

Geologic Map of the Escabosa Quadrangle, Bernalillo County, New Mexico

By

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**New Mexico Bureau of Geology and Mineral Resources
*Open-file Digital Geologic Map OF-GM 49***

Scale 1:24,000

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Description of Map Units to Accompany Geologic Map of the Escabosa 7.5-Minute Quadrangle

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Quaternary Map Units

General

Surface deposits in the map area consist of upland valley alluvium and colluvium derived from weathering of shale, limestone, and sandstone of the Pennsylvanian Madera Group. The drainage divide between the Rio Grande basin (west) and the Estancia basin (east) runs north-south through the map area. Sediment transport from the western side of the map area is towards Hell Canyon, a major east-west drainage on the eastern piedmont of the Rio Grande basin. Major drainages to the east of the map area are Woodman and Bachelor Draws. Mapping units consist of valley-floor alluvium associated with modern drainages (Qa), upland valley alluvium and colluvium (Qva and Qvac), and alluvium, colluvium, and residuum on valley backslopes and bedrock uplands (Qcr). Unconsolidated deposits are generally on the order of 5 m thick or less, but may be 10 m thick or more along higher-order drainages in the eastern part of the map area. Thin to moderately deep, well-drained soils cover extensive areas mapped as bedrock, and belong to the Seis-orthids soil association in the western part of the map area, and the Silver-Witt-Laporte soil association in the eastern part of the map area (Hacker, 1977).

Description of Map Units

Qa- Valley floor alluvium. Holocene. Predominantly silt, sand, and clay in modern drainages and underlying floodplains. Coarser grained materials occur in some areas. Unit is inset into older deposits of units Qva and Qvac, and interfingers with younger deposits of Qva and Qvac along drainage foot slopes. Includes unmapped bedrock exposures in scoured channel reaches. Generally less than 3 m thick.

Qva / Qvac- Upland valley alluvium and colluvium. Holocene to middle Pleistocene (?). Predominantly silt, sand, and gravel grading into relatively coarse-grained colluvium along valley backslopes. Along higher-order drainages unit consists of eroded older deposits and younger inset fills. Includes unmapped bedrock exposures along valley backslopes. Thickness ranges from a few meters or less over bedrock highs, to an estimated 10 m or

more along trunk drainages. Unit Qvac is mapped where alluvial and colluvial deposits form a relatively thin mantle (generally less than 3m thick) over underlying bedrock.

Qcr- Alluvium, colluvium, and residuum on valley backslopes and interfluvial summits in bedrock uplands. Holocene to middle Pleistocene (?). Predominantly silt, clay, and sand. Derived from weathering of the Madera Group (residuum on relatively flat-laying areas), and from downslope transport of weathering products. Generally mapped where accumulations cover extensive areas and are sufficiently thick to support large areas of grass cover. Includes areas of unmapped bedrock exposures. Unit ranges from less than one to several meters in thickness.

Bedrock Map Units

General

Surface exposures of bedrock in the map area belong for the most part to the Madera Group. The Middle to Upper Pennsylvanian (Desmoinian-Virgilian) and lower Permian (?) (Wolfcampian) Madera Group includes marine and marginal-marine carbonate and clastic sediments consisting of interbedded limestone, shale, sandstone, and minor conglomeratic sandstone. The thickness of the Madera Group in the vicinity of the Sandia and Manzano Mountains ranges from about 400 m (Kelley and Northrop, 1975) to perhaps 580 m (Read et al., 1944, measured section 14), or more, and has traditionally been divided (e.g. Read et al., 1944; Kelley and Northrop, 1975) into a lower unit containing a large proportion of limestone (“lower gray limestone”), and an upper unit containing a large proportion of clastic sediments (“upper arkosic limestone”). The Madera Group gradationally overlies rocks of the Middle Pennsylvanian (Atokan) Sandia Formation, which is also marine to marginal-marine in origin and is dominated by clastic sediments. Small, poorly exposed exposures of the Sandia Formation occur in the southwestern corner of the map area. The Sandia Formation generally overlies Proterozoic crystalline rocks in the area, although a thin (up to 20m thick) sequence of limestone and shale deposited during the Mississippian (?) occurs between the Sandia Formation and Proterozoic crystalline rocks at several localities in the Sandia and Manzanita Mountains (Kelley and Northrop, 1975). The Madera Group is overlain by Permian redbeds of the Abo Formation, or, to the south of the map area, is gradationally overlain by the Bursum Formation (Virgilian-Wolfcampian) which is overlain by the Abo Formation. In the map area, the upper part of the Madera Group and overlying units have been removed by erosion.

Subdivision of the Madera Group in the Manzano and Manzanita Mountains was formalized by Myers (1973), who elevated the Madera to group status and designated three formations within the Madera- the Los Moyos Limestone, the overlying Wild Cow Formation, and, in the southern Manzano Mountains, the Bursum Formation. The Los

Moyos Limestone and Wild Cow Formation generally correspond to the earlier, lithostratigraphic concept of lower gray limestone and upper arkosic limestone members of the Madera "Formation". Myers (1988) determined that most of the Los Moyos Limestone lies within the fusulinid zone of *Beedeina*, indicating that the unit is correlative to Desmoinian strata of the mid-continent. The overlying Wild Cow Formation lies within the zone of *Triticites*, and was subdivided by Myers (1973) into three members. The three members in ascending order are the Sol se Mete, Pine Shadow, and La Casa. Each of the three members conceptually consists of a basal sequence containing clastic beds, which grade upward into carbonate shelf limestones. Regional correlation of fusulinid assemblages in the Wild Cow Formation suggest that the Sol se Mete is correlative to Missourian, the Pine Shadow lower Virgilian, and the La Casa upper Virgilian to Wolfcampian strata of the mid continent (Myers, 1988, Fig. 4). As noted by Myers (1973), the Los Moyos and Wild Cow Formations are probably equivalent to the Gray Mesa and Atrasado Members, respectively, of the Madera "Formation" as defined by Kelley and Wood (1946) in the vicinity of the Lucero uplift. Recent recommendations to simplify the stratigraphic nomenclature of Pennsylvanian rocks in New Mexico (Kues, 2001) suggest that the formation names Los Moyos and Wild Cow may eventually be abandoned in favor of the names Gray Mesa and Atrasado, which have precedence.

