GM-52—Geology of Florida Gap quadrangle, Luna County, New Mexico

By R. E. Clemons, 1982

Discussion

Florida Gap quadrangle is in east-central Luna County, approximately 6 mi east-southeast of Deming (fig. 1). NM-549 (old US-70–US-80) crosses the northern edge of the quadrangle, and paved roads from NM-549 and NM-11 go to Rock Hound State Park in the west-central part of the quadrangle. Paved roads from NM-549 and gravel roads provide good access to the Lewis Flats area in the northeast corner of the quadrangle. Access to the remainder of the map area is good via gravel roads and jeep trails to the many cattle tanks, windmills, mines, and subdivisions.

The Little Florida Mountains occupy the northwest third of the quadrangle; the Lewis Flats (elevations 4,100–4,200 ft) portion of the Mimbres Basin covers the northeast corner. Florida Gap (elevation approximately 4,570 ft) separates the Little Florida Mountains (highest elevation 5,634 ft) from the Florida Mountains to the south. The highest elevation in the map area (7,440 ft) is in the extreme southwest corner of the quadrangle, 0.2 mi north of Florida Peak (7,448 ft, the highest point in the Florida Mountains). Needles Eye (formerly called Arco del Diablo) is 0.5 mi east of the high point in the quadrangle.

The Florida Gap quadrangle was included in Darton's (1916) geologic map of Luna County and in the Deming folio (Darton, 1917). Lasky (1940) published a generalized geologic map of the Little Florida Mountains in his report on the manganese deposits of the area. Griswold (1961) included generalized descriptions of the geology and mining districts within the Florida Gap quadrangle as part of his report on the mineral deposits of Luna County. The southwest corner of the quadrangle was mapped by Corbitt (1971).

This report, the result of a detailed geologic study conducted in 1979, is intended as the first phase of a comprehensive geologic and mineral-resource investigation of the Florida Mountains. A geologic study of the Capitol Dome quadrangle will be completed in 1981 and followed by geologic studies of the South Peak and Gym Peak quadrangles. Several age determinations and regional correlations are tentative.

STRATIGRAPHY

RUBIO PEAK FORMATION (*Trs*)—The oldest rocks exposed in the Florida Gap quadrangle are assigned to the Rubio Peak Formation (probably late Eocene). The northeast Florida Mountains are composed of approximately 1,600 ft of volcaniclastic rocks. These rocks were mapped as Tertiary volcanic agglomerate by Darton (1916, 1917), Lochman-Balk (1958, 1974), and Corbitt (1971). The rocks consist almost entirely of material derived from andesitic to dacitic tuffs and lavas, with lesser amounts of basalt clasts. The strata are primarily fluvial deposits, but laharic and talus(?) deposits are common in the lower part.

The base of the volcaniclastic sequence is not exposed in the Florida Gap quadrangle. However, within 1 mi to the west and south of the southwest corner of the quadrangle, the sequence is disconformably underlain by the Lobo Formation of Darton (1916). A basal conglomerate is composed of well-rounded clasts, up to boulder size, of limestone, cherty limestone, granite, and occasional andesitic rocks in a tuffaceous, sandy matrix. This conglomerate is overlain by a thick sequence of grayish-purple and reddish breccias of polylithic volcanic clasts, up to several feet in size, in a reddish, sandy matrix. Bedding is generally thick to massive and in places obscure. This sequence grades upward for approximately 100 ft into a light-gray to greenish-gray sequence of massive to medium-bedded breccias and conglomeratic sandstones. The uppermost beds, at the highest point in the Florida Mountains, are fine- to medium-grained sandstones with a few interbedded pebble conglomerates. Here the sandstones are intensely propylitized, very poorly sorted, plagioclase-rich, volcanic arenites with microcrystalline quartz cement. Epidote is extremely abundant and forms bright-green concretions in the sandstones. Epidote concretions up to 10 inches in diameter commonly weather out of the sandstone beds around the Needles Eye, Windmill Canyon, and Spring Canyon areas.

