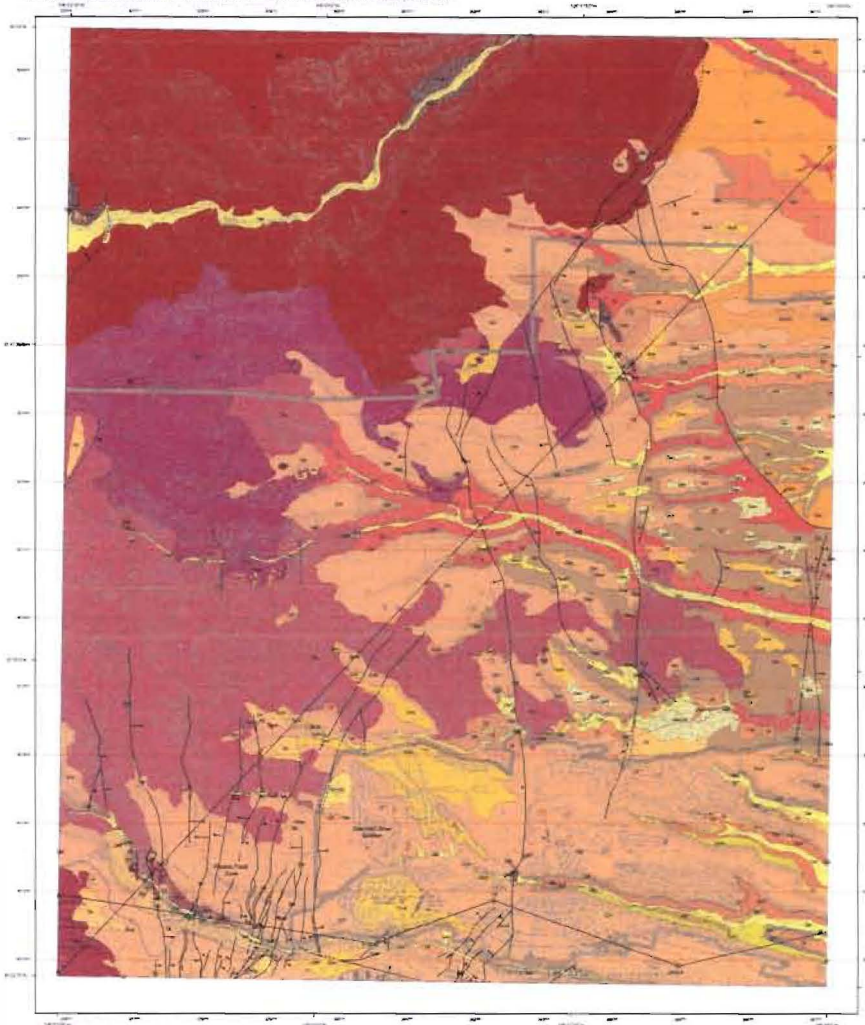


Map Unit Descriptions

Qal — **Alluvium (Late Pleistocene to Holocene)** — Silt, sand and gravel deposited in stream drainages and valleys. Source deposits. Alluvium deposits the Rinconada Canyon and Los Valles are particularly large, with sand and gravel of the Rinconada to source derived from the Tschicoma Formation, among deposits within the Pajarito Plateau contain abundant chert and phenocryst grains of the Bandelier Tuff. Age based on work of Phillips et al. (1998) and Reneau (1990) maximum thickness of 7 m.

Qes — **Eolian and sheet wash deposits (Late Pleistocene to Holocene)** — Tan to brown silty clay, silt and fine sand deposited primarily on Cerro Grande alluvial on the east side of the map area. Sediment is transported to by the wind, but is reworked by sheet wash. Average thickness of 1 m.

Qc — **Colluvium (Late Pleistocene to Holocene)** — Talus debris that typically forms wedge-shaped deposits adjacent to cliffs, in particular the Chicago Intermediate of the Bandelier Tuff. Debris is angular to subrounded, often poorly sorted, and contains boulders up to 1 meter. Although thickness from hundreds even mapped at only 1 km thickness, underlains on south facing slopes. Maximum thickness of 17 m.