Subdivision of the Madera Group on the geologic map uses the nomenclature of Myers (1973). Only the basal beds of the La Casa Member of the Wild Cow Formation are exposed in the map area, thus, unresolved issues related to the stratigraphy of the uppermost beds of the Madera (e.g. Lucas et al., 2000) are not addressed in this compilation.

Description of Map Units

Pennsylvanian

[Pw- Wild Cow Formation. Upper Pennsylvanian to Lower Permian (?). Approximately 180 m (600 ft) of the Wild Cow Formation is partially exposed in the map area. Outcrops are largely restricted to limestone ledges and resistant sandstone beds; exposures of shale are limited to roadcuts and the walls of arroyos.

[Pwc- La Casa Member. Approximately 25 m (80 ft) of the La Casa Member is exposed in the northwestern part of the map area. These basal beds are predominantly clastic sediments, although thin (<5 m thick) intervals containing limestone beds are present. Inflated forms of *Triticites*, which characterize fusulinid assemblages in the La Casa Member (Myers, 1988, Plates 8-12), exist in stratigraphically higher beds just to the north of the map area (sec. 13, T9N, R5E) in a sequence of interbedded shale and nodular-weathering limestone. The basal clastic beds of the La Casa Member in the northwestern map area contain beds of resistant, gray-, red-, and yellow-weathering arkosic sandstone and sandy siltstone,

and overlie ledge-forming limestone beds of the upper part of the Pine Shadow Member.

[Pwp- Pine Shadow Member. Approximately 60 to 90 m (200 to 300 ft) thick. The upper 25 to 30 m (80 to 100 ft) generally consists of ledge-forming limestone beds and calcareous shale, with relatively thin, poorly exposed clastic interbeds. These clastic interbeds thicken and coarsen laterally in the map area, and locally appear to be the dominant lithology. The upper limestone interval is underlain by two to three, comparatively thick (up to 10 m or more) clastic intervals separated by beds of ledge-forming limestone. The Kinney brick quarry (sec. 18, T9N, R6E), known for its abundant fish and terrestrial plant fossils, is located in one of the clastic intervals within the lower part of the Pine Shadow Member. The base of the Pine Shadow Member over much of the northwestern part of the map area is marked by a red- to yellow-weathering, arkosic sandstone, up to several meters thick, that generally lies on ledge-forming limestone beds of the upper Sol se Mete Member. This sandstone bed appears to be absent towards the east. Large pieces of petrified wood and limestone beds containing abundant fusulinids are commonly present above the basal contact in the map area.

[Pws- Sol se Mete Member. Approximately 75 to 105 m (250 to 350 ft) thick. The upper 12 to 18 m (40 to 60 ft) of the member contains several-meter-thick, ledge-forming limestone beds. Underlying deposits contain a higher proportion of limestone and fewer thick sandstone beds than the lower part of the overlying Pine Shadow Member. Poorly exposed clastic intervals in the unit are generally difficult to trace for long distances, although a green- to yellow-weathering sandstone bed occurs approximately 18 m (about 60 ft) below the top of the unit that can be identified over much of the western part of the map area. In comparison to overlying and underlying units, the abundance of fusulinids is relatively low in the Sol se Mete Member in the map area. Limestone beds containing abundant chert are not as common as in the underlying Los Moyos Limestone. A few meters of clastic deposits, locally consisting of conglomeratic sandstone commonly mark the base of the unit.

[Pm- Los Moyos Limestone. Middle Pennsylvanian. Approximately 150 to 180 (500 to 600 ft) thick. The Los Moyos Limestone is characterized by ledge-forming beds of cherty limestone, separated by comparatively thin shale beds, with minor sandstone. Ledge-forming limestone beds in the unit are typically more closely spaced than in the overlying Sol se Mete Member of the Wild Cow Formation. The contact with the underlying Sandia Formation is poorly exposed in the map area, suggesting that limestone beds of the Los Moyos Limestone grade downward into shale beds of the uppermost Sandia Formation.

Ps- Sandia Formation. Middle Pennsylvanian. Approximately 35 m (120 ft) or more exposed in the map area; unit apparently thins locally to approximately 25 m (80 ft) or less in the vicinity of exposed Proterozoic rocks. The basal beds of the unit in the map area consist of brown pebbly sandstone, and directly overlie Proterozoic crystalline rocks. Poor exposures of green-weathering silty sandstone are present above the basal sandstone beds, and overlying units, presumably dominated by shale, are commonly covered by blocks of limestone derived from the overlying Los Moyos Limestone.

Proterozoic

Xqs- Exposed crystalline rocks in the map area consist of gray- to red-weathering quartzite, and brown-weathering, schistose, metasedimentary rocks. Primary fabric consisting of centimeter-scale cross bedding is preserved in the quartzite. Isoclinal folding of foliation is apparent in the schist. The distribution of outcrops and the apparent thinness of the overlying Sandia Formation in the vicinity of the outcrops suggest localized areas of relatively high relief just prior to burial by the Sandia Formation.

Xu- Proterozoic crystalline rocks, undifferentiated (cross-sections).

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