Numerous narrow, mafic dikes intrude the Starvation Draw member, but it is doubtful that they are responsible for the intensive propylitization of at least 1,600 ft of volcaniclastic strata. Possibly, a pluton under the area provided the altering fluids. The dikes, severely weathered near the surface and poorly exposed on steep slopes, appear similar to the diabasic hawaiite dikes north of Fluorite Ridge dated at 37.6 m.y. (Clemons, 1980).

This thick section of volcaniclastic rocks tentatively is correlated with the Starvation Draw member (Clemons, 1980) of the Rubio Peak Formation in the Massacre Peak quadrangle. The basal beds have similar lithology except for the abundance of Sarten Sandstone clasts in the Massacre Peak quadrangle where the Rubio Peak Formation was deposited on the Sarten Sandstone and Colorado Shale; these strata are missing in the Florida Mountains where the Rubio Peak was laid down on the Lobo Formation (probably Early Cretaceous). The great thickness of fine-grained, fluvial beds indicates deposition in a basin farther from the source area than the tuff breccias that predominate in the Good Sight Mountains to the northeast (Clemons, 1979) and Cooke's Range to the north (Clemons, 1980). These areas and the Tres Hermanas Mountains may have been the sources for the volcaniclastic rocks.

ANDESITE OF LITTLE FLORIDA MOUNTAINS (*Tla*)—Discontinuous outcrops of basaltic andesite, andesite, and dacite are poorly exposed for approximately 7.5 mi along the western base of the Little Florida Mountains from Florida Gap to the extreme northwest corner of the quadrangle. The andesite is exposed in the roadcut of NM-549 at the western edge of the map. Exact age of this unit is unknown, but it probably also belongs in the Rubio Peak Formation. Darton (1916, 1917) reported thin flows of similar rock (keratophyre) interbedded in the lower agglomerate near Capitol Dome to the west. I have been unable to locate these flows. Darton also reported a hornblende-augite andesite capping the agglomerate 1.5 mi southeast of the Needles Eye. Whether or not the andesite in the Little Florida Mountains is intrusive or extrusive is uncertain. Probably both rock types are present and may have come from some of the same vents that later supplied the voluminous rhyolites.

The dense, finely crystalline rock is characteristically medium gray to brownish gray and varies little in appearance throughout its 7.5 mi of discontinuous exposures. Microscopic examination reveals plagioclase laths (average 0.15 mm) forming a hyalopilitic, pilotaxitic texture. Oxidized hornblende(?) microphenocrysts, tiny grains of magnetite, and an occasional augite microphenocryst compose less than 2 percent of the rock. Chemical analyses of four representative samples are included in table 1.

ASH-FLOW TUFF OF LITTLE FLORIDA MOUNTAINS (*Tlaf*)—Six small exposures of ash-flow tuff occur west and northwest of The Little Gap. Neither the base nor the top of the ash flow is exposed at any of the outcrops, but the tuff, either resting on or intruded by andesite, is overlain by tuffaceous sediments and flow-banded rhyolite. Approximately 1 mi north of Rock Hound State Park more than 300 ft of south-dipping, massive ash-flow tuff is exposed in the small, prominent, west-trending ridge. Slope colluvium also obscures the contacts at this locality, but the tuff overlies the Rubio Peak Formation and was intruded by flow-banded rhyolite.

The ash-flow tuff is typically a grayish-pink to pale-red rock with abundant small, white, flattened pumice fragments. Pumice is less abundant in the massive tuff. Crystal fragments compose 7–30 percent of the tuff, and lithic fragments, composing up to 8 percent of the massive tuff, are less abundant in the small outcrops to the northwest. The basal part of the massive tuff is a lithic tuff with relatively few crystals. Plagioclase (5–12 percent), sanidine (1–10 percent), quartz (1–8 percent), biotite (1–3 percent), traces of hornblende and sphene crystals, and rock fragments occur in a matrix of abundant axiolitic shards and glass throughout the upper three-fourths of the unit. Hydrothermal alteration has converted the plagioclase to chalky white clays.

