
Al_2O_3	13.46	13.60	
TiO_2	0.293	0.296	
Fe_2O_3	1.91	0.29	
FeO		1.47	
MnO	0.051	0.052	
MgO	0.40	0.40	
CaO	1.30	1.31	
Na_2O	3.44	3.48	
K_2O	4.87	4.92	
P_2O_5	0.074	0.075	
H_2O^+/LOI	0.31	-	
H_2O -	0.29	-	
CO_2	-	-	
Others			
FeO*			1.74
Total	99.74	99.99	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 77-3-1

CHEMICAL DATA FORM

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 15 T. 4S R. 2W (NE¼ of NE¼)

Lat. 33°57' 57" N Long. 107°02' 19" W

Mtn Range, Valley, etc. south of Pound Ranch about 1.7 mi; bold outcrop on point of ridge.

Sample Description:

Formation

Catalogue #

Our Rock Name rhyolite

Formation lower rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 12.1 ± 0.5 m.y.

Field # 77-3-1 Collected By Chapin & Osburn Date Collected 3/1/77

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date: 1/24/83

Quartz	31.43	
Corundum	0.73	
Orthoclase	29.84	
Albite	28.14	
Anorthite	5.91	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.90	
Ferrosilite	1.97	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.40	
Hematite		
Ilmenite	0.50	
Sphene		
Apatite	0.18	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 89.4

Sample # 77-3-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	73.51	74.09	
Al_2O_3	13.72	13.83	
TiO_2	0.263	0.265	
Fe_2O_3	1.81	0.28	
FeO		1.39	
MnO	0.042	0.042	
MgO	0.36	0.36	
CaO	1.28	1.29	
Na_2O	3.30	3.33	
K_2O	5.01	5.05	
P_2O_5	0.075	0.076	
H_2O^+/LOI	0.40	-	
H_2O^-	0.20	-	
CO_2	-	-	
Others			
FeO*			1.60
Total	99.97	100.00	

Isotopes

Sr 87/86 measured 0.7070
initial 0.70656

Oxygen
Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF	(ppm)
Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb	25	
Nd		
Ni		
Pb	20	
Pd		
Pr		
Rb	185	
Rc		
Sb		
Sc		
Sm		
Sn		
Sr	203	
Ta		
Tb		
Th	24	
Tm		
U		
V		
Y	27	
Yb		
Zn		
Zr	174	
Others		

Sample # 7-24-6

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 15 T. 4S R. 2W (NE¼ of NW¼)

Lat. 33°57' 58" N Long. 107°02' 23" W

Mtn Range, Valley, etc. Approx. 150 ft above and northeastward of joining of smaller with larger stream channels.

Catalogue #

Our Rock Name rhyolite

Formation lower rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 12.1 ± 0.5 m.y.

Sample Description:

Field # 7-24-6 Collected By D. B. Date Collected 7/24/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	30.66	
Corundum	0.44	
Orthoclase	31.20	
Albite	27.56	
Anorthite	6.25	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.76	
Ferrosilite	2.04	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.41	
Hematite		
Ilmenite	0.50	
Sphene		
Apatite	0.19	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

Sample # 7-24-6

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	73.06	73.89	
Al_2O_3	13.64	13.80	
TiO_2	0.261	0.264	
Fe_2O_3	1.85	0.29	
FeO		1.43	
MnO	0.051	0.052	
MgO	0.30	0.30	
CaO	1.35	1.37	
Na_2O	3.22	3.26	
K_2O	5.22	5.28	
P_2O_5	0.080	0.081	
H_2O^+/LOI	2.02	-	
H_2O -	0.17	-	
CO_2	-	-	
Others			
FeO*			1.69
Total	99.22	100.02	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

CHEMICAL DATA FORM

Sample # 7-24-1

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 15 T. 4S R. 2W (NE¼ of SW¼)

Lat. 33°57' 45" N Long. 107°2' 14" W

Mtn Range, Valley, etc. Southern outcrop below saddle.

