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CENOZOIC STRATIGRAPHY IN THE SANTA FE EMBAYMENT AND NORTHWARDS TO THE BUCKMAN WELL FIELD, ESPAÑOLA BASIN, NM

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We use several cross-sections, primarily constructed using well data, to demonstrate stratigraphic relations in the southern Española basin. The Santa Fe embayment refers to the southernmost part of the Española basin that extends south of the city of Santa Fe. There, a Pliocene-age, west-sloping, alluvial-slope deposit called the Ancha Fm overlies pre-Pliocene strata deformed into a north-plunging syncline. The Ancha Fm pinches out north of Santa Fe against the Santa Fe uplands, and attains a 90 m thickness near the center of the syncline. The folded and faulted Cenozoic units beneath the Ancha Fm include, from bottom to top, the Galisteo, Espinaso, and Tesuque Fms. The Eocene-age Galisteo Fm underlies the Santa Fe embayment south of the Santa Fe River. It consists of SE-flowing axial river deposits to the WSW (bearing much quartzite and chert gravel) and tributary fluvial deposits to the NNE (bearing granite and subordinate limestone gravel). The Espinaso Fm generally extends across the entire southern Española basin, and represents a volcanoclastic alluvial fan shed ENE from latitic-intermediate eruptive centers in the Cerrillos uplift and Cerrillos Hills.

The Tesuque Fm consists of several units, informally referred to as lithosomes, which laterally interfinger with one another. On the southeast side of the embayment lies lithosome E, consisting of latitic and basaltic volcanoclastic sediment eroded from the Cerrillos uplift to the SSW. Lithosome E interfingers to the ENE with two fluvial units derived from the southern Sangre de Cristo Mountain (SdC Mtns). One of these two fluvial systems is called lithosome S. Lithosome S was deposited by a west-flowing, ancestral Santa Fe River sourced in the present-day Pecos River drainage. This lithosome is relatively coarse (mostly a pebbly sand), contains minor quartzite and Paleozoic sedimentary detritus, and is generally not strongly cemented. Lithosome S grades north and south into alluvial-slope deposits derived from the western flanks of the SdC Mtns. Called lithosome A, these alluvial-slope deposits consist of silty arkosic sand and minor pebbly sand channel-fills, where the clasts are predominately granitic.

The lower strata of the Tesuque Fm are more complicated than previously realized. It has recently been demonstrated that SdC Mtns-derived sandy gravels and sands interfinger with the distal parts of the Espinaso Fm volcanoclastic apron (equivalent to the Bishop's Lodge Member of the Tesuque Fm) and have large ranges in thickness. Overlying the Bishop's Lodge Member is a 100-125 m-thick interval characterized by widespread lithosome A strata intercalated with basalt flows probably correlative to the Cieneguilla basanite (25-26 Ma); lithosome S is much restricted in extent. The prevalent lithosome A sediment was restricted to the east side of the syncline axis, whereas lithosome E was restricted to the west side of the syncline axis – suggesting that synclinal folding exerted a control on sedimentation patterns at this time. Following 25 Ma, lithosome S deposits greatly expanded at the expense of lithosome A.

Exposed strata at the old Buckman well field are late Miocene in age. Here, wells largely pump from sandy axial river deposits belonging to the Vallito Member of the Chamita Formation. The Vallito Member interfingers eastward with distal alluvial-slope deposits of lithosome A. It overlies noticeably finer-grained, basin-floor deposits of the Pojoaque Member of the Tesuque Fm that consists of muddy floodplain deposits with subordinate sandy channel-fills.