A potassium-argon age of 37.3 ± 1.4 m.y. was determined for biotite from the tuff cropping out west of The Little Gap. An age of 32.0 ± 1.2 m.y. was determined for biotite from the massive tuff 1.0 mi north of Rock Hound State Park. The tuff at these two areas probably belongs to the same formation. The younger age for the second tuff is probably the consequence of that tuff having undergone hydrothermal alteration related to later rhyolitic intrusives.

RHYOLITE AND TUFF OF LITTLE FLORIDA MOUNTAINS (*Tlr* and *Tlt*)—The western and northern parts of the Little Florida Mountains are composed of mostly flow-banded rhyolite (*Tlr*), obsidian, rhyolitic tuff, and associated tuffaceous beds (*Tlt*). Darton (1916, 1917) and Lasky (1940) described these rocks as interbedded rhyolite, obsidian flows, and tuff beds. A different interpretation follows as a result of the present geologic study. At least half, and maybe most, of the rhyolite exposed along the western escarpment and crest of the Little Florida Mountains belongs to a series of elongate, irregular, domal to dike-like intrusions. Their contacts are obscure but appear to range from vertical to steep, east- or northeast-dipping attitudes. Many of the intrusions between Rock Hound State Park and the southeast end of the range have black, perlitic obsidian border zones. These zones intrude the penecontemporaneous, greenish- to orangish-gray lithic tuffs and volcaniclastic beds deposited around the vents. Exposures between the lower parts of Mamie and South Canyons indicate a partly buried rhyolitic volcano and vent area with extensive hydrothermal alteration. Several west-trending rhyolite dikes form prominent, low ridges in the slopes and piedmont surface southwest of The Little Gap. Two or three small, intrusive, rhyolite bodies crop out on the southwest side of the hill northwest of The Little Gap. Several flows from these intrusions flowed northeastward and form the northeast part of the hill.

The rhyolite, ranging from grayish pink and pale red to dark grayish red, is very finely crystalline and contains less than 1 percent microphenocrysts. Flow banding is prominent locally near the margins of the intrusions, but generally the rock is massive; an autobreccia texture predominates. The breccia in the southeast end of the range contains prolific cavities, apparently caused by alteration and removal of angular autoliths up to 12 inches in diameter. Some cavities contain spherulites that formed after removal of the clasts. Spherulites up to several inches diameter are common near contacts in the southern end of the Little Florida Mountains. Some of the spherulites have white to bl ˙sh-gray chalcedony centers. Geodes partly filled with chalcedony and occasional vugs containing clear quartz crystals are common in a zone extending from Rock Hound State Park southeastward across the range. Moderate reddish-brown jasper fills fractures in the rhyolite and tuff near the contacts throughout this same zone.

A whole-rock sample from the eastern edge of Rock Hound State Park yielded a potassium-argon age of 23.6 ± 1.0 m.y.

RHYOLITE DIKES IN FLORIDA MOUNTAINS (*Tr*)—Several white rhyolite dikes intrude the Rubio Peak Formation in Windmill Canyon. The dikes, 6–18 ft thick, were intruded along en echelon fractures with a northeasterly trend and steep southerly dips. Similar ˙kes are present in the Florida Mountains to the west and south. The rhyolite is holocrystalline, aphanitic (0.2–0.5 mm), and comprises orthoclase and quartz with minor muscovite, magnetite, and pyrite (Corbitt, 1971). Dendrites of manganese oxide coat most fracture surfaces. The orthoclase contains sericite alteration; weathered outcrops contain much kaolin.

This rhyolite is considered to be Oligocene or Miocene because it intrudes the Rubio Peak (late Eocene–early Oligocene) and older rocks.