Sample Description:

Formation

Catalogue #

Our Rock Name rhyolite

Formation lower rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 12.1 ± 0.5 m.y.

Field # 7-24-1 Collected By D. B. Date Collected 7/24/82

Author's Rock Name high-K, high-SiO_2 rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted 2089 Grid 2/3 x 1/3

Over area of 1 thin sections mm

Multiple Analyses

average of ____ thin sections counted as above.

Counted by: D. Bobrow

Type Counter Swift Date 6/28/83

Quartz	5.2	
K-Feldspar	4.3	
Plagioclase	10.1	
Biotite	3.9	
Amphiboles	0.3	
Pyx. clino		
ortho		
Olivine		
Opaques	0.2	
Groundmass	76.0	
Others (Apatite)	t	
Zircon	t	
Sphene	t	

Plagioclase Composition

Analyst: D. Bobrow

Method: universal stage

Date: 2/83

	Phenocrysts	Groundmass
Average	An_{27}	
Range	An_{22} to An_{37}	
Zoning	normal to oscillatory	
# Grains	8	

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	30.12	
Corundum	0.47	
Orthoclase	31.29	
Albite	28.64	
Anorthite	5.35	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.93	
Ferrosilite	2.02	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.42	
Hematite		
Ilmenite	0.56	
Sphene		
Apatite	0.20	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

D.I. =90.1

Sample # 7-24-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	73.11	73.87		
Al_2O_3	13.59	13.73		
TiO_2	0.289	0.292		
Fe_2O_3	1.87	0.29		1.86 INAA
FeO		1.44		
MnO	0.049	0.050		
MgO	0.37	0.37		
CaO	1.18	1.19		
Na_2O	3.35	3.39		3.12 INAA
K_2O	5.24	5.29		
P_2O_5	0.085	0.086		
H_2O^+/LOI	0.27	-		
H_2O -	0.18	-		
CO_2	-	-		
Others				
FeO*				1.69
Total	99.58	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		736
Be		
Ce		86
Cd		
Co		2.9
Cr		4.0
Cs		1.9
Cu		
Dy		
Er		
Eu		0.9
Ga		
Gd		
Ge		
Hf		5.2
Ho		
La		46
Li		
Lu		0.5
Mo		
Nb	26	
Nd		
Ni		
Pb	21	
Pd		
Pr		
Rb	199	187
Rc		
Sb		0.14
Sc		3.6
Sm		5.6
Sn		
Sr	192	
Ta		2.3
Tb		0.7
Th	26	21.2
Tm		
U	4	4.3
V		
Y	31	
Yb		3.4
Zn		
Zr	174	
Others		

CHEMICAL DATA FORM

Sample # 7-26-4

Formation

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 21 T. 4S R. 2W (NW¼ of NW¼)

Lat. 33°57' 10" N Long. 107°03' 32" W

Mtn Range, Valley, etc. Bold outcrop that caps ridge (columnar-jointed(?)).

Catalogue #

Our Rock Name rhyolite

Formation upper rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 10.8 ± 0.4 m.y.

Sample Description:

Field # 7-26-4 Collected By D. B. Date Collected 7/26/82

Author's Rock Name high-K rhyolite

Description:

Reference:

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	25.38	
Corundum	0.10	
Orthoclase	22.93	
Albite	34.03	
Anorthite	11.04	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.73	
Ferrosilite	2.95	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.62	
Hematite		
Ilmenite	0.89	
Sphene		
Apatite	0.33	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 82.3

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 7-26-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.21	70.77	
Al_2O_3	14.84	14.96	
TiO_2	0.466	0.470	
Fe_2O_3	2.80	0.43	
FeO		~2.15	
MnO	0.071	0.072	
MgO	0.69	0.70	
CaO	2.39	2.41	
Na_2O	3.99	4.02	
K_2O	3.85	3.88	
P_2O_5	0.139	0.140	
H_2O^+/LOI	0.43	-	
H_2O -	0.16	-	
CO_2	-	-	
Others			
FeO*			2.54
Total	100.04	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	
Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb	21	
Nd		
Ni		
Pb	19	
Pd	-	
Pr		
Rb	112	
Rc		
Sb		
Sc		
Sm		
Sn		
Sr	401	
Ta		
Tb		
Th	15	
Tm		
U	4	
V		
Y	31	
Yb		
Zn		
Zr	183	
Others		

