Lithologic and hydrologic characteristics of Tesuque Formation piedmont deposits in the Santa Fe area, N.M.

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Santa Fe Group

- Definition (Spiegel and Baldwin, 1963): Sediment and intercalated volcanic flows that fill the Rio Grande rift above the extensive Oligocene-age intermediate-felsic volcanic rocks (Espinaso Fm)

- Constitutes the basin-fill for the Española basin

- In Española basin east of Los Alamos, strata generally dip to west and exposed strata becomes younger to west
West-east cross-section at the latitude of Buckman

NE-SW cross-section ~1 mile south, and parallel to, Arroyo Hondo
Santa Fe Group near S.F.

- **Age:** 26 Ma to 1.5 Ma (Baldridge et al., 1980; Koning et al., 2002; Koning, 2013)

- **Two formations:** Ancha Formation that overlies the Tesuque Formation (Galusha and Blick, 1971; Spiegel and Baldwin)
Subdividing the Santa Fe Group

- Formalized members up north are difficult to recognize south of Tesuque Pueblo.

- Lithosome nomenclature, expanded from Cavazza (1986), provides a hydrologically relevant way of subdividing the Tesuque Fm. Lithosomes are relatively uniform and distinctive bodies of sediment that intertongue with one another.

- Lithosomes correspond to unique paleo-drainage systems in the Santa Fe area.
Lithosomes A, S, and E were deposited in specific paleo-drainage system tracts.

A marked coarsening of sedimentation occurs at 13.2-13.0 Ma; this coarser, younger sediment correlates to the Chamita Fm west of the Rio Grande.
Coarse lower-middle lithosome A (medial proximal alluvial slope)

Muddy very fine to very coarse sand with minor silt and clay beds

Greater than ~15% coarse channel sediment; ribbon to broadly lenticular beds

Sand is arkosic; gravel dominated by granite with <2% Paleozoic clasts and <3% quartzite clasts

Color: Pink to light brown to very pale brown
Fine lower-middle lithosome A (distal alluvial slope)

Silty very fine- to medium-grained sand with subordinate silt and clay beds

Coarse channel sediment generally minor; ribbon to broadly lenticular beds

Gravel dominated by granite with <2% Paleozoic clasts and <3% quartzite clasts

Sand is arkosic

Color: light brown to pink
Lithosome S

- volcaniclastic alluvial slope
- basin floor & axial river (lithosome B)
- Lithosome A alluvial slope
- Southern Española basin
- Ancestral Santa Fe Ri (lithosome S)
- periodic shallow lake(s) on floodplain
- present-day Santa Fe
- Sangre de Cristo Mtns
- View to approx. north
Figure 6. Schematic portrayal of the extent of the Late Oligocene to the mid-Miocene Tts fan (red outline) and its ancestral Santa Fe Range sediment-source area (white outline). Upper Santa Fe River watershed outlined in green. A Google® diagram of an idealized alluvial fan in a piedmont setting with distributary-channel components is inset in the 10/3/13 Google Earth® image-base. Below; Variable Tts channel percentages shown.
Lithosome S clast composition
Coarse sediment near fan axis and near mtn front

Pebbly sand and sand channel deposits with minor clay and silt beds
Channel complexes are very thick and possess very thin to medium, planar to lenticular internal bedding
Sand is arkosic
Reddish color
Gravel is composed of granite with 3-40% Paleozoic clasts and 5-30% quartzite
Coarser lithosome S (ancestral Santa Fe River)

Pebbly sand and sand channel deposits with minor clay and silt beds

Channel complexes are very thick and possess very thin to medium, planar to lenticular internal bedding

Sand is arkosic

Reddish color
Finer lithosome S (ancestral Santa Fe River)

Pebbly sand and sand channel deposits with about subequal very fine to fine sand, clay, and silt beds

Channel complexes are thick and possess very thin to medium, planar to lenticular internal bedding

Sand is arkosic

Reddish color
Interfingering zone between northern lithosome S and southern lithosome A
Lithosome S upward coarsening

La Cañada exploratory borehole
Tesuque Fm hydrogeology

Potentiometric surface and groundwater flow regimes
Tesuque Fm hydrogeology

Hydrogeologic cross section through the Agua Fria well, Canada borehole, Baca St well, and Hickox well.
Hydrogeologic differences between lithosomes