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SEDIMENTOLOGIC AND STRUCTURAL FRAMEWORK OF THE SOUTHERN AND CENTRAL ESPAÑOLA BASIN – INSIGHTS FROM RECENT STATEMAP AND EDMAP EFFORTS

KONING, Daniel J.¹, READ, Adam², and BORCHERT, Claudia³¹ Rt. 1, Box 28A, Santa Cruz, NM 87567, <u>danchikoning@yahoo.com</u>² N.M. Bureau of Geology, 801 Leroy Place, Socorro, NM 87801³ 212 Lugar de Monte Vista, Santa Fe, NM 87505

Geologic mapping conducted under the STATEMAP and USGS EDMAP programs has led to improved understanding of the sedimentologic and structural characteristics of the southern and central parts of the Española basin (east of the Rio Grande and south of Española). Mapping the Tesuque Formation using provenance and textural criteria has been successful where attempted; however, it is difficult to differentiate the Tesuque Formation into the Nambé, Skull Ridge, and Pojoaque Members south of the Pueblo of Tesuque. Three basic units that follow provenance criteria include: Lithosome A (representing a piedmont facies derived from the Sangre de Cristo Mountains south of the Peñasco Embayment, whose clast assemblage includes granite with none to subordinate quartzite), Lithosome B (representing a fluvial system derived from the Sangre de Cristo Mountains east and northeast of the Peñasco Embayment, whose clast assemblage contains Paleozoic sedimentary clasts, quartzite, felsic volcanic rocks, and only minor granite), and volcanic-rich sediment observed in the subsurface and probably correlative to the Chama-El Rito Member of the Tesuque Formation. Texturally, these three units become finer in their downstream directions (west for Lithosome A, southwest for Lithosome B, and probably south for the volcanic-rich sediment). The Tesuque Formation, however, also exhibits an overall coarsening-upward trend in middle to late Miocene strata. Concomitant with this coarsening trend, these three units have generally shifted to the west from the middle to late Miocene, albeit in an irregular manner, that has been hypothesized by the lead author to reflect westward basin floor tilting in response to an increase in rift tectonism during this time period. The overall basin structure in the central basin is consistent with a halfgraben, with strata generally tilting to the west and a progressive, but irregular (due to numerous local structures), decrease in dip magnitudes from older to younger strata. A major north-south structure that is greater than 24 km long, called the Barrancos monocline, is located between Highway 285 and the Rio Grande. This structure forms the eastern boundary of a relatively deep, graben-like feature within the larger half-graben; the structure is bounded on the east by the Pojoaque-Road fault zone and includes the West- and East-Jacona faults and the Huerfano fault. There is also a 4-km-wide zone of significant faulting that extends from the town of Nambé northward to 3 km north of the Santa Cruz River. These two structures are manifested by a higher abundance of faults in zones up to 6 km wide and more steeply westward-tilted strata compared to adjoining areas. North of Rio Chupadero, we interpret a structure along the present-day mountain front that is marked by down-to-the-west monoclinal flexure and localized faulting. The overall basin geometry in the southern basin (south of Santa Fe) is a northward-plunging syncline in Miocene and older strata that are unconformably overlain by the essentially undeformed Ancha Formation. The geologic maps covering the central and southern Española basin are improving our understanding of the evolution of the basin, and are providing an essential framework for on-going, detailed hydrogeologic investigations as well as other studies.