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Lexicon of stratigraphic names used in Lincoln County, New Mexico

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LEXICON OF STRATIGRAPHIC NAMES USED IN LINCOLN COUNTY, NEW MEXICO

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This lexicon is an alphabetical listing and brief discussion of the stratigraphic names which have been used in Lincoln County, New Mexico, for units that are Pennsylvanian through Quaternary in age. The form used is as follows:

Unit name (formation or group)—system or period. Names printed entirely in capitals are currently accepted by the U.S. Geological Survey. Names printed in caps and lower case are used locally or have been recently proposed.

1) Areal distribution given in original description.
2) Reference in which unit was first defined or mentioned.
3) Type locality.
4) Short lithologic description and thickness at type locality or in the type area.
5) Age to stage; contacts; emending or redefining descriptions; additional information on areal distribution and thickness, lithology, and character of the beds in the area of the field conference.

ABO FORMATION — Permian

1) Central New Mexico
2) W. T. Lee, 1909; redescribed by Needham and Bates, 1943.
3) Abo Canyon, south end of Manzano Mountains, Socorro Co.
4) Dark red, purple, coarse-grained ss., cgl. at base, some sh., 300 to 800 feet thick.
5) Wolfcampian — Leonardian; conformable and gradational on Bursum Fm., disconformable (?) on upper Madera Ls.; overlain conformably and gradationally by Yeso Fm. (Pray and Otte 1954). Abo is transitional with Bursum in northern Sacramento Mtns.; in southern Sacramento Mtns. Early Wolfcampian is absent and Abo or equivalent marine beds of late Wolfcampian age lie unconformably on Pennsylvanian or older rocks. Abo is 1,400 feet thick in the north and thins abruptly to 250 feet in the central Sacramento Mtns. Farther south it is composed of two tongues separated by, and transitional with southward thickening brackish-marine Hueco Fm.; basal tongue is the Powwow Cgl. and upper tongue is Deer Mountain red sh. Widespread in New Mexico and in the subsurface of West Texas.

ARTESIA GROUP — Permian

1) Eastern New Mexico and West Texas.
2) D. B. Tait, and others, 1962, p. 504.
3) Humble Federal Bogle well No. 1, sec. 30, T. 16 S., R. 30 E., Eddy Co.
4) A sequence of shelf rocks composed of anhydr., dolo., ss., siltst. and red sh. 1,710 feet thick in the Type wall.
5) Upper Guadalupian; unconformably lies on San Andres Fm.; overlain unconformably by Triassic rocks in northeastern New Mexico, and overlain disconformably on the shelf and conformably in the Delaware Basin by the Ochoan series. The group extends from the top of the Tansill Fm., down through the Yates Fm., Seven Rivers Fm., Queen Fm., and Grayburg Fm., including the basal or Premier sand; it is traceable both in the surface and in the subsurface of southeastern and east-central New Mexico. All units thin northwestward across the shelf and top units are missing because of erosion; traced into West Texas and southwestern Oklahoma where marker beds thin and disappear and predominate clastic facies pass into the Whitehorse Group; to the south group units pass into the Capitan and Goat Seep reefs of the Delaware Basin. The authors do not comment on the use of the term "Artesia red sand" from 1929-1953 for the upper mbr. of the Queen Fm. in the Artesia oil field, Eddy Co., New Mexico.

BERNAL FORMATION — Permian

1) Central-northern New Mexico.
2) G. O. Bachman, 1953.
3) Section at Bernal Butte, near Chapelle, T. 13 N., R. 16 E.
4) Red, red-orange siltst. with 11-foot thick gyp. bed approximately 35 feet above the base. The formation is 165 feet thick.
5) Upper Guadalupian; lies disconformably on karst surface of the San Andres Fm.; in field conference area, also disconformably on the Glorieta Ss. mbr. of the San Andres Ls.; overlain unconformably by the Triassic Santa Rosa Ss. Thickness ranges from 30 to 355 feet. Originally was upper clastic mbr. of the San Andres Fm. In the field conference area it is red-brown to yellow-brown siltst., clayst. and fine ss., with a basal buff ss., a few gyp. beds, local crossbedding and many lenses, and is rather friable. It is the lateral equivalent to the Artesia Gp. (Tait, and others, 1962).

