

Geologic Map of the Welty Hill Quadrangle, Socorro County, New Mexico

By

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Scale 1:24,000

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- H Human deposits (Holocene)** – Areas of extensive disturbed ground due to human activity, principally earthen dams.
- Qv Valley Alluvium (Holocene – Late Pleistocene)** – Valley bottom alluvium including active alluvium and low terraces incised less than 3m.
- Qf Alluvial fans (Holocene – Late Pleistocene)** – Discrete fans and coalesced fans overlap and merge locally with valley (**Qv**) and terraced alluvium (**Qt**).
- Qc Colluvium and talus (Holocene – Late Pleistocene)** – Slope colluvium and talus shown in areas of extensive cover or in areas where critical bedrock relationships are concealed.
- Qt Terrace surfaces (Holocene – Late Pleistocene)** – The upper, soil-modified surface of alluvial terraces incised more than 3m above active alluvial deposits. Terrace deposits not differentiated from older piedmont alluvium (**QTp**).
- QTp Piedmont alluvium (Pleistocene - Pliocene)** - Poorly to moderately consolidated sandstone and conglomerate comprising the main mass of piedmont alluvium throughout the map area. In some areas the unit may consist of inset terrace deposits (**Qt**), but most of the unit probably correlates with deeply weathered deposits of the Pliocene-Miocene sandstone and conglomerate unit (**Ty**). Dips locally up to 20 degrees to the west are common.
- Ty Sandstone and conglomerate (Pliocene-Miocene)** – Poorly to moderately consolidated sandstone and conglomerate of the Piedmont alluvium unit (**QTp**) are differentiated locally in areas of good exposure where the unit dips moderately to steeply to the southwest.
- Ts Volcaniclastic sedimentary rocks undifferentiated (Miocene-Oligocene)** – Minor areas underlain by strongly consolidated sedimentary rocks whose age is unconstrained with respect to the Turkey Springs, South Canyon, or Vicks Peak Tuff
- Tbt Beartrap Canyon Formation (Miocene)** – Volcaniclastic sandstone, conglomerate with abundant, complexly interleaved, felsic pyroclastic rocks. Medium- to thick-bedded sandstone, pebbly sandstone, and pebble-cobble-boulder conglomerate is locally matrix-supported and/or clast-supported. Some sandstone intervals that display moderate to high-angle, thick-bedded cross-stratified sets suggestive of eolian deposition. Beartrap Canyon Formation is

virtually indistinguishable from the Miocene – Oligocene unit of East Red Canyon. The Beartrap contains more non-welded pyroclastic rocks, but the principal difference is that it overlies the Turkey Springs Tuff.

- Tru Rhyolite of uncertain age (Miocene-Oligocene)** – Phenocryst-poor rhyolite that either intrudes (making it equivalent to Beartrap rhyolite **Tbr**) or is overlain by the unit of East Red Canyon (making equivalent to the older rhyolite **Tr**).
- Tbr Beartrap Canyon Formation, phenocryst-poor rhyolite lava and lava domes (Miocene)** – Rhyolite lava and hypabyssal rhyolite containing less than ~10% phenocrysts of feldspar, biotite, \pm quartz.
- Tbrx Beartrap Canyon Formation phenocryst-rich rhyolite lava and lava domes (Miocene)** – Rhyolite lava and hypabyssal rhyolite containing greater than ~10% phenocrysts of quartz, feldspar, and biotite.
- Tay Younger andesite lava (Miocene)** – Phenocryst-poor, sparsely fine-grained plagioclase and very fine-grained mafic mineral porphyritic andesitic lava younger than Turkey Springs Tuff.
- Ttsu Turkey Springs Tuff, upper non-welded zone (Miocene)** – Non-welded rhyolite ash-flow tuff containing 15-20% quartz-feldspar phenocrysts with biotite. Gradationally overlies the main part of the Turkey Springs in the southeastern part of the map area.
- Tts Turkey Springs Tuff (Miocene)** – Welded to non-welded rhyolite ash-flow tuff containing 2-30% quartz-feldspar phenocrysts with biotite. Phenocryst content increases up-section. The tuff is typically light gray to pink. Locally, a relatively thick lower non-welded unit is recognized (Ttsl), and in other areas the tuff exists as two distinct flow-units (welded and non-welded) separated by a sedimentary interval (Ttss).
- Ttsl Lower Turkey Springs Tuff (Miocene)** – Non-welded, massive rhyolite ash-flow tuff containing 2-5% quartz-feldspar phenocrysts with biotite. Phenocryst content increases up-section.
- Ttss Sedimentary rocks within the Turkey Springs Tuff (Miocene)** – Sandstone and conglomerate with minor non-welded pyroclastic rocks that separate distinct flow-units of the Turkey Springs Tuff.