Sample # 7-24-9

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 15 T. 4S R. 2W (NW¼ of NW¼)

Lat. 33°58' 08" N Long. 107°02' 56" W

Mtn Range, Valley, etc. Outcrop approx. 100 ft above and north of the saddle that spans lower & upper rhyolites.

Catalogue #

Our Rock Name rhyolite

Formation upper rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 10.8 ± 0.4 m.y.

Sample Description:

Field # 7-24-9 Collected By D.B. Date Collected 7/24/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	25.68	
Corundum	0.28	
Orthoclase	27.59	
Albite	31.76	
Anorthite	9.22	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.83	
Ferrosilite	2.80	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.61	
Hematite		
Ilmenite	0.89	
Sphene		
Apatite	0.34	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

Sample # 7-24-9

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.70	71.14	
Al_2O_3	14.79	14.88	
TiO_2	0.467	0.470	
Fe_2O_3	2.74	0.42	
FeO		2.10	
MnO	0.033	0.033	
MgO	0.33	0.33	
CaO	2.04	2.05	
Na_2O	3.73	3.75	
K_2O	4.64	4.67	
P_2O_5	0.147	0.148	
H_2O^+/LOI	0.31	-	
H_2O -	0.13	-	
CO_2	-	-	
Others			
FeO*			2.48
Total	100.06	99.99	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-24-4

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Molino Peak 7½'
Sec. 14 T. 4S R. 2W (SW¼ of SW¼)
Lat. 33°57' 23" N Long. 107°02' 31" W
Mtn Range, Valley, etc. Columnar-like outcrop on west side of peak; hill is south of hill "6358."

Catalogue #
Our Rock Name rhyolite
Formation upper rhyolite of Pound Ranch
Age: Epoch, etc: mid-Miocene
Radiometric 10.8 ± 0.4 m.y.

Sample Description:

Field # 7-24-4 Collected By D. B. Date Collected 7/24/82
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted 2062 Grid 2/3 x 1/3
Over area of 1 thin sections . mm

Multiple Analyses
average of ____ thin sections
counted as above.

Counted by: D. Bobrow
Type Counter swift Date 6/28/83

Quartz	t	
K-Feldspar	t	
Plagioclase	10.1	
Biotite	1.3	
Amphiboles	2.0	
Pyx. clino		
ortho		
Olivine		
Opaques	0.4	
Groundmass	86.2	
Others Apatite	t	
Zircon	t	
Sphene	t	

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	26.12	
Corundum	0.10	
Orthoclase	24.43	
Albite	33.18	
Anorthite	10.65	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.04	
Ferrosilite	2.71	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.59	
Hematite		
Ilmenite	0.89	
Sphene		
Apatite	0.29	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 7-24-4

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	69.92	71.21	
Al_2O_3	14.66	14.93	
TiO_2	0.459	0.467	
Fe_2O_3	2.60	0.40	
FeO		2.02	
MnO	0.057	0.058	
MgO	0.41	0.42	
CaO	2.27	2.31	
Na_2O	3.85	3.92	
K_2O	4.06	4.14	
P_2O_5	0.123	0.125	
H_2O^+/LOI	0.49	-	
H_2O -	0.21	-	
CO_2	-	-	
Others			
FeO*			2.38
Total	99.14	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-24-8

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Molino Peak 7½'
Sec. 15 T. 4S R.2W (NW¼ OF NW¼)
Lat. 33°58' 07" N Long. 107°02' 55" W
Mtn Range, Valley, etc. Flow-banded interval approx. 80 ft above saddle.