Qt — **Terrace gravel (Late Pleistocene to Holocene)** — Fluvial bedded to massive sand and gravel, composed primarily of Tschicoma Formation lava in Bandelier Tuff, deposited along the edges of modern drainages, as level, as much as 30 m above the present channel. Terraces are moderately well developed in Rinconada Canyon (Reneau and McDonald, 1996). Terraces are also well preserved in eastern Pueblo Canyon, Sleepy Canyon, and Sawyer Canyon. In Pueblo Canyon, QTt is the higher terrace level, QTt is lower. El Cajete Pumice Bed occurs a few meters in the south wall of Pueblo Canyon. Maximum thickness of 30 m.

Qls — **Landslides (Late Pleistocene to Holocene)** — Two types: 1) deep-seated block slides that remain nearly intact after remaining from a steep slope to drift, 2) unconsolidated, mostly debris emplaced during a disorder mechanism with from a steep slope or cliff. The latter deposits are typically found on the valley floor. Maximum depth unknown.

Qpa — **Pediment alluvium (Late Pleistocene)** — Fan and sand gravel deposited on pediment surfaces at the eastern part of the long line. The El Cajete Pumice Bed occurs this area at the eastern edge of the quadrangle. Maximum 1 m in thickness.

Qmb — **Old alluvium (Late Pleistocene)** — Clasts of material Tschicoma formation clasts in Abiquiu and Ancestral Rinconada. Tuff preserved in a combination forming paleotemperature of the Lower Frijoles canyon in upper Little Canyon.

Qmb — **Older alluvium (Late Pleistocene)** — In the west part of Los Alamos this unit is largely composed of alternating gravel and sandstone layers of Sheep's upper underlained with lines of tuffites. Some gravel beds are dominated by pumice that now longer contains abundant phenocrysts of pumice and Tshicoma Formation lava and the Bandelier rhyolite and obsidian gravels. In pebble-sized gravel. The pumice beds are 15 to thick, the pumice is likely derived from the Cerro del Medio dome to the west of Los Alamos, which erupted at 1.1 Ma (Spell and Harmon, 1990). The main pumice is well exposed at a clear cut and southwest of the Lower Pueblo Canyon and Los Alamos Road in Los Alamos. Northeast of Los Alamos, the unit is dominantly gravel, including clasts of Bandelier Tuff, Tshicoma Formation lava, and Paleozoic limestone. Clasts of Bandelier Tuff are dominantly gravel, including clasts of abundant chert phenocrysts. Rounded to subrounded, mostly fine gravel, and sand. Maximum and thin composition of gravel, clasts other than sequence of QPt. Pumice beds are equivalent to the Lower Puye Formation (Reneau, 1990). Maximum thickness of 40 m.

Qcb — **Cerro Toledo deposits (see below) with younger alluvium under collectively undivided (Pleistocene)** — Tuffs deposits typically found in valleys where the upper portions of the underlying Cerro Toledo tuffites have been crumbled and are mixed with younger alluvium and colluvial material. Younger material typically includes crumbled clasts primarily of Bandelier Tuff (Tshirege Member Tuff) or Tshirege Member or clasts of pre-Bandelier Bandelier Tuff. Alluvial material may also include volcanic clasts, with crumbled cobbles and boulders of Tschicoma lava.

QTt — **Upper Bandelier Tuff, Tshirege Member (Pleistocene)** — Bright to orange to gray, poorly-welded to densely-welded quartzitic crystal-rich rhyolitic pyroclastic of rhyolite and quartz and trace amounts of sanidine and hypersthene (Smith and Bailey, 1966). Sanidine constitutes dominant feldspar phenocrysts. Accessory other diagenetic hypersthene < 1% except in discrete zones and lay sections. QTt is a compositional zone and with another zone is recognized by Reneau and McDonald (1996) and Gardner et al. (1996, 1996) and is well exposed in canyons throughout the Pajarito Plateau. Stage alternate Sanidine > 1 meter thick, are common at the base of the unit and contain a smaller pumice clasts (Pumicite Bed) that is typically. Thin pumicite was erupted from the Valles caldera at 1.2 Ma (Spell and Harmon, 1990). Maximum thickness of 100 m.