BASALTIC ANDESITE OF LITTLE FLORIDA MOUNTAINS (*Tlb*)—Vesicular to amygdaloidal, basaltic-andesite flows overlie the rhyolite, altered tuff, and obsidian northeast of Mamie Canyon. The flows are overlain by massive fanglomerate breccias. One small outcrop of the basaltic andesite occurs near a manganese prospect on the west side of Mamie Canyon.

The dark-grayish-red to reddish-brown basaltic andesite is composed of altered plagioclase laths in an intersertal matrix of iron-oxide grains and brownish, cryptocrystalline to glassy material. A chemical analysis (table 1, no. 54) indicates probable potassium metasomatism of this rock. The interior vesicles are filled mostly with calcite and some chalcedony.

The exact age of the basaltic andesite is unknown (tentatively considered to be late Oligocene to early Miocene) but may correlate with part of the Bear Springs Basalt and Uvas Basaltic Andesite.

FANGLOMERATE OF LITTLE FLORIDA MOUNTAINS (*Tlf*)—The most extensive rock unit in the Little Florida Mountains is a thick fanglomerate sequence of breccias and conglomeratic sandstones. The basal breccias were deposited on an angular unconformity developed on the basaltic andesite, flow-banded rhyolite, tuff, and, in the extreme northwest corner of the map area, on andesite. Poorly developed pebble imbrication in the basal beds indicates a probable northeastward transport of the clasts. With few exceptions, the strata dip northeast 10–15 degrees. These strata are he host for manganese, barite, and fluorite deposits. A complete section cannot be measured because of numerous faults and poor exposures, especially on the pediment surface to the northeast. Lasky (1940) stated that at least 1,000 ft of the strata are present; a thickness of approximately 2,000 ft was estimated in this study.

The basal beds contain cobbles and boulders of andesite, vesicular basalt, and rhyolite. These beds are overlain by several hundred feet of coarse breccia beds composed of angular rhyolite clasts, up to 4 ft in diameter, in a red, silica-cemented, coarse sandy and muddy matrix. The sand and mud typically is restricted to the interstices between the larger clasts. At a couple of horizons within this sequence the matrix is light gray, resulting in light bands noticeable on aerial photographs. At the northeast base of the mountains a sudden, considerable decrease in clast size occurs—probably due to downfaulting of the northeast blocks, thus cutting out part of the fanglomerate section. As the clasts decrease from cobble to pebble size northeastward across the low hills and pediment to NM-549, the amount of interbedded sandstone increases. Moderately cemented, tuffaceous sandstones are exposed in the barite prospects and pipeline roadcuts in sec. 7, and thin-bedded, pebbly sandstone crops out along the small arroyo in the southwest corner of sec. 6 north of the highway.

The fanglomerate, tentatively considered to be middle Miocene and postdating the 23.6-m.y. age of source-rock emplacement, accumulated as a result of initial uplift of the Little Florida Mountains block. This block probably represents an early stage of Basin and Range faulting in this area. The age of similar deposits related to early rift faulting in the Cedar Hills, approximately 40 mi northeast, is considered to be approximately 26 m.y. (Chapin and Seager, 1975). Seager and Hawley (1973) attributed the basal fanglomerates in the Santa Fe Group at Rincon to early Miocene block faulting. The fanglomerates of the Little Florida Mountains were lithified and faulted before manganese, barite, and fluorite mineralization occurred. Similar mineralization near Rincon is considered to be of Miocene age (Seager and Hawley, 1973).

DACITE OF LITTLE FLORIDA MOUNTAINS (*Tld*)—A grayish- to dusky-red, microcrystalline to glassy dacite crops out in the southeast end of the Little Florida Mountains. A border zone of several feet, containing prolific spherical, ellipsoidal, and rod-shaped spherulites, displays steep-dipping to vertical flow foliation. The dacite intrudes hydrothermally altered vent tuffs, basaltic andesite, and fanglomerate. If the assumed Miocene age of the fanglomerate is correct, the dacite is probably middle to late Miocene and may be related to the manganese, barite, and fluorite mineralization that occurs in the fanglomerate.