Catalogue #
Our Rock Name rhyolite
Formation upper rhyolite of Pound Ranch
Age: Epoch, etc: mid-Miocene
Radiometric 10.8 ± 0.4 m.y.

Sample Description:

Field # 7-24-8 Collected By D. B. Date Collected 7/24/82
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted ____ Grid ____
Over area of ____ thin sections

Multiple Analyses
average of ____ thin sections counted as above.

Counted by:
Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	25.69	
Corundum	0.20	
Orthoclase	27.45	
Albite	32.02	
Anorthite	9.17	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.91	
Ferrosilite	2.77	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.59	
Hematite		
Ilmenite	0.88	
Sphene		
Apatite	0.31	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 7-24-8

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	70.41	71.25		
Al_2O_3	14.64	14.81		
TiO_2	0.460	0.465		
Fe_2O_3	2.65	0.41		2.59 INAA
FeO		2.05		
MnO	0.066	0.067		
MgO	0.36	0.36		
CaO	2.00	2.02		
Na_2O	3.74	3.79		3.78 INAA
K_2O	4.59	4.65		
P_2O_5	0.132	0.134		
H_2O^+/LOI	0.52	-		
H_2O -	-	-		
CO_2	-	-		
Others				
FeO*				2.37
Total	99.75	100.01		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1147
Be		
Ce		81
Cd		
Co		4.5
Cr		5.5
Cs		2.0
Cu		
Dy		
Er		
Eu		1.2
Ga		
Gd		
Ge		
Hf		5.8
Ho		
La		44
Li		
Lu		0.46
Mo		
Nb	20	
Nd		
Ni		
Pb	21	
Pd		
Pr		
Rb	141	136
Rc		
Sb		0.4
Sc		5
Sm		5.1
Sn		
Sr	359	
Ta		1.6
Tb		0.7
Th	15	12.7
Tm		
U	4	3.1
V		
Y	32	
Yb		3.3
Zn		
Zr	203	
Others		

Sample # 7-24-3

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 15 T. 4S R. 2W (SW¼ of SW¼)

Lat. 33°57' 27" N Long. 107°02' 29" W

Mtn Range, Valley, etc. Columnar-like outcrop approx. 80 ft above saddle (on northeastern nose of hill).

Catalogue #

Our Rock Name rhyolite

Formation upper rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 10.8 ± 0.4 m.y.

Sample Description:

Field # 7-24-3 Collected By D. B. Date Collected 7/24/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted Grid

Over area of thin sections

Multiple Analyses

average of thin sections counted as above.

Counted by:

Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	26.03	
Corundum	0.45	
Orthoclase	25.88	
Albite	33.38	
Anorthite	9.16	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.55	
Ferrosilite	2.74	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.60	
Hematite		
Ilmenite	0.92	
Sphene		
Apatite	0.29	
Calcite		
Rutile		
Others		

COMMENTS: 100.00

Sample # 7-24-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.46	71.27	
Al_2O_3	14.87	15.04	
TiO_2	0.477	0.482	
Fe_2O_3	2.66	0.41	
FeO		2.05	
MnO	0.058	0.059	
MgO	0.22	0.22	
CaO	1.99	2.01	
Na_2O	3.90	3.95	
K_2O	4.33	4.38	
P_2O_5	0.125	0.126	
H_2O^+/LOI	0.31	-	
H_2O -	0.12	-	
CO_2	-	-	
Others			
FeO*			2.42
Total	99.52	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-26-3

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Molino Peak 7½'
Sec. 21 T. 4S R. 2W (NW¼ of NW¼)
Lat. 33° 57' 08" N Long. 107° 03' 26" W
Mtn Range, Valley, etc. Flow-banded interval after slight break in slope--above

Catalogue #
Our Rock Name rhyolite
Formation upper rhyolite of Pound Ranch
Age: Epoch, etc: mid-Miocene
Radiometric 10.8 ± 0.4 m.y.

Sample Description: vitrophyre.