Qcc — **Lower Tshirege Member (Pleistocene)** — Tuffites crystal-rich rhyolite tuff equivalent alternate sequence between sequences of the Tshirege and lower sequence of the Bandelier Tuff (Reneau and Reneau, 1990). Alternate sequence occurs near left and complemented with volcanic clasts of Tschicoma lava. Approximate alternate sequence in Los Alamos Canyon occurs a basin lacking volcanic clasts. Tuffites contain abundant chert phenocrysts and hypersthene (Smith and Bailey, 1966). Tuffite deposits typically contain pumices with two phenocrysts of quartz and sanidine and hypersthene. At the surface portion of the lower zone overlapped tuffites cover over the top of the upper of with abundant phenocrysts of quartz and sanidine. Radiometric ages of pumices and sanidine from Stage Stage 1 (1.2 to 1.04 Ma (Spell et al., 1990; Spell et al., 1990; Maximum thickness of 100 m.

Qbc, Qbcg — **Lower Bandelier Tuff, Otowi Member (Pleistocene)** — Where to stage quartz-crystal quartzitic with dominant phenocrysts of quartz and sanidine (Smith et al., 1960). Sanidine accounts other fragments of tuff gray to red, tuffs, tuffs gray sanidine a supported appearance. This is primarily a stage-forming unit and was erupted from the Valles caldera at 1.61 ± 0.01 to 1.62 ± 0.01 Ma (Spell and Harmon, 1990; Spell et al., 1990). Otowi Member quartzitic was deposited primarily in the southeastern portion of the quadrangle and was not deposited north of Rendija Canyon. The Otowi Member Tuff, a densified quartzitic tuff and tuffs deposited from pyroclastic Otowi quartzitic composition, is exposed in isolated outcrops in Cerro Cuarto (gallery) and beneath the Otowi Member in Pueblo Canyon. The Otowi Member Tuff, which is 1.1 to thick, also crops out the contact between the Puye Formation and Cerro Toledo deposits in Sleepy Canyon. Maximum exposed thickness is 70 m.

Tp, Tpc — **Puye Formation (Pliocene)** — Light to dark gray fanglomerate derived from Tschicoma lava (Griggs, 1964; Stevens et al., 1984; Waresbacke, 1986; Turbeville et al. 1989). Tuff and sand layers interbedded with cobble or boulder layers conglomerates deposited in alluvial fans, debris, and alluvial fans. Clasts are typically coupled to subrounded and include a wide variety of rhyolite and trachyandesite lava. Phenocrysts of Rendija Canyon and Sacred of Labyrinth Mountains clasts are calcium. Lower Puye Formation deposits the overall Puye Fe Group extensions type of the Puye area include clasts of rhyolitic of Rendija Canyon, suggesting a upper reversed progradation of Puye Formation following the eruption of the Rendija Canyon Bandelier at 1.4 Ma. Reneau and Gardner (1990) note that deposition of the Puye Formation was probably controlled by footwall of the Rio Grande fault, subsidence of the Cuerva and Rio Grande, later located in the southeast of the quadrangle. An equal amount Rio Grande deposits containing crumbled pumicite and other volcaniclastic gravel known locally as the Cerro Cuarto (gallery) and beneath the Otowi Member in Pueblo Canyon. The Otowi Member Tuff, which is 1.1 to thick, also crops out the contact between the Puye Formation and Cerro Toledo deposits in Sleepy Canyon. Maximum exposed thickness is 70 m.