- Tts** **Turkey Springs Tuff breccia (Miocene)** – Mostly non-welded rhyolite ash-flow tuff with abundant zones of mesobreccia and megabreccia (blocks of rhyolite lava and South Canyon Tuff). Intervals of poorly organized sedimentary breccia, sandstone and conglomerate are also present. The unit may merge down-section into the unit of East Red Canyon in some areas. Unit is confined to an area along the east edge of the map area, north of West Red Canyon.
- Tao** **Older andesite lava (Oligocene)** – Phenocryst-poor, sparsely plagioclase porphyritic andesitic lava older than Turkey Springs Tuff.
- Ter** **Unit of East Red Canyon (Miocene - Oligocene)** - Volcaniclastic sandstone, pebbly sandstone, conglomerate with minor felsic pyroclastic rocks. Medium- to thick-bedded sandstone, pebbly sandstone, and pebble-cobble-boulder conglomerate is locally matrix-supported and/or clast-supported. Some sandstone intervals that display moderate to high-angle, thick-bedded cross-stratified sets suggestive of eolian deposition. The unit is virtually indistinguishable from sedimentary dominated portions of the Beartrap Canyon Formation. The unit of East Red Canyon contains lesser amounts of non-welded pyroclastic rocks, but the principal difference is that it underlies the Turkey Springs Tuff. This definition becomes important in the south where the South Canyon Tuff, which underlies the unit of East Red Canyon in its type area, is absent.
- Trm** **Rhyolite (Oligocene)** – Feldspar phenocryst-poor rhyolite that intrudes South Canyon Tuff and is overlain by Turkey Springs Tuff.
- Tsc** **South Canyon Tuff (Oligocene)** – Phenocryst-poor to phenocryst-rich quartz-feldspar-biotite, mostly welded ash-flow tuff. Phenocryst content increases up-section. Most of the South Canyon in this map area correlates with informal divisions 1-3 as recognized in northeasterly adjacent map areas (Ferguson, 1991, Ferguson and Osburn, 1994). Virtually identical to the Turkey Springs Tuff, it is impossible to determine which unit is which without stratigraphic context or high-precision geochronology.
- Tto** **Non-welded ash-flow tuff (Oligocene)** – A single polygon of non-welded quartz-feldspar moderately phenocryst-rich ash-flow tuff that underlies the South Canyon Tuff (Tsc) on the north side of West Red Canyon along the east edge of the map area, possibly non-welded Lemitar Tuff.
- Tr** **Older Rhyolite lavas and lava domes (Oligocene)** – Phenocryst-poor rhyolite lava and lava domes containing feldspar, and sparse mafic (pyroxene, hornblende, biotite) phenocrysts, but no quartz. The lava is complexly interleaved with lesser

amounts of non-welded and welded pyroclastic rocks that are locally differentiated (Trt). Unit correlates with the rhyolite of Welty Hill.

- Trt** **Ash-flow tuff associated with older rhyolite lava (Oligocene)** – Phenocryst-poor (2-10%), typically tabular euhedral plagioclase and sanidine-phyric welded to non-welded ash-flow tuff complexly interleaved with the older rhyolite lava and lava dome unit (Tr), in some areas (southeast corner), but also present as a discrete flow-unit and locally a pair of flow-units that overlie older rhyolite lavas along Sim Yaten, and West Red Canyon.
- Trw** **Rhyolite of Welty Hill (Oligocene)** – Phenocryst-poor to moderately phenocryst-poor (5-15%) rhyolite lava containing plagioclase, sanidine, and sparse mafic (pyroxene, hornblende, biotite) phenocrysts, but no quartz. The lava is distinguished from the older rhyolite (Tr) in that it is more phenocryst-rich, and includes abundant zones of reomorphically flow-foliated welded ash-flow tuff. Only the most obvious ash-flow tuff units are differentiated (Trwt). Unit correlates with the older rhyolite (Tr).
- Trwt** **Ash-flow tuff associated the rhyolite of Welty Hill (Oligocene)** – Phenocryst-poor (2-10%), typically tabular euhedral plagioclase and sanidine-phyric welded to non-welded ash-flow tuff.
- Tpo** **Granite porphyry (Oligocene)** – Porphyritic medium-grained granitic intrusion in Kelly Canyon, and in the Burnt Peaks area.
- Tvp** **Vicks Peak Tuff (Oligocene)** – Phenocryst-poor (0-15%), euhedral to subhedral tabular (1-5mm) plagioclase-sanidine phenocryst ash-flow tuff with sparse pyroxene and biotite. Typically densely welded, light gray with distinctive, recessively weathering compacted pumice lapilli.

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