Field # 7-26-3 Collected By D. Bobrow Date Collected 7/26/82
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections
counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	26.82	
Corundum	0.22	
Orthoclase	24.35	
Albite	32.13	
Anorthite	10.00	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.81	
Ferrosilite	2.84	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.61	
Hematite		
Ilmenite	0.89	
Sphene		
Apatite	0.33	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 7-26-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.69	71.38	
Al_2O_3	14.45	14.59	
TiO_2	0.463	0.468	
Fe_2O_3	2.71	0.42	
FeO		2.09	
MnO	0.067	0.068	
MgO	0.72	0.73	
CaO	2.18	2.20	
Na_2O	3.76	3.80	
K_2O	4.08	4.12	
P_2O_5	0.139	0.140	
H_2O^+/LOI	0.55	-	
H_2O -	0.28	-	
CO_2	-	-	
Others			
FeO*			2.47
Total	100.09	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-28-2

CHEMICAL DATA FORM

Formation

Location
County Socorro
Quad. Molino Peak 7½'
Sec. 10 T. 4S R. 2W (NW¼ of NE¼)
Lat. 33° 58' 50" N Long. 107° 01' 56" W
Mtn Range, Valley, etc. Approx. 70 ft below peak (on northward-trending nose of hill).
Sample Description:

Catalogue #
Our Rock Name rhyolite
Formation upper rhyolite of Pound Ranch
Age: Epoch, etc: mid-Miocene
Radiometric 10.8 ± 0.4 m.y.

Field # 7-28-2 Collected By D. B. Date Collected 7/28/82
Author's Rock Name high-K rhyolite
Description:

Reference:

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	27.02	
Corundum	0.64	
Orthoclase	26.10	
Albite	31.65	
Anorthite	9.26	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.88	
Ferrosilite	2.74	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.58	
Hematite		
Ilmenite	0.83	
Sphene		
Apatite	0.30	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

Modal Analysis (Volume %)

Single analysis
Points counted ______ Grid ______
Over area of ______ thin sections

Multiple Analyses
average of ______ thin sections
counted as above.

Counted by:
Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

Sample # 7-28-2

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.88	71.46	
Al_2O_3	14.84	14.96	
TiO_2	0.434	0.438	
Fe_2O_3	2.61	0.40	
FeO		2.01	
MnO	0.057	0.057	
MgO	0.35	0.35	
CaO	2.02	2.04	
Na_2O	3.71	3.74	
K_2O	4.38	4.42	
P_2O_5	0.128	0.129	
H_2O^+/LOI	0.30	-	
H_2O -	0.36	-	
CO_2	-	-	
Others			
FeO*			2.37
Total	100.07	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 26-2

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Molino 7½'

Sec. 10 T. 4S R. 2W (SE¼ of SW¼)

Lat. 33°58' 12" N Long. 107°02' 13" W

Mtn Range, Valley, etc. flow-banded outcrop on southeast nose of hill

Catalogue #

Our Rock Name rhyolite

Formation upper rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 10.8 ± 0.4 m.y.

Sample Description:

Field # 26-2 Collected By D.B. Date Collected 6/26/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D.B.

hand/program name Fortran: NORM

Date:

Quartz	27.03	
Corundum	0.22	
Orthoclase	27.30	
Albite	31.34	
Anorthite	9.09	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.87	
Ferrosilite	2.50	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.54	
Hematite		
Ilmenite	0.81	
Sphene		
Apatite	0.30	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

Sample # 26-2

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	70.61	71.84		
Al_2O_3	14.40	14.65		
TiO_2	0.420	0.427		
Fe_2O_3	2.39	0.37		
FeO		1.85		
MnO	0.057	0.058		
MgO	0.34	0.35		
CaO	1.97	2.00		
Na_2O	3.64	3.70		
K_2O	4.54	4.62		
P_2O_5	0.127	0.129		
H_2O^+/LOI	0.55	-		
H_2O^-	0.31	-		
CO_2	-	-		
Others				
FeO*				2.18
Total	99.35	99.99		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 77-3-2

CHEMICAL DATA FORM

Location

County Socorro
Quad. Molino Peak
Sec. 15 T. 4S R. 2W (NW¼ of NW¼)
Lat. 33°58' 07" N Long. 107°02' 25" W
Mtn Range, Valley, etc. Near top of ridge; bold outcrop above flow-banded interval.
Sample Description:

Formation
Catalogue #
Our Rock Name rhyolite
Formation upper rhyolite of Pound Ranch
Age: Epoch, etc: mid-Miocene
Radiometric 10.8 ± 0.4 m.y.