This level of history and is approximate. Clasts are dominantly from Tschicoma lava (Griggs, 1964; Stevens et al., 1984; Waresbacke, 1986; Turbeville et al. 1989). Tuff and sand layers interbedded with cobble or boulder layers conglomerates deposited in alluvial fans, debris, and alluvial fans. Clasts are typically coupled to subrounded and include a wide variety of rhyolite and trachyandesite lava. Phenocrysts of Rendija Canyon and Sacred of Labyrinth Mountains clasts are calcium. Lower Puye Formation deposits the overall Puye Fe Group extensions type of the Puye area include clasts of rhyolitic of Rendija Canyon, suggesting a upper reversed progradation of Puye Formation following the eruption of the Rendija Canyon Bandelier at 1.4 Ma. Reneau and Gardner (1990) note that deposition of the Puye Formation was probably controlled by footwall of the Rio Grande fault, subsidence of the Cuerva and Rio Grande, later located in the southeast of the quadrangle. An equal amount Rio Grande deposits containing crumbled pumicite and other volcaniclastic gravel known locally as the Cerro Cuarto (gallery) and beneath the Otowi Member in Pueblo Canyon. The Otowi Member Tuff, which is 1.1 to thick, also crops out the contact between the Puye Formation and Cerro Toledo deposits in Sleepy Canyon. Maximum exposed thickness is 70 m.

Tschicoma Formation (Pliocene)

Tsch — **"Tschicoma dacites" (shown only on cross-section B-B')** — Crystal-poor dacite with 1.5% phenocrysts of plagioclase, orthopyroxene and subordinate amphibole as well (B-B'). The age of 1.46 ± 0.14 and 1.50 ± 0.12 Ma have been determined from dacite lavas in a shallow to the south of the quadrangle (Gardner et al., 1987; Reneau et al., 1987).

Tsm — **Dacite of Cerrada Mountain** — Lavas or dacite flow-banded dacite lavas and associated flows and tuffs flows stepped from the vicinity of Cerrada Mountain. Dacite flow-banded lavas is an dacite contains. Lavas contain 30-35% phenocrysts of plagioclase and hornblende with subordinate pyroxene, biotite and quartz. At least three separate flows occur, the youngest containing some abundant hornblende. These flows outlined in two basin directions: one overlying Mill of Cerrada Mountain, capping the north canyon wall of Sleepy Canyon, and one that flowed to the ESE of Cerrada Mountain, continuing to east west of Bear Springs. Average age of of Cerrada Mountain lava ranges of 1.61 ± 0.11 Ma (Reneau et al. 1987).

Tsc — **Small volcanic neckes, pyroclastic, block and ash flows, and associated colluvial deposits** — Outcrops are known to exposure: 0.7 km NNW of Pajarito Springs. Dacite lava fragments in the block and ash flows include clasts with phenocrysts of plagioclase, amphibole, pyroxene and biotite. Detailed replica and geochemistry focus dacite. 27 m in eastern exposure. These deposits appear to be overlying by Cerrada Mountain dacite and are therefore likely to be < 1.5 Ma. Maximum thickness is 10 m.

Tpm — **Battle of Pajarito Mountain** — Light to medium gray to reddish brown lavas and associated flows and tuff flows erupted from Pajarito Mountain. Phenocrysts make up 30 - 35 % of the rock and consist of plagioclase (orthoclase/anorthoclase), orthopyroxene, orthopyroxene and trace hornblende. Fe and Ti-oxides are opaque. Common crystal cores of orthopyroxene and orthoclase/anorthoclase. At least 7 major flows are observed in Los Alamos Canyon, overlying Rendija Canyon lavas. Base-most basal pumice regular. Age range from 2.91 ± 0.04 Ma to 1.87 ± 0.02Ma on Pajarito Mountain (Woldegabriel, personal communication) with a maximum thickness of 300 m in the map area.

Tla — **Tshirege Formation lava, undifferentiated** — This unit, which primarily consists of rhyolites on the Sierra Chico lavas Association, represents undivided volcanic units where in this report are not shown. An unusual crystal rich of Sierra Chico Canyon (Smith et al., 1970) is also likely more old. 1.79 ± 0.17 to 1.19 ± 0.11 Ma (Spell, Wolfenbarger et al., 2000) reported in Sierra Chico Canyon and south of the quadrangle boundary. Although the majority of the lavas reported in the canyon are believed to be Tshirege Formation, there are younger rocks (see 1ka).