Broken Back Basalt Flow — Quaternary

1) Near Broken Back Crater.
2) Used by R. H. Weber, 1963, and defined by C. T. Smith, 1964.

3) Broken Back Crater, Broken Back Crater quadrangle, Lincoln Co.
4) Gray-green to black alkali olivine basalt.
5) Post-Pleistocene(?); rests unconformably on the San Andres Ls., Bernal Fm., or Santa Rosa Fm., overlain(?) disconformably by the Little Black Peak flow.

BURSUM FORMATION — Permian

1) Central, New Mexico.
2) R. H. Wilpolt, and others, 1946.
3) NE½ sec. 1, T. 6 S., R. 4 E., Socorro Co., (E. A. Lloyd, 1949, designated a new type section in NE½ sec. 14, T. 2 N., R. 4 E.).
4) Dark purple-red and green sh. interbedded with arkose, arkosic cgl. and gray ls. Locally there is a reworked rubbly nodular ls. at the base. It is 28 to 234 feet thick.
5) Late Virgilian and Early Wolfcampian; gradationally and transitionally overlies the arkosic mbr. of the Madera Ls., gradationally and transitionally overlain by the Abo; local erosional disconformities at base of clastic lenses, of intertonguing terresterial to brackish-water red beds and of marine ls. with fusulinid fauna (*Triticites* and *Schwagerian*) of both Pennsylvanian and Permian aspect. In the northern Sacramento Mtns. the Laborcita Formation of Otte (1954, 1959) is equivalent to the Bursum and represents continental near-short deposits across the Pennsylvanian-Permian boundary; near Tularosa it contains huge algal bioherms and wedges out unconformably a few miles to the southeast. Occurs throughout central and southeastern New Mexico.

CHALK BLUFF FORMATION — Permian

1) The Pecos Valley area of southeastern New Mexico.
2) W. B. Lang, 1937.
3) Section at Chalk Bluff, on eastern bank of the Pecos River, southeast of Artesia.
4) Anhydr., dolo. anhydr., ss., dolo., ls., beds of green bentonite. It is a back-reef fm. 1,000 feet thick and consists of, in ascending order, the Queen Ss., the Seven Rivers gypsif. Mbr., and the Three Twins Mbr.
5) Upper Guadalupian; lies unconformably on the San Andres Fm. and is conformably overlain by the Salado Fm. (Tait, and others, 1962). It is equivalent to the evaporite facies of the Artesia Gp. The top of Lang's Carlsbad Ls. is the top of the Tansill Fm., but the base of the Dog Canyon Ls. is not known. "Chalk Bluff" not adequate as originally defined, will not be redefined as it is only one facies (evaporite) of the units of the Artesia Gp.; use restricted to the Artesia area of the Pecos River Valley.

CHINLE FORMATION — Upper Triassic

1) Northern Arizona, Southern Utah.
2) H. E. Gregory, 1915.
3) Chinle Valley in northeastern Arizona.
4) Four units — red sh. and shly. ss., lenses of ls. cgl., and red sh., variegated sh. with ls. cgl., dark-brown sdy. sh. (named Divisions A, B, C, D). The Chinle is 400 to 1,000 feet thick.
5) In the conference area it overlies unconformably the Santa Rosa Ss., is unconformably overlain by Tertiary sediments and volcanics and consists of a single unit 200 to 400 feet thick. Here it is composed of interbedded dark-red, purple, chocolate-brown silst., clayst. and mudst. with some thin beds of ss. and ls. peb. cgl.; soft, friable, contains some fossil wood.

