Geologic Map of the El Valle Quadrangle, Rio Arriba, Santa Fe, Taos Counties, New Mexico

By

Aby, Scott; Timmons, J. Michael

June, 2005

New Mexico Bureau of Geology and Mineral Resources Open-file Digital Geologic Map OF-GM 105

Scale 1:24,000

This work was supported by the U.S. Geological Survey, National Cooperative Geologic Mapping Program (STATEMAP) under USGS Cooperative Agreement 06HQPA0003 and the New Mexico Bureau of Geology and Mineral Resources.



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

The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government or the State of New Mexico. Unit descriptions for El Valle Quadrangle New Mexico

Qal

Quaternary alluvium.

Active channel alluvium, floodplains, low (young) alluvial terraces, tributary-mouth fans and some valleyslope colluvium. Often brownish and/or reddish, poorly-to-moderately sorted, angular-to-rounded, thinlyto-thickly bedded, loose silt and silty sand with subordinate coarse lenses of thin-to-medium beds of mostly locally derived clasts.

Qty/Qfy

Young alluvial terrace deposit of the Rio Santa Barbara.

Found only in the northeast corner of the map, on the Penasco quadrangle these deposits consist of "...poorly sorted silt, sand, pebbles, and boulders; stage I and II calcium carbonate development; clasts primarily of Pennsylvanian sedimentary rocks and Proterozoic quartzite..."(Bauer et al., 2003).

QTg

High-level alluvium and(?) colluvium

Ridge-capping gravel composed predominantly of Quartzite clasts. Almost no good exposures of this unit exist on the quadrangle. Clast counts were conducted at numerous locations (Table1) along ridges and show variability related to variability in the lithology of the source area east of the Picuris-Pecos Fault. In general, west of the Truchas Peaks area this unit is composed almost wholey of Quartzite clasts. To the south an increasing proportion of granitic clasts are found and to the north Paleozoic clasts are found as a (generally) minor component. This unit forms extensive 'colluvial aprons' on slopes that often completely obscure the underlying bedrock units all the way downslope to (and along) present drainages (Table 1). Only east of the Picuris-Pecos fault (where this unit is not found) do modern drainges contain >50% non-Quartzite clasts. Poor exposure makes estimation of thickness speculative but geomorphic inference (break in slope on the shoulders of some slopes) indicates a thickness of 3-15(?) meters. The greater apparent thickness indicated on the map is also due to the tendency for this unit to from colluvial aprons. In traversing the numerous ridges radiating away from the 'high country' on the eastern part of the quadrangle one follows gentle slopes separated by relatively steep 'steps' in the topography between ~8 and 25 m high that are entirely mantled by this unit. The unit may therefore be composed of numerous discrete packages of sediment at progressively lower levels or may represent the dissected and reworked remnant of an originally thicker piedmont deposit. Where this unit overlies the Tertiary Dixon member (between Chamisal Creek and Osha Canyon) it contains up to 50% Paleozoic clasts. This part of the unit may represent an erosional 'lag' and further indicates the probable complex genesis and subsequent history of this deposit.

The surface formed by this deposit has previously been designated as a part of the 'Oso' Surface (Manley, 1976). As noted by Smith, et al. (2004) this and other surfaces in the region are complex and their origin and subsequent history is obscure. This surface does seem to be consistently overlain by alluvial gravel on the El Valle quadrangle, but is an erosional geomorphic surface on parts of the Truchas and Trampas quadrangles. We would also point out that there is local relief on this surface greater than the presumed thickness of the underlying deposit-- indicating that it is not a 'geomorphic surface' in the sense of being 'graded' so a specific base level at a specific time. This observation makes age estimates based on the projection of this surface to a presumed paleo-base level suspect. The Guaje Pumice (~1.6 Ma) is found on a surface inset below the level of the Oso surface (the 'Ancha' surface -Smith et al., 2004) and provides a minimum age for this and all higher surfaces. This pumice would have been deposited on all surfaces (and hillslopes) in this area and its presence on the Ancha surface does not provide an 'absolute' age for that surface and does not preclude regional incision below 'Ancha'' level prior to 1.6 Ma.

Τq

Quartzite-rich Tertiary unit.