Tlcc — **Water to gray quartzitic and tuffite** — Exposed as a bedrock was in upper Chaqui Canyon, west of Chaqui Reservoir, represents a section Tla. Lower portion includes large blocks fragments of sub-rounded boulders of Rendija Canyon lava (Tlcc). This unit and large tuffs (1" 0.5 cm) occur in the sequence. The upper portion of the lavers appears under as a horizontal lava, containing phenocrysts of plagioclase (white transparent quartz, and lesser biotite and pyroxene. Age unit likely comparable to the Rendija Canyon lavas. Maximum exposed thickness is 30m.

Tlcc — **Discussion of Rendija Canyon** — Light to dark gray to red discussion lavas that lines the central part of Sierra de Los Valles. Phenocrysts make up 15-20% of the rock and consist of plagioclase (orthoclase to 1 cm across), dark-brown biotite, or amphibole and anorthoclase and quartz (xenoliths), subordinate biotite, clinopyroxene, and hornblende, and trace opaque, zircon, and Fe-Ti-oxides. Elongated vesicles lavas with associated black and red lavas where overlapped lava flows collapsed lavas. Average. Lavas outcrops are be massive and to dissected, and typically exhibit a blocky surface. Some flow quite off 1-2 meters fragmented outcrops and a few Cerro Grande lava. Rendija Canyon lavas with of Chaqui Canyon contact manifest attempts of lavas. Maximum thickness is > 150 meters. Age range from 1.97 ± 0.06 to 1.61 ± 0.01 Ma (Reneau et al., 2007).

Tla — **Small volcanic quantities** — In an isolated outcrop there with contents of 0.75 m of brown to gray quantities. 15 km of bedded tuffs. 0.61 m of white quantities and 0.60 m of light gray to brownish well bedded. Phenocrysts consist of plagioclase and trace amounts of quartz and biotite. This deposit is located at upper Chaqui Canyon, west of the Mesa on top of the old Chaqui Reservoir. Lavas quantities has age range of 1.21 ± 0.02 Ma (Woldegabriel, personal communication). Maximum exposed thickness is 2.5 m.

Lower Group and Lower Fe Group (Miocene)

Tmr? — **Peralta Tuff Member, Bearhead Rhyolite (Shown only on cross-section B-B')** — Pumiceous rhyolitic tuff, minerals and crystal with well-developed vesicles. A pumice sample from 396-414 ft in WIPP-11 has a $^{40}Ar/^{39}Ar$ age of 1.4 ± 0.2 Ma. Pumice from 414-417 ft in the same well gave a gravity consistent $^{40}Ar/^{39}Ar$ age of 1.6 ± 1.1 Ma.

Tmr? — **Cieneguilla Formation, Santa Fe Group (Shown only on cross-section B-B')** — Rhyolitic sanidine with minor quartz or biotite in Cerro del Medio and well-dated.

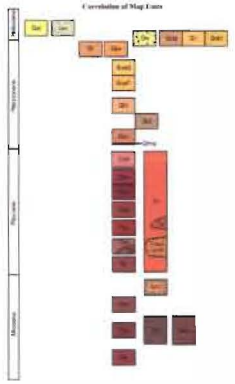
Tpm — **Pajarito Canyon Formation lava flows and volcaniclastic deposits, undivided (Shown only on cross-section)**

Tpc — **Andesite, Pajarito Canyon Formation (Miocene)** — Dark gray to red-colored volcaniclastic conglomerate lavas exposed in Santa Clara Canyon, Los Alamos Canyon, and the Pajarito Springs area. The unusual in Santa Clara Canyon is quite dark gray, and properties with phenocrysts of plagioclase (Woldegabriel et al., 2000). The $^{40}Ar/^{39}Ar$ age for this unusual is 7.9 ± 0.04 Ma in Los Alamos Canyon, the geologically unusual lava is the youngest, earlier than 20% phenocrysts of plagioclase, clinopyroxene and orthopyroxene and an $^{40}Ar/^{39}Ar$ age date of 8.1 ± 0.05 Ma (Reneau et al. 2007). This lava unit has crystal clots of clinopyroxene, orthopyroxene, and magnetite. Vesicular lavas are common in the Pajarito Springs area where lava regular vesicular crystal (accounting two lava layer). One separate crystal lavers, with major phenocrysts of plagioclase and lighter colors and one more andesitic, with a lava. Two separate groundmass with similar phenocrysts of plagioclase and pyroxene. Woldegabriel et al. (2000) report a $^{40}Ar/^{39}Ar$ age of 11.18 ± 0.13 Ma for an andesite in the southeastern outcrop of Pajarito Spring. The three synthetic andesites are the contemporary and the southeastern outcrop is somewhat younger. Maximum exposed thickness is 40 m.