MIMBRES FORMATION (*QTm* and *Qm*)—Clemons (1980) proposed using Mimbres formation informally in the Mimbres Basin until current mapping projects in the basin are completed. The piedmont-slope facies of the Mimbres formation (Pliocene–Pleistocene), composed of mostly alluvial-fan and coalescent-fan deposits, also includes thin, colluvial veneers on pediment surfaces. *Qm* is correlative with the Camp Rice Formation piedmont facies (*Qcrp*) in south-central New Mexico. *QTm* is correlative in part with the basal Camp Rice Formation (*Qcrc*) but probably includes some older strata of Pliocene age.

Remnants of colluvial veneers cemented with caliche are present around the Little Florida Mountains, and more extensive exposures occur on the fanglomerate west and northwest of Lewis Flats. Thick, alluvial-fan deposits are prominent southeast of Florida Gap.

QUATERNARY ALLUVIUM—Older piedmont-slope alluvium (*Qpo*) is similar in composition to the Mimbres formation piedmont-slope facies in that the alluvium invariably reflects the lithology of local source areas. The alluvium includes arroyo-terrace and fan deposits, and thin (less than 10 ft) veneers on erosion surfaces, generally of late Pleistocene age. Thin soil horizons and weak soil-carbonate accumulations are present in most sections. Arroyo-channel, terrace, and fan deposits associated with modern arroyos (*Qpy*) range in age from late Wisconsinan (less than 25,000 yrs old) to the present. These deposits and the late Pleistocene deposits are products of repeated episodes of cutting and partial backfilling of arroyo valleys (Seager and others, 1975). Zones of soil-carbonate accumulation are weak or absent in the Holocene (less than 10,000 yrs old) deposits. An undifferentiated piedmont unit (*Qpa*) is used in areas where *Qpo* and *Qpy* deposits did not warrant separate mapping.

Colluvial and alluvial deposits (*Qca*) have been mapped on slopes where they form a relatively continuous cover on older units. These deposits are generally less than 10 ft thick and reflect the lithology of nearby higher slopes and ledges. Most of the mapping unit is an age equivalent of older and younger piedmont-slope alluvium (*Qpo* and *Qpy*). Locally, the unit may correlate with the younger piedmont-slope facies of the Mimbres formation (*Qm*).

Basin-floor sediments (*Qbf*) cover an extensive area in the northeast part of the Florida Gap quadrangle. They include loamy to clayey alluvium deposited by distributaries of the Mimbres River in an area essentially unaffected by arroyo incision. The deposits are typically devoid of gravel, but sporadic, intertonguing, gravelly lenses were deposited by flooded arroyos from the Little Florida and Florida Mountains.

Eolian sand (*Qs*) covers a large area along the margin of the piedmont slope and basin floor east of the mountains. Small areas of sand cover also extend into the map area from the northwest. The dunes are generally less than 10 ft high; most are more or less stabilized by desert vegetation. Nearby exposures generally warrant using a double map symbol to indicate the underlying unit, such as *Qs/Qbf*.

STRUCTURE

Darton (1916, 1917) and Lasky (1940) showed several faults and folds in the rhyolite and tuff along the western slopes of the Little Florida Mountains. These structures apparently were used to explain the repetition of rhyolite cliffs and obsidian and tuff exposures. However, no other evidence of faulting was observed during the present study; by interpreting the rhyolites as intrusive, no faults are required. In the map area most of the faults confined to the fanglomerate outcrops in the east-central part of the Little Florida Mountains trend north to northwest and dip 60–80 degrees. Although both down-to-the-east and down-to-the-west movements are evident, the largest displacements have been down to the east or northeast. Lasky (1940) reported that the maximum stratigraphic throw recognizable in the manganese mine workings is approximately 200 ft; he also noted that the footwalls have deep, steeply pitching grooves suggesting movement parallel to the dips of the faults. Although several periods of movement can be recognized from vein structures, the latest movement predates the manganese, barite, and fluorite deposits.