Mostly light-colored (buff to very pale brown), moderatly(?)-to-poorly sorted, loose-to-weakly cemented, medium-to-thick bedded(?), silty sandstone(?) to sandy cobble conglomerate composed of Quartzite and 5-12 % granitic clasts (Table 1). Unit is only exposed at 'Vallecitos' in the northwest part of Quadrangle. This lone exposure was produced by diversion of water from the Rio de las Trampas into the Canada de los Alamos drainage along the Acequia de Ojo Sarco producing a spectacular headcut and

canyon tens of meters high and > 100 m long. (Acequia water has subsequently been diverted around this declevity through a siphon.) Is more Granitic-rich to the southwest on the Truchas quadrangle (Smith et al, 2004).. On the Truchas quadrangle this unit contains ash/pumice layers. An ash found in the Vallecitos exposure has been submitted for dating.

Td

Dixon member of Tesuque Formation of Santa Fe Group (Middle Miocene)-

Red, tan, beige, and locally green sandy to clayey silt and silty clay beds ~.1-6(?)m thick, interbedded with tan, brownish, reddish, and characteristically greenish; moderately to very poorly sorted; often preferentially carbonate cemented; thinly to thickly bedded; conglomerates and fine to coarse arkosic sandstones between ~.5 and 5(?)m thick. Conglomerates contain abundant poorly to moderately-well rounded clasts of Precambrian quartzite and Paleozoic sandstone, limestone, and siltstone (Table 1). On mapped quadrangles to the north and northwest (Penasco, Trampas) conglomerates also contain clasts of Tertiary volcanic rocks, especially in coarser fraction, but such clasts are absent in available exposures on this quadrangle. Sedimentary features other than plane lamination are not common but include ripple marks, cross beds, and lateral accretion (point-bar) foresets. Contacts between beds are usually abrupt and bases of sandstones and conglomerates are commonly scoured, with .01-1m relief. Imbrication of clasts is not common, but is locally moderately developed. Sandstones and conglomerates are preferentially cemented with calcium carbonate. Carbonate cement sometimes forms a sparry white matrix between grains. Exposures are rare on this Quadrangle and can be inferred from the location of bedding attitude, clast count, and paleocurrent data on the map. The lower contact of this unit is exposed in only one location southeast of El Valle where it is an unconformity on Precambrian granitic rocks representing well over a billion years. Poor exposure and possible cryptic faulting makes estimation of thickness speculative.

Recent mapping on the Trampas and Truchas quadrangles (Smith et al., 2004; Bauer et al., 2005 in preparation) shows that the Dixon and Cejita members of the Tesuque formation are indistinguishable in the field where not separated by the Ojo Caliente Sandstone Member of the Tesuque Formation. Since the Ojo Caliente Sandstone pinches out west of the El Valle quadrangle, the upper part (or all) of the Dixon member mapped here may be chronologically equivalent to the Cejita Member.

Pz

Undivided Pennsylvanian sedimentary rocks.

Sandstone, siltstone , shale and limestone of the Flechado, Alamitos(?), and La Pasada(?) Formations and Del Padre Sandstone (Miller et al, 1963). Mostly poorly exposed except for occasional outcrops of sandstone, limestone, and associated shaley intervals. Miller et al., (1963) place the contact between the laterally correlative La Posada and Alamitos Formations between Jicarilla 'Ridge'' (Peak) in the southeast part of the quadrangle and Jicarita Peak north of the Quadrangle. Most of the Paleozoic strata exposed on the quadrangle are therefore Flechado Formation with isolated exposures of the underlying Del Padre Sandstone.

Precambrian rocks

- **Xgm** *muscovite granite, Paleoproterozoic.* Coarse-grained to pegmatitic, white peraluminous granite composed of quartz, orthoclase, muscovite, garnet, and trace opaque minerals. Quartz and feldspar are present as graphic intergrowths at some locations. Rock is typically nonfoliated. This unit is probably co-genetic with nonfoliated pegmatite dikes that cross cut unit Xqm and Xa.
- Xqm biotite quartz monzonite, Paleoproterozoic. Medium grained, foliated, brown to red-brown granitoid rocks composed of variable proportions of quartz, plagioclase, and microcline with abundant biotite. K-feldspar grains are typically coarser grained and are dynamically recrystallized. Although the intrusion locally truncates foliation the main foliation preserved in this rock is subparallel to the foliation in the surrounding supracrustal rocks, suggesting that the regional main foliation developed before, after, and possibly during emplacement of the pluton. Locally includes white pegmatites of nonfoliated muscovite granite and amphibolite that are not mapped separately.
- **Xbg** *fine-grained biotite gneiss, Paleoproterozoic.* Fine-grained to very fine grained biotite granite gneiss. Composed of quartz, alkali feldspar, orthoclase, and biotite. This rock preserves a well-