Tpa — **Dacite, Pajarito Canyon Formation (Miocene)** — Dacite in Chaqui Canyon is a crystal-poor lava with compositions phenocrysts of sanidine and numerous with crystals of plagioclase, quartz of which are altered. Sanidine constitutes 15% of the whole rock, minor amphibole constitutes 1% of the whole rock. Minor quartz is present, but whether lava are quartz phenocrysts or relicts (Fig. 12) is unclear. Small mafic crystals are also present, these appear to be pyroxenes. A $^{40}Ar/^{39}Ar$ age of 9.91 ± 0.13 Ma was determined for this dacite. Maximum exposed thickness is 4 m.

Tlb — **Lobato Formation (Miocene)** — Dark gray to black basalt with olivine and plagioclase phenocrysts associated with the Lower Formation. $^{40}Ar/^{39}Ar$ ages of 10.1 ± 1.1 Ma were determined for basalt flows in the Lower Formation near north of the quadrangle boundary (Woldegabriel et al., 2000).

Correlation of Map Units



View of Guaje Mountain with (pumice cliffs of Tschicoma Rendija Canyon lava (Qbc) and Upper Bandelier Tuff (QTt) (at right) in portion of the Cerro Grande fire burn area in view in the foreground.

REFERENCES

Baldwin, R. J., Smith, R. L., and Ross, C. S., 1960, Stratigraphic nomenclature of volcanic rocks in the Jemez Mountains, New Mexico: U.S. Geological Survey Bulletin 1274-A, p. 1-19.

Broxton, D.E., and Reneau, S.L., 1995, Stratigraphic nomenclature of the Bandelier Tuff for the Environmental Restoration Project at Los Alamos National Laboratory: Los Alamos National Laboratory, Report LA-13010-MS, 44 p.

Broxton, D., Vaniman, D., Stone, J., Thomas, J., and Kirk, J., 1997, Pliocene volcanic rocks of the Tschicoma Formation, Jemez mountains (Inner volcanic field, Northwestern Rio Grande Rift): New Mexico Geological Society, 48th Field Conference, Guidebook, in press.

Gardner, J.N., Goff, F., Garcia, S., and Hagan, R.C., 1986, Stratigraphic, volcanic and lithologic relationships in the Valles caldera, Jemez Volcanic Field, New Mexico: Journal of Geophysical Research v. 91, p. 1763-1779.

Gardner, J., Lavigne, A., Wolfenbarger, D., Kyle, P., Vaniman, D., Carrasquillo, J., Lewis, C., Reneau, S., Kluk, E., and Spell, M.L., 1996, Historical geology of the southwestern portion of Los Alamos National Laboratory, Los Alamos NM New Mexico, Implications for seismic analysis, pumice deposits from Cerro Grande: Los Alamos National Laboratory Report LA-13189-MS, 121 pp.

Gardner, J.N., Reneau, S.L., Lewis, C.J., Lavigne, A., Kuyer, D.O., Wolfenbarger, D., and Gardner, D.G., 1997, Geology of the Pajarito Fault zone in the vicinity of Mesita: Los Alamos National Laboratory, Bandelier Tuff Project, New Mexico, Los Alamos National Laboratory Report LA-13131-MS, 38 p.

Griggs, R. L., 1964, Geology and geomorphic evolution of the Los Alamos area, New Mexico: U.S. Geological Survey Water-Supply Paper 1753-B, 107 p.