More recent movements are evident on two faults. One extends from the northwest corner of the Florida Gap quadrangle south-southwest into the Capitol Dome quadrangle for approximately 7 mi. Windblown sand covers the fault trace at its northern end, but to the southwest a slightly eroded, west-facing, 6–10 ft scarp truncates the Mimbres formation (*Qm*). This fault crosses NM-549 at the west end of the roadcut containing the basaltic andesite. Just south of the roadcut is a small, brecciated outcrop of ash-flow tuff on the western edge of the upthrown block. This fault is probably the frontal fault of the present day Little Florida Mountains and has moved as recently as middle Pleistocene time. A smaller(?) fault of similar age has offset the Mimbres formation (*Qm*) at Headquarters Draw in the south-central part of the map area. The eastern block has been dropped down along this fault. This fault may continue northwest through Florida Gap and may have older movements that downdropped the Little Florida Mountains block relative to the Florida Mountains.

ECONOMIC GEOLOGY

The mineral deposits in the Florida Gap quadrangle have been described by Lasky (1940) and Griswold (1961). The Little Florida district is located at the northeast end of the mountains. The principal ores extracted intermittently between 1918 and 1959 consisted of manganite, psilomelane, pyrolusite, and wad. Some veins contained much botryoidal hematite. At the northeast end of the district, fluorite and barite were mined intermittently from 1925 to 1951. All the mineralization occurs along faults cutting the fanglomerate. Currently the mines are inactive, but some interest in the barite is evident from fresh prospect pits for mill samples.

The Bradley mine, located approximately 1 mi east of the Needles Eye in the northern Florida Mountains, is a lead-zinc-silver prospect in the Rubio Peak Formation. An east-trending, vertical vein contains small amounts of galena, sphalerite(?), and minor chalcopyrite, in a gangue of pyrite, limonite, calcite, and quartz (Griswold, 1961). Principal mining activity was in the early 1900's.

A clay pit in the southeast end of the Little Florida Mountains is located in altered tuff associated with rhyolite. The period of activity, amount and type of material removed, and its use have not been determined. Neither Lasky (1940) nor Griswold (1961) mentioned the clay quarry, but the topographic map published in 1964 shows a gravel quarry at this location.

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REFERENCES

Chapin, C. E., and Seager, W. R., 1975, Evolution of the Rio Grande rift in the Socorro and Las Cruces areas: New Mexico Geological Society, Guidebook 26th field conference, p. 297–321

Clemons, R. E., 1979, Geology of Good Sight Mountains and Uvas Valley, southwest New Mexico: New Mexico Bureau of Mines and Mineral Resources, Circ. 169, 32 p.

———, 1981, Geology of Massacre Peak quadrangle, Luna County, New Mexico: New Mexico Bureau of Mines and Mineral Resources, Geol. Map 51, scale 1:24,000

Corbitt, L. L., 1971, Structure and stratigraphy of the Florida Mountains, New Mexico: Ph.D. thesis, University of New Mexico, 115 p.

Darton, N. H., 1916, Geology and underground water of Luna County, New Mexico: U.S. Geological Survey, Bull. 618, 188 p.

———, 1917, Description of the Deming quadrangle: U.S. Geological Survey, Geologic Atlas, Folio 207

Griswold, G. B., 1961, Mineral deposits of Luna County, New Mexico: New Mexico Bureau of Mines and Mineral Resources, Bull. 72, 157 p.

Irvine, T. N., and Baragar, W. R. A., 1971, A guide to the chemical classification of the common volcanic rocks: Canadian Journal of Earth Sciences, v. 8, p. 523–548

Lasky, S. G., 1940, Manganese deposits in the Little Florida Mountains, Luna County, New Mexico; a preliminary report: U.S. Geological Survey, Bull. 922-C, p. 55–73

Lochman-Balk, C., 1958, The Capitol Dome section, Florida Mountains: Roswell Geological Society, Guidebook 11, p. 47–52

———, 1974, The Capitol Dome section, Florida Mountains: El Paso Geological Society, Guidebook 8, p. 7–15

Seager, W. R., and Hawley, J. W., 1973, Geology of Rincon quadrangle, New Mexico: New Mexico Bureau of Mines and Mineral Resources, Bull. 101, 42 p.