developed foliation defined by biotite and locally quartz and feldspar. This rock may represent a sheared fine-grained phase of unit Xqm or an older fine-grained granite that was intruded by Xqm.

- Xa *amphibolite and biotite schist, Paleoproterozoic.* Intimately intermixed amphibolite and biotite schist. Amphiboles locally define lineation within the biotite-dominant foliation. Amphiboles locally exhibit garbenschiefer texture. Amphibolite and biotite schist are typically associated with white pegmatites of nonfoliated muscovite granite and are mapped in the southern portion of the map along the A-A' cross-section line to illustrate intrusive relationships and relative abundance.
- Xq- *Quartzite, Paleoproterozoic* Quartz arenite Bounded on the west by the Picuris-Pecos fault and on the east by the Jicarilla fault, the Ortega Formation of the Hondo Group is exposed in the southeastern portion of the map area. The Ortega Formation consists of cliff-forming, grey to grayish-white, medium to coarse grained cross bedded quartzite. The quartzite is remarkably pure and suggests a high degree of sorting and winnowing of accessory material (fine grained silisiclastics) during deposition of the protolith. Cross beds are defined by higher concentrations of oxide minerals and as younging criteria, indicate that the section is upright. Sillimanite is present in bedding and foliation planes within the map area.

Precambrian Geologic history:

Basement rocks of the El Valle area represent a complex suite of igneous intrusive rocks dominated by a biotite bering quartz monazite. The main foliation is typically defined by biotite or muscovite and is axial planar to isoclinal, shallowly south-plunging folds observed in nearby quadrangles. Fold closures in the map area have not been observed, perhaps due to poor exposure and the absence of reliable marker units to define the fold hinges.

Paleoproterozoic supracrustal rocks were intruded by at least three igneous units, including Xqm, Xbg, and Xgm. Clear crosscutting relationships between Xgm and older units are abundant where pegmatite dikes are exposed. The relative timing between Xqm and Xbg remains speculative. Unit Xqm represents the most abundant rock type by volume in the area. The foliation preserved in Xqm is subparallel to the foliation measured in supracrustal rocks perhaps an indication that emplacement of this pluton was concurrent with development of the regional foliation.

Tertiary and Quaternary Geologic History:

The Tertiary geologic history on this quadrangle begins with the deposition of sediments of the Dixon member of the Tesuque Formation on a landscape eroded into Precambrian granitic rocks west of the Picuris–Pecos Fault system. This landscape may have been of only moderate local relief, as 'outliers' of basement rocks are not found within the Tertiary unit exposures. However, on the Trampas Quadrangle to the northwest, the Dixon member buried a landscape of tens-to-hundreds of meters of relief. The absence of evidence for relief on this scale here may simply reflect the generally poor exposure and extensive development of colluvial cover. Derivation of sediment from uplands east of the Picuris-Pecos fault at this time represents a reversal of throw on this fault system relative to Paleozoic and 'Laramide' time when the Uncompahgre (Pz) and 'Pajarito' (Laramide) uplifts existed west of this same fault system.

Uplift and/or erosion of the block east of the Picuris-Pecos faults eventually removed Paleozoic strata from the Truchas Peaks area while >1.5 km of Paleozoic section remain to the north at the latitude of Penasco (Miller et al., 1963). It is interesting to note further that the Paleozoic Del Padre Sandstone is thickest in the vicinity of the Truchas Peaks (see figure 8 in Miller et al., 1963). This area therefore experienced maximum subsidence during the Paleozoic and then maximum uplift during the Tertiary. The exposure of pre-Paleozoic rocks in the Truchas Peaks area lead to deposition of the Quartzite-rich Tertiary unit that overlies the Dixon member.