Field # Collected By Chapin & Osburn Date Collected 3/2/77
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.
hand/program name Fortran: NORM
Date:

Quartz	26.62	
Corundum	0.29	
Orthoclase	29.60	
Albite	30.59	
Anorthite	7.82	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.83	
Ferrosilite	2.59	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.55	
Hematite		
Ilmenite	0.81	
Sphene		
Apatite	0.30	
Calcite		
Rutile		
Others		
	100.01	

COMMENTS:

D.I. = 86.8

Sample # 77-3-2

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	70.88	71.87		
Al_2O_3	14.36	14.52		
TiO_2	0.440	0.428		
Fe_2O_3	2.57	0.38		2.68 INAA
FeO		1.90		
MnO	0.069	0.066		
MgO	0.42	0.33		
CaO	1.76	1.75		
Na_2O	3.71	3.62		3.90 INAA
K_2O	4.95	5.01		
P_2O_5	0.134	0.130		
H_2O^+/LOI	0.38	-		
H_2O -	0.169	-		
CO_2	-	-		
Others				
FeO*				2.33
Total	99.84	100.00		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

(ppm)	XRF	INAA
Ag		
B		
Ba		1133
Be		
Ce		81
Cd		
Co		5.2
Cr		5
Cs		2.2
Cu		
Dy		
Er		
Eu		1.2
Ga		
Gd		
Ge		
Hf		5.7
Ho		
La		46
Li		
Lu		0.5
Mo		
Nb	20	
Nd		
Ni		
Pb	21	
Pd		
Pr		
Rb	162	167
Re		
Sb		0.5
Sc		5
Sm		6
Sn		
Sr	315	
Ta		1.6
Tb		0.9
Th	16	14
Tm		
U	3	3.4
V		
Y	33	
Yb		3.3
Zn		
Zr	184	
Others		

Sample # 7-26-2

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 21, T. 4S R. 2W (NE¼ of NW¼)

Lat. 33°57'08" N Long. 107°03' 24" W

Mtn Range, Valley, etc. Columnar-jointed vitrophyre at base of hill.

Catalogue #

Our Rock Name rhyolite

Formation upper rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 10.8 ± 0.4 m.y.

Sample Description:

Field # 7-26-2 Collected By D. B. Date Collected 7/26/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	27.71	
Corundum	0.30	
Orthoclase	25.18	
Albite	31.76	
Anorthite	9.17	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.62	
Ferrosilite	2.56	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.55	
Hematite		
Ilmenite	0.84	
Sphene		
Apatite	0.30	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 84.7

Sample # 7-26-2

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %	
SiO_2	69.59	71.96		
Al_2O_3	13.97	14.45		
TiO_2	0.427	0.442		
Fe_2O_3	2.42	0.38		2.59 INAA
FeO		1.91		
MnO	0.054	0.056		
MgO	0.63	0.65		
CaO	1.95	2.02		
Na_2O	3.63	3.75		4.01 INAA
K_2O	4.12	4.26		
P_2O_5	0.123	0.127		
H_2O^+/LOI	2.86	-		
H_2O -	0.09	-		
CO_2	-	-		
Others				
FeO*				2.29
Total	99.86	100.01		