Seager, W. R., Clemons, R. E., and Hawley, J. W., 1975, Geology of Sierra Alta quadrangle, Dona Ana County, New Mexico: New Mexico Bureau of Mines and Mineral Resources, Bull. 102, 56 p.

TABLE 1—Chemical analyses of ro[illegible]s in the Florida Gap quadrangle, adjusted for Irvine and Baragar classification (1971).

	Sample 16 Basaltic andesite Rock Hound State Park SW¼SW¼ sec. 30, T. 24 S., R. 7 W.	**Sample 29** Rhyolite Rock Hound State Park NE¼SW¼ sec. 30, T. 24 S., R. 7 W.	**Sample 33** Altered rhyolite ash flow tuff 1 mi north of [illegible]ock Hound State Park N[illegible]¼SE¼ sec. 24, T. 24 S., R. 8 W.	**Sample 43** Rhyolite ash-flow tuff west side of The Little Gap NW¼SW¼ sec. 18, T. 24 S., R. 7 W.
SiO_2	52.76	80.40	68.23	70.00
TiO_2	1.28	0.25	0.45	0.18
Al_2O_3	18.59	9.37	12.51	11.94
FeO_t	7.70	1.03	1.59	1.88
MnO	0.04	0.03	0.04	0.12
MgO	3.58	0.08	0.32	0.45
CaO	8.68	0.45	4.20	5.15
Na_2O	4.15	0.89	1.19	2.49
K_2O	1.25	6.26	5.54	4.94
LOI	1.39	0.52	4.72	3.16
P_2O_5	0.08	0.05	0.05	0.05
total	99.50	99.33	98.84	100.36

Sample 47 Andesite west side of The Little Gap NE¼NW¼ sec. 18, T. 24 S., R. 7 W.	Sample 54 Altered, amygdaloidal basaltic andesite east side of Mamie Canyon SE¼SW¼ sec. 32, T. 24 S., R. 7 W.	Sample 56 Glassy dacite southwest of Mamie Canyon NW¼NE¼ sec. 5, T. 25 S., R. 7 W.	Sample 57 Rhyolite perlitic obsidian upper end of South Canyon NW¼SE¼ sec. 31, T. 24 S., R. 7 W.
61.97	56.63	67.11	72.72
0.62	1.23	0.76	0.17
17.95	17.50	15.00	12.09
4.70	8.12	2.63	1.23
0.06	0.06	0.03	0.05
1.01	0.53	0.15	0.12
5.88	1.75	0.87	1.06
3.93	0.82	2.49	3.04
1.93	10.84	9.15	6.02
1.21	1.32	0.41	4.00
0.05	0.13	0.08	—
99.31	98.93	98.68	100.50

Sample 61 Andesite NM-549 roadcut SE¼SW¼ sec. 1, T. 24 S., R. 8 W.	Sample 67 Andesite west side of The Little Gap NE¼NW¼ sec. 18, T. 24 S., R. 7 W.	Sample 69 Basalt boulder in Starvation Draw member Lover's Leap Canyon SE¼NE¼ sec. 12, T. 25 S., R. 8 W.	Sample 76 Rhyolite dike Windmill Canyon NW¼NW¼ sec. 18, T. 25 S., R. 7 W.
57.53	63.42	51.38	75.23
1.08	0.58	0.30	0.08
18.14	17.55	17.08	14.28
5.01	4.38	9.77	0.57
0.03	0.07	0.07	0.02
1.89	0.88	3.42	0.10
7.95	6.44	5.99	0.95
3.93	3.90	3.96	2.52
1.93	2.17	1.93	4.82
0.86	0.84	4.06	1.25
0.34	0.05	0.16	—
98.69	100.28	98.12	99.82