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Preliminary Geologic Map of the Northwestern Part of the Alamosa 30 X 60 Minute Quadrangle, Alamosa and Conejos Counties, Colorado

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Base enlarged from 1:100,000-scale metric topographic map (1/2° by 1° sheet) of Alamosa, Colorado, 1983; Universal Transverse Mercator projection, 1927 North American datum.

SCALE 1:50 000

Geology mapped in 2004-2005 using aerial photographs, U.S. Dept. of Agriculture county soil survey maps, and field reconnaissance. Geology compiled on 1:24,000-scale topographic base maps (see index map below) using a photogrammetric plotter (Kern PG-2).

DESCRIPTION OF MAP UNITS

[Map-unit names and stratigraphic associations are based on mapping over the entire Alamosa 1/2° x 1° sheet, which contains about 60 units. Combined map units, such as Qay/Qai, indicate thin deposits (Qay) over older deposits (Qai) as seen in limited exposures. In addition, some map units of questionable age or origin are shown with a query (?) after the map-unit name (for example, QTla?)]

EOLIAN DEPOSITS

Eolian dune sand (Holocene)-Eolian sand that forms small pronounced dunes as much as 5 m high. Commonly interspersed with interdune playas that are comprised of organic silts and clays. Some dunes are active; others have indistinct buried soils (A horizons) indicating multiple episodes of stability and redeposition

Eolian cover sand (Holocene)_-Eolian sand that forms thin (1-3 m) sheets and small coppice (plant anchored) dunes

LACUSTRINE DEPOSITS

Lake and pond deposits (Holocene)-Lacustrine deposits in small local lakes and ponds, commonly impounded by alluvial fans or eolian sand

Shoreline deposits of Lake Alamosa (middle? Pleistocene)-Coarse-grained, locally derived sand and gravel in barrier bars, spits, and shorelines of ancient Lake Alamosa (see Machette, 2004), and fine-grained sand and silt in lagoons and ponds impounded by barrier bars and spits formed by the ancient lake. Mainly preserved at elevations of 7,620-7,650 ft (2,323-2,332 m) on the northern margin of the San Luis Hills, in the southeastern part of the map area. Constitutes the uppermost part of the Alamosa Formation of Siebenthal (1910)

Alamosa Formation of Siebenthal (1910) (middle? Pleistocene to Pliocene)-Closed-basin lacustrine deposits (mainly clay, silt, and sand) and near-shore deposits

(sand and fine gravel) related to alternating, climatically(?) driven shallow- and deep-water phases of ancient Lake Alamosa. The best exposed section of the Alamosa Formation is along Hansen Bluff (east margin of map area), where Rogers and others (1985) have made an extensive collection of fossils (flora and fauna) and volcanic ashes, and have analyzed the paleomagnetic record in the sediments. The maximum elevation of the lake was about 7,650-7,670 ft (2,332-2,338 m) as recorded by unit Qlag elsewhere in the San Luis Basin. Strong calcic soils (stage III; Machette, 1985) on the shoreline features suggest that the lake overflowed through the San Luis Hills about 300-400 ka

ALLUVIAL DEPOSITS-PIEDMONT FACIES

Younger piedmont alluvium (upper Pleistocene)-Fine- to coarse-grained alluvium and debris flows that form moderate to steeply sloping surfaces adjacent to bedrock-cored hills (San Luis Hills for this map). Alluvium is typically silty sand to pebbly sand. Contains zonal soils with A, Bw or Bt, and (or) Bk horizons. Surface of deposits typically not dissected

Undifferentiated piedmont alluvium (middle Pleistocene)-Fine- to coarse-grained alluvium and debris flows that form moderately to steeply sloping surfaces adjacent to bedrock-cored hills (San Luis Hills on this map). Alluvium is typically silty sand to pebbly or cobbly sand. Contains zonal soils with A, Bw or Bt, and Bk horizons, the latter of which locally have stage II-III morphologies (K horizons). Depositional surfaces typically dissected