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	INAA
Ag		
B		
Ba		1098
Be		
Ce		86
Cd		
Co		4
Cr		4
Cs		2.0
Cu		
Dy		
Er		
Eu		1.1
Ga		
Gd		
Ge		
Hf		6.2
Ho		
La		47
Li		
Lu		0.50
Mo		
Nb	21	
Nd		
Ni		
Pb	19	
Pd		
Pr		
Rb	117	120
Rc		
Sb		0.61
Sc		5
Sm		5.8
Sn		
Sr	326	
Ta		1.7
Tb		0.7
Th	14	14.5
Tm		
U	3	3.6
V		
Y	30	
Yb		3.5
Zn		
Zr	194	
Others		

Sample # 7-28-1

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 10 T. 4S R. 2W (NW¼ of NE¼)

Lat. 33°58'52" N Long. 107°01' 50" W

Mtn Range, Valley, etc. Approx. 80 ft above power-line road (first gully west of gate).

Sample Description:

Catalogue #

Our Rock Name rhyolite

Formation upper rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 10.8 ± 0.4 m.y.

Field # 7-28-1 Collected By D. B. Date Collected 7/28/82

Author's Rock Name high-K rhyolite

Description: flow-banded interval

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ____ Grid ____

Over area of ____ thin sections

Multiple Analyses

average of ____ thin sections counted as above.

Counted by:

Type Counter ____ Date ____

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst: D. Bobrow

Method: universal stage

Date: 2/83

	Phenocrysts	Groundmass
Average	An_{39}	
Range	An_{29} to An_{47}	
Zoning	normal to oscillatory	
# Grains	10	

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	29.10	
Corundum	1.00	
Orthoclase	26.41	
Albite	29.61	
Anorthite	8.38	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	1.07	
Ferrosilite	2.70	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.58	
Hematite		
Ilmenite	0.85	
Sphene		
Apatite	0.29	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

D.I. = 85.1

Sample # 7-28-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.63	72.06	
Al_2O_3	14.38	14.67	
TiO_2	0.436	0.445	
Fe_2O_3	2.55	0.40	
FeO		1.98	
MnO	0.062	0.063	
MgO	0.42	0.43	
CaO	1.82	1.86	
Na_2O	3.43	3.50	
K_2O	4.38	4.47	
P_2O_5	0.123	0.125	
H_2O^+/LOI	0.77	-	
H_2O -	0.81	-	
CO_2	-	-	
Others			
FeO*			2.34
Total	99.81	100.00	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		

Sample # 7-28-3

CHEMICAL DATA FORM

Formation

Location

County Socorro

Quad. Molino Peak 7½'

Sec. 10 T. 4S R. 2W (NW¼ of NE¼)

Lat. 33°58' 20" N Long. 107°02' 11" W

Mtn Range, Valley, etc. Approx. 80 ft above stream channel.

Catalogue #

Our Rock Name rhyolite

Formation upper rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene

Radiometric 10.8 ± 0.4 m.y.

Sample Description:

Field # 7-28-3 Collected By D. B. Date Collected 7/28/82

Author's Rock Name high-K rhyolite

Description:

Reference:

Modal Analysis (Volume %)

Single analysis

Points counted ______ Grid ______

Over area of ______ thin sections

Multiple Analyses

average of ______ thin sections counted as above.

Counted by:

Type Counter ______ Date ______

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:

Method:

Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D. B.

hand/program name Fortran: NORM

Date:

Quartz	26.72	
Corundum	0.16	
Orthoclase	31.22	
Albite	29.66	
Anorthite	7.01	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.84	
Ferrosilite	2.69	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.58	
Hematite		
Ilmenite	0.82	
Sphene		
Apatite	0.30	
Calcite		
Rutile		
Others		

COMMENTS: 100.01

Sample # 7-28-3

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	70.96	72.09	
Al_2O_3	13.99	14.21	
TiO_2	0.424	0.431	
Fe_2O_3	2.56	0.40	
FeO		1.98	
MnO	0.044	0.045	
MgO	0.33	0.34	
CaO	1.56	1.59	
Na_2O	3.45	3.51	
K_2O	5.20	5.28	
P_2O_5	0.127	0.129	
H_2O^+/LOI	0.53	-	
H_2O -	0.22	-	
CO_2	-	-	
Others			
FeO*			2.34
Total	99.40	100.01	

