

Koning and Johnson, 2006 -- Proceedings of the 5th Annual Española Basin workshop, Santa Fe, New Mexico, March 7-8, 2006: U.S. Geological Survey, Open-file Report 2006-1134, p. 24.

LOCATIONS AND TEXTURAL CONTRASTS OF TESUQUE FORMATION LITHOSTRATIGRAPHIC UNITS IN THE SOUTHERN ESPAÑOLA BASIN, NM, AND HYDROGEOLOGIC IMPLICATIONS

KONING, Daniel, J.; and JOHNSON, Peggy S.

New Mexico Bureau of Geology and Mineral Resources, 801 Leroy Place, Socorro, NM, 87801,
dkoning@nmt.edu, peggy@gis.nmt.edu

In the southern Española basin, four lithostratigraphic units of the Tesuque Fm (late Oligocene-late Miocene), representing depositional systems of unique provenance, are identified and described using outcrops and wells. Their mapped locations are shown in the accompanying figure. Lithosome S is mostly a pebbly sand, with increasing mud beds to the northwest, deposited by an ancestral Santa Fe River sourced east of the Picuris-Pecos fault. The approximate southern boundary of lithosome S is immediately north of modern Bonanza Creek. Near the N.M. State Penitentiary, this boundary turns northwestward towards La Cieneguilla. The southern lithosome S boundary laterally grades into sand and silty sand of lithosome A, which drained granitic highlands in the southern Sangre de Cristo Mtns and coarsened in the latest middle Miocene. Neither lithosome S nor lithosome A is present in exposures of strata along the La Bajada escarpment to the west of the southern Española basin. Their absence there is consistent with a paleo-topographic high trending approximately north-south between the Cerrillos Hills and Tetilla Peak. Lithosome E is generally a muddy sand derived from erosion of Cieneguilla Basalt and Espinazo Formation on the eastern flanks of the paleo-topographic high and highlands south of the basin. The fourth lithosome consists of thick clay and sandy clay (possibly as much as 500 ft) observed in wells north of Arroyo Hondo in the vicinity of the Santa Fe Airport and likely continuing an unknown distance to the NNW. We interpret that the clay was deposited in a lake or playa in a closed basin, possibly during a time of rapid tectonic subsidence during the middle(?) Miocene.

Hydraulic conductivity values, derived from aquifer test data, appear to reflect the gross textural differences between these four lithosomes. For example, the coarse part of lithosome S is the coarsest of the aforementioned units (with the possible exception of the coarse upper part of lithosome A) and possesses the highest mean conductivity (7 ft/d). The grossly finer, lower-middle part of lithosome A exhibits a relatively low conductivity value of 0.4 ft/day, which is similar to the finer portion of lithosome S located north of Las Campanas. Limited data (one test value) for lithosome E suggest a hydraulic conductivity as low as 0.005 ft/d. The approach of quantifying means and ranges of hydraulic conductivity for each unit may provide improvements for regional groundwater flow models and support limits for sensitivity testing.