ALLUVIAL DEPOSITS-FLUVIAL FACIES

Undifferentiated stream alluvium (Holocene)-Fine-grained silt and clay to medium-grained sand and gravel that form active stream channels and floodplains along most drainage courses too small to map separately as either unit Qaa or Qfp. Grain size and lithology variable depending on material being eroded in stream headwaters. Gravel clasts generally <2 cm in diameter, slightly coarse (5-8 cm) along Rio Grande

Active stream alluvium (upper Holocene)-Fluvial sand and gravel in modern to recently active stream channels that retain fresh expression (that is, oxbow loops, abrupt terrrace escarpments). Gravel clasts generally 5-10 cm in diameter along the Rio Grande, <3 cm in diameter along other streams

Floodplain alluvium (upper Holocene)-Fine-grained silt and clay to medium-grained sand and pebble gravel that form floodplains adjacent to active channels. Floodplains commonly have muted depositional morphology (that is, infilled oxbow loops, subtle terrrace margins). Gravel clasts generally <2 cm in diameter, slightly coarse (5-8 cm) along Rio Grande

Younger stream alluvium (upper Pleistocene)-Fluvial sand and gravel in former floodplains that are now terraces elevated 1-2 m above modern stream level. Commonly contains weak soils with Bw and (or) Bk horizons

Intermediate stream alluvium (upper middle Pleistocene)-Fluvial sand and gravel in former floodplains that are now at intermediate elevation (2-5 m) above modern stream level. Many of the elongate, northeast-trending deposits fill alluvial channels that were incised into lake deposits (unit QTla) following draining of Lake Alamosa (see description of units Qlag and QTla). These channels are now topographically high as a result of erosion of the much softer lake deposits (that is, topographic reversal). The relict surface of the

intermediate stream alluvium has moderately developed soil (Bt and stage II-III Bk horizons). Locally, thin deposits of unit Qay overlie unit Qai

Older stream alluvium (middle Pleistocene)_-Fluvial sand and gravel in former floodplains that are now elevated 10-15 m above modern streams. Forms major high-level surfaces east of the Rio Grande, such as on Hansen Bluff (east margin of map area). Commonly has strongly developed calcic soil (Bk and stage III-IV K horizons)

MASS-WASTING DEPOSITS-Gravitationally driven, locally derived deposits; only mapped in the San Luis Hills, which are in the southeastern part of the map area

Colluvium, undivided (Holocene to middle Pleistocene)-Poorly sorted, nonstratified, sandy to gravelly deposits; typically on moderate to steep slopes of resistant volcanic rocks. Typically includes some debris-flow deposits and locally derived alluvium

Rockfall and talus (Holocene to middle Pleistocene)-Unsorted, nonstratified deposits of angular rock debris; typically accumulates at the base of bedrock escarpments

VOLCANIC ROCKS, OLIGOCENE

Hinsdale Formation (upper Oligocene)-Basaltic lava, associated breccia, and near-vent pyroclastic deposits. Typically forms flat-topped mesas of the San Luis Hills in the southeastern part of the map area. Previously dated at about 26 Ma by whole-rock K/Ar methods (Thompson and Machette, 1989)

Conejos Formation (Oligocene) as mapped by Thompson and Machette (1989)-Includes mafic to intermediate-composition vent-facies rocks consisting of lava flows, flow breccias, explosion breccias, and mudflow breccias, all from local sources. Previously bracketed at 26-29 Ma by whole-rock K/Ar dates (Thompson and Machette, 1989). Separated into an upper and lower sequence based on observed stratigraphy and variations in flow morphology and mineralogy. In this area, only the lower sequence is locally preserved beneath rocks of the Hinsdale Formation (unit Th). See Thompson and Machette (1989) for details

SYMBOLS

Contact

Terrace riser-Back edge of mappable fluvial terrace within unit Qfp

Lacustrine spit or barrier bar of Lake Alamosa- Highest shoreline in map area is at about 2,332 m (7,650 ft) (Machette, 2004) along the northern margin of the San Luis Hills in the southeastern part of the map area

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