Isotopes

Sr 87/86 measured 0.7069
initial 0.7067

Oxygen

Others

U	Pb
3.17	20.0

Pb 207/204 15.500
Pb 206/204 17.537

Comments

U, Pb, & Sr data by S. Bowring (personal communication)

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

	XRF (ppm)	
Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb	22	
Nd		
Ni		
Pb	19	
Pd		
Pr		
Rb	175	
Rc		
Sb		
Sc		
Sm		
Sn		
Sr	287	
Ta		
Tb		
Th	16	
Tm		
U	3	
V		
Y	29	
Yb		
Zn		
Zr	179	
Others		

Sample # 26-1

CHEMICAL DATA FORM

Formation

Location

County Socorro
Quad. Molino Peak 7½'
Sec. T. R.
Lat. Long.
Mtn Range, Valley, etc.

Catalogue #
Our Rock Name rhyolite
Formation upper rhyolite of Pound Ranch

Age: Epoch, etc: mid-Miocene
Radiometric 10.8 ± 0.4 m.y.

Sample Description:

Field # 26-1 Collected By D.B. Date Collected 6/26/82
Author's Rock Name high-K rhyolite
Description:

Reference:

Modal Analysis (Volume %)

Single analysis
Points counted Grid
Over area of thin sections

Multiple Analyses
average of thin sections
counted as above.

Counted by:
Type Counter Date

Quartz		
K-Feldspar		
Plagioclase		
Biotite		
Amphiboles		
Pyx. clino		
ortho		
Olivine		
Opaques		
Groundmass		
Others		

Plagioclase Composition

Analyst:
Method:
Date:

	Phenocrysts	Groundmass
Average		
Range		
Zoning		
# Grains		

CIPW Norms

Calculated by: D.B.
hand/program name Fortran: NORM
Date:

Quartz	27.51	
Corundum	0.55	
Orthoclase	29.77	
Albite	30.24	
Anorthite	7.00	
Nepheline		
Diopside		
Wollastonite		
Enstatite		
Ferrosilite		
Hypersthene		
Enstatite	0.63	
Ferrosilite	2.64	
Olivine		
Forsterite		
Fayalite		
Magnetite	0.56	
Hematite		
Ilmenite	0.81	
Sphene		
Apatite	0.29	
Calcite		
Rutile		
Others		
	100.00	

COMMENTS:

Sample # 26-1

MAJOR OXIDES (%)

Analyst:
Lab: NMBMMR
Method: X-R-F
Date:

	Wt.%	H_2O & Vol Free	Mole %
SiO_2	71.49	72.18	
Al_2O_3	14.31	14.45	
TiO_2	0.423	0.427	
Fe_2O_3	2.52	0.39	
FeO		1.94	
MnO	0.054	0.055	
MgO	0.25	0.25	
CaO	1.56	1.58	
Na_2O	3.54	3.57	
K_2O	4.99	5.04	
P_2O_5	0.124	0.125	
H_2O^+/LOI	0.40	-	
H_2O -	0.06	-	
CO_2	-	-	
Others			
FeO*				2.29
Total	99.72	100.01	

Isotopes

Sr 87/86 measured

initial

Oxygen

Others

Comments

TRACE ELEMENTS (ppm)

Analyst:
Lab:
Method:
Date:

Ag		
B		
Ba		
Be		
Ce		
Cd		
Co		
Cr		
Cs		
Cu		
Dy		
Er		
Eu		
Ga		
Gd		
Ge		
Hf		
Ho		
La		
Li		
Lu		
Mo		
Nb		
Nd		
Ni		
Pb		
Pd		
Pr		
Rb		
Rc		
Sb		
Sc		
Sm		
Sn		
Sr		
Ta		
Tb		
Th		
Tm		
U		
V		
Y		
Yb		
Zn		
Zr		
Others		