Gonzales, G., Goff, F., Gardner, J., Vaniman, D., Shafiqullah, M., Garcia, A., and Hagan, R., 1995, Intracaldera volcanism, resurgent doming, and tectonic inversion, Valles caldera, New Mexico: Journal of Geophysical Research v. 10, 100 p., 27,941-27,956.

Goff, F., and Shevenell, L.A., 1994, "Fossil" hydrothermal systems in the Jemez Mountains, New Mexico, and their relevance to geothermal exploration: Geothermal Resources Council Transactions, v. 18, p. 65-73.

Gonzales, G., Gardner, J., Vaniman, D., Shafiqullah, M., Goff, F., Heiken, G., Kyle, P., and Delagnelo, M. M., 1995, Distribution of faults from Mesita the Pajarito Plateau, Valles Geothermal, NM: Los Alamos National Laboratory, Unpublished manuscript.

Heiken, G., Goff, F., Gardner, J., Baltz, E., Valentine, G., Grigsby, C., Hulen, J., Counce, D., and Renshaw, C., 1990, Interim data report on the Valles caldera geothermal drilling program: Los Alamos National Laboratory Report LA-11777-MS, 197 p.

Kempter, K.A., Harmon, R.S., Harrison, D.L., Wolfenbarger, D., Wolff, J.A., Broxton, D.E., Kluk, E., and Delgado, M. M., 1997, Distribution of rhyolite lavas beneath the Pajarito Plateau, Valles Geothermal, NM: Los Alamos National Laboratory, Unpublished manuscript.

Smith, R. L., and Bailey, R. A., 1966, The Bandelier Tuff: A study of ash-flow eruptions of a zoned crystal-rich rhyolite magma: Bulletin Volcanologique v. 29, p. 83-104.

Smith, R. L., Bailey, R. A., and Ross, C. S., 1970, Geologic map of the Jemez Mountains, New Mexico: U.S. Geological Survey, Miscellaneous Geologic Investigations, I-571, scale 1:125,000.

Spell, T. L., and Harmon, R. M., 1995, "Ar/Ar geochronology of post Valles caldera volcanism, Valles caldera, New Mexico: Journal of Geophysical Research v. 99, p. 15,941-15,957.

Spell, T. L., McDougall, I., and Gardner, J. N., 1990, The Valles Tuffs, Rhyolite, Jemez Volcanic Field, New Mexico: $^{40}Ar/^{39}Ar$ geochronology of eruptive histories: Geochemical Society, Geochronology Series, Abstract v. 108, p. 1104-1106.

Stix, J., Goff, F., Gardner, G., Heiken, G., and Garcia, S., 1988, Evolution of compositional gradients in the Bandelier caldera: magma chamber formation from multivariate modeling: Journal of Geophysical Research v. 93, p. 6129-6147.

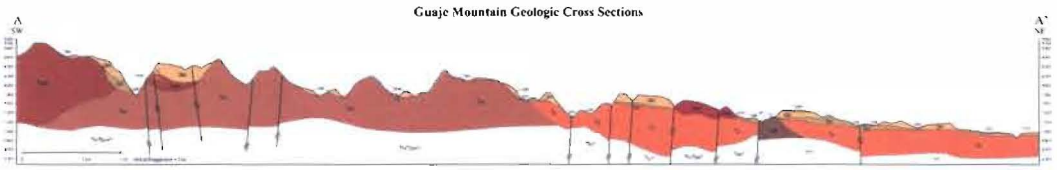
Turbeville, B. N., Waresbacke, D. B., and Self, S., 1989, Quaternary geology and alignment volcanism in the Jemez Mountains, New Mexico: Evidence from the Pajarito Plateau and adjacent areas: Journal of Volcanology and Geothermal Research v. 36, p. 267-291.

