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## **TEXTURAL AND THICKNESS VARIABILITY OF THE ANCHA FORMATION IN THE SANTA FE EMBAYMENT, RIO GRANDE RIFT, NORTH-CENTRAL NEW MEXICO**

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The Ancha Formation consists of arkosic sand, silty sand, gravel, and mud that was deposited in the Santa Fe embayment during Pliocene and early Pleistocene time. Reaching a thickness of ~90 m, the Ancha Formation unconformably overlies the Tesuque Formation. The lower part of the Ancha Formation is locally saturated and forms an important aquifer for the greater Santa Fe area. We assess the spatial variability of the gross texture of the Ancha Formation and how this variability may influence hydrogeologic properties of this thin but important aquifer. Also, we present structural contour maps showing our best estimate of the elevation of the Ancha Formation basal contact, and use these maps to discuss the thickness variability of this unit and the three-dimensional shape of its lower contact. The Ancha Formation was deposited by two different depositional systems. South of approximately Interstate 25 and north of the Santa Fe River, this formation was deposited by relatively small drainages on an alluvial slope along the southwestern flank of the Sangre de Cristo Mts. Here, sediment is characterized by poorly to moderately sorted, silty or muddy sand (mostly very fine- to medium-grained sand with subordinate coarse- to very coarse-grained sand) that contains scattered pebbles. This finer grained sediment, referred to as extra-channel sediment, is interbedded with various proportions of channel deposits that are composed of medium- to very coarse-grained sand and gravel. The overall texture of these alluvial-slope deposits (estimated by the proportion of the coarse channels relative to extra-channel sediment) becomes finer away from the mountain front. Saturated alluvial slope sediment is found only in the western part of the embayment, where the Ancha Formation is finer-grained and probably less permeable than correlative deposits near the mountain front. North of the Santa Fe River, the alluvial-slope sediment is relatively thin (18-25 m) and generally unsaturated. Alluvium deposited by the ancestral Santa Fe River, the second depositional system of the Ancha Formation, is generally coarser than the alluvial slope sediment in the central and western parts of the embayment. Gravel is generally clast-supported, poorly sorted, and contains 50-70% pebbles and 30-50% cobbles. This unit contains relatively minor, discontinuous beds of floodplain sediment (silty or clayey very fine to fine sand). Based on available pumping test data, in the western part of the embayment this unit has higher hydraulic conductivity and yield values compared to laterally adjacent alluvial slope deposits. Our interpretation of the base of the Ancha Formation using well data suggests that it is irregular, having a relief of up to ~40 m with significant paleovalleys. The Ancha Formation appears to thicken westward across a broad fault zone in the eastern part of the embayment. Cross-sections indicate that the slope of the basal Ancha Formation contact flattens west of La Cienega. This flattening may be due to increased discharge to the ancestral Santa Fe River from springs near La Cienega, or it may be the result of eastward tectonic tilting of the footwall of the La Bajada fault. Stratigraphic relations suggest that local base level changes associated with the emplacement of the Cerros del Rio basalt field could have contributed to much of the aggradation of the Ancha Formation. However, 19-25 m of Ancha Formation ancestral Santa Fe River deposits lay beneath the basalt flows at the western edge of the Caja del Rio Plateau. This indicates that aggradation of the Ancha Formation commenced before emplacement of these basalts at ~3 Ma. The lack of deformation of the Ancha Formation and correlation to other weakly deformed Plio-Pleistocene deposits in the northern Rio Grande rift suggests that climatic influences might have played a role in the aggradation of this unit.