Cub Mountain Formation — Early Tertiary

1) Central New Mexico, peripheral to Sierra Blanca.
2) Used without definition by M. W. Bodine, Jr., 1956, p. 8-11; and defined by R. H. Weber, 1964. Also see Kelley and Thompson, 1964, for remarks concerning the Cub Mountain Fm.
3) Sanders Canyon, from SW¼SW¼ sec. 16 to SW¼SW¼ sec. 24, T. 9 S., R. 10 E.
4) White to gray, yellow, buff, brown, massive to thin-bedded, fine- to coarse-grained, poorly sorted, arkosic ss. Contains cross-laminations and channels. Interbedded with variegated montmor. clayst., mudst., siltst., and fine ss., thin cgl. lenses in lower part; upper part contains coarse-grained graywacke ss. It is 2,400 feet thick.
5) Latest Upper Cretaceous(?) — Eocene(?); apparently lies conformably to disconformably on the Mesaverde Gp.; overlain unconformably by the Sierra Blanca Volcanics. The upper contact is sharp. Thought to be lithologic and stratigraphic equivalent of the Baca Fm.; upper mbr. possibly equivalent to Spears Mbr. of the Datil Fm.

DAKOTA SANDSTONE — Upper Cretaceous

1) Nebraska and Kansas.
2) F. B. Meek and F. V. Hayden, 1862, p. 419-420.
3) Hills back of the town of Dakota, Dakota Co., Nebraska.
4) Yellow, red and white ss. interbedded with variegated clays and lignite. About 400 feet thick.
5) In the field conference area it overlies unconformably the Triassic (Chinle or Dockum) and is overlain conformably by the Mancos Sh.; elsewhere some units of the Dakota contain fossils and are now known to be of Early Cretaceous age. In the conference area the Dakota is 144 to 182 feet thick. It is usually divided into 3 units: a lower white qtz., massive-bedding, coarse ss., a middle carbonaceous sh. (locally thin coal beds) siltst., mudst., and an upper interbedded fine-med. grained ss. and sh.; gradational into the Mancos Shale.

DOCKUM GROUP — Upper Triassic

1) Texas Panhandle.
2) W. F. Cummins, 1890, p. 189.
3) Vicinity of Dockum, western Dickens Co., Texas.

4) Red, red-brown ss., white qtz. peb. cgls., siltst. and clays; very lenticular; contains silicified wood, reptile bones and *Unio*.
5) Possibly equivalent to interval C of the Chinle; unconformably overlies Permian to Precambrian rocks and is overlain unconformably by the Dakota Ss.; occurs in northeastern to southeastern New Mexico and Oklahoma and Texas Panhandle; locally two or more fms. recognized; equivalence not known; in central New Mexico the Dockum is divided into the Santa Rosa Ss. the overlying Chinle Fm.; 500 to 600 feet thick in the field conference area.

GLORIETA SANDSTONE — Permian

1) Central northern New Mexico.
2) C. R. Keyes, 1915, p. 257, 262.
3) South-central part of T. 15 N., R. 12 E., on Glorieta Mesa, 1 mile west of the village of Rowe, San Miguel Co. as designated by Needham and Bates (1943).
4) White-gray, medium-coarse grained qtzitic. ss., beds 2-6 feet thick, cliff-former; at the base is a 20-foot thick buff-white, thin-bedded ss. It is 12 to 300 feet thick.
5) Leonardian; conformably overlies the Yeso Fm., and is conformably overlain by the San Andres Fm. Occurs in central and southeastern New Mexico, the subsurface of West Texas. It is stratigraphic equivalent of the Hondo Ss. Mbr.

HONDO SANDSTONE MBR. (of the San Andres Fm.) — Permian

1) Pecos Valley area of southeastern New Mexico.
2) W. B. Lang, 1937.
3) Probably along the base of the Algerita escarpment, on the east side of Big Dog Canyon, Tps. 23 and 24 S., R. 20 E.
4) Coarse white qtz. ss. grains streaked with yellow or red-brown, cemented by iron and lime. 50± feet thick.
5) Leonardian; conformably rests on the Yeso Fm., conformably overlain by the San Andres Fm.; a stratigraphic equivalent of the Glorieta Ss.; Pray (1961) uses unit in Sacramento Mtns. for beds of clean, qtz. ss. with rounded, frosted grains. Occurring within typical San Andres Ls. 60 to 120 feet above the top of the Yeso Fm.; the Hondo Ss. is now not used as originally defined by Lang as a mbr. of the Chupadera Fm. (abandoned).

Jicarilla Monzonite — Tertiary(?)

1) From the vicinity of the village of Jicarilla east to the vicinity of Jack's Peak.
2) A. J. Budding, 1964.
3) Vicinity of the village of Jicarilla, Lincoln Co.
4) Leucocratic, gray to buff, monzonite porphyry, varying amounts of qtz.
5) Latest Upper Cretaceous-pre-Pliocene.

Little Black Peak Basalt Flow — Quaternary

1) 44 miles to south and west of Little Black Peak.
2) C. T. Smith, 1964.
3) Little Black Peak, Little Black Peak quadrangle, Lincoln Co.
4) Dense, fine-grained to aphanitic olivine basalt, trachyte texture.
5) Post-Pleistocene to Recent; lies disconformably on Quaternary fill in Recent topographic valleys.

Lone Mountain Stock — Tertiary

1) Lone Mtn., Lincoln Co.
2) C. T. Smith, 1964.
3) Lone Mtn.
4) Nordmarkite, 80 percent potash feldspar, 8 percent qtz., 5 percent dark minerals; plagioclase feldspar almost absent.
5) Middle Tertiary; regional discordant, local, concordant.

McRae Formation — Upper Cretaceous to Early Tertiary

1) Caballo Mtns. and Dona Ana Co.
2) V. C. Kelley and C. Silver, 1952, p. 115-120.
3) Eastern shore of Elephant Butte Reservoir for several miles north of dam.
4) At base pebble to boulder cgls. interbedded with sh. and siltst., some breccia, overlain by interbedded sh. and ss., cgl. thin and rare, sh. red-brown to purple, ss. gray-green or pink, arkose common; *Triceratops* in lower beds. More than 3,000 feet thick.
5) Latest Upper Cretaceous to Eocene; overlies the Mesaverde Gp. conformably and gradationally to unconformably; unconformably overlain by younger Tertiary sediments and volcanics.

MADERA LIMESTONE (of Magdalena group) — Pennsylvanian

1) Bernalillo Co.
2) C. R. Keyes, 1903.
3) Eastern slope of the Sandia Mtns.
4) Blue to gray ls. 300 feet thick.
5) Desmoinesian-Virgilian; conformably and gradationally overlies the Sandia Fm.; overlain conformably or disconformably by the Bursum or Abo; interbedded ls. and gray calcareous sh., ls. thickest and most common in lower two-thirds, sh., little ss. with arkose, and red beds predominate in upper one-third of the formation. It is 1,000 to 2,500 feet thick in the field conference area. Widespread in New Mexico.

MAGDALENA GROUP — Pennsylvanian

1) Central New Mexico.
2) C. H. Gordon, 1907.
3) Magdalena Mtns. — no type section designated.
4) Divided into two formations. The upper is the Madera Ls. It is 300 to 700 feet thick and is composed of dark-blue ls.; the lower is the Sandia Fm., 500 to 700 feet thick. It consists of blue and black clay sh., dense earthy ls., and cgl. ss. or qtzite. The Magdalena has a maximum thickness of 1,400 feet.

5) Restricted to Pennsylvanian; rests disconformably on Mississippian ls., and is disconformably