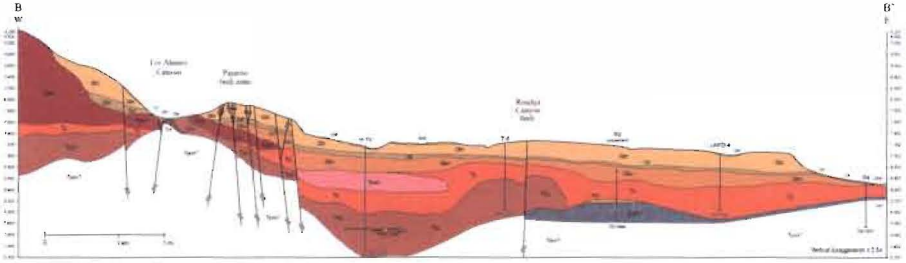
Waresbacke, D., 1986, The Puye Formation, Jemez Mountains: evidence of a compositionally stratified caldera-forming eruption: M.S. thesis, University of Texas, Arlington, 270 pp.

Wolfenbarger, D., Gardner, J., Gardner, D., Vaniman, D., T. Snyder, D., Kuyer, D., and Pelz, J., 1995, Extensive volcaniclastic pathways and lithostratigraphy of the Pajarito Plateau and adjacent areas of the Rio Grande rift, and the Jemez Mountains: in Gonzales, G. T., and Gardner, J. N., eds., Volcanology in New Mexico: New Mexico Bureau of Mines and Mineral Resources, Bulletin 150, p. 97-139.

Wolfenbarger, D., Gardner, J., Gardner, D., Vaniman, D., Pelz, J., Snyder, D., and Kluk, E., 1996, Volcanism, tectonics and chronostratigraphy in the Pajarito Plateau of the Rio Grande Rift, Jemez Mountains, Los Alamos National Laboratory, LA-13064-MS, 111 p.

Guaje Mountain Geologic Cross Sections





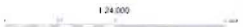
Preliminary geologic map of the Guaje Mountain quadrangle, Los Alamos and Sandoval Counties, New Mexico.

May 1998

K.A. Kempter[1], S.S. Kelley[1], J. Gardner[1], S. Reneau[1], D. Broxton[1], F. Goff[1], A. Levine[1], and C. Lewis[1].

[1] Contact: (505) 667-5420 and another author. Santa Fe, NM 87505
New Mexico Bureau of Geology and Mineral Resources, 801 Leroy Place, Socorro, NM 87801
[2] Earth and Environmental Science Division, Los Alamos National Laboratory, Los Alamos, NM 87545

QUADRANGLE LOCATION



1:24,000

New Mexico Bureau of Geology and Mineral Resources
Open-File Geologic Map 55

DRAFT

New Mexico Bureau of Geology and Mineral Resources
New Mexico Tech
801 Leroy Place
Socorro, New Mexico
87801-4796

(505) 835-5490
http://geoinfo.nmt.edu

This and other STATE MAP quadrangles are on-line and may be ordered for free download in both PDF and ArcGIS formats at:

http://geoinfo.nmt.edu/publications/maps/geologic/ofgm/home.html

COMMENTS TO MAP USERS

Perhaps this digital information is the definitive, most complete, and up-to-date product of such and likewise may be accurate in internal manner. Geology and field science are dynamic and so this map is a snapshot of the current knowledge. Although many of the following recommendations field geologic mapping, compilation of additional data, reinterpretation with and development interpretations. Locations of contacts are not accurate that are plotted for interpretations to the extent of a given surface with a topographic base map. Moreover, the accuracy of contact or dashes depends on the scale of mapping and the interpretation of the geologist. Any interpretation of this map could also contain errors in mapping and interpretation. Map and data updates are undertaken. Site-specific studies should be verified by ground survey mapping or subsurface exploration. Topographic and cultural changes associated with seismic-related hazards may be given.

Users assume an unlimited license upon the appropriateness of the maps shall term permanent, perpetual and available geothermal and subsurface exploration data. Contractors should be used or in order to understanding the present geologic framework in the large area, and not for the site-specific or information for use in designs or engineering work, buildings, roads, or other structural structures.

The map has not been reviewed according to New Mexico Bureau of Geology and Mineral Resources standards. The contents of the report and map should not be considered final and complete until reviewed and published by the New Mexico Bureau of Geology and Mineral Resources. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the State of New Mexico, or the U. S. Government.

31750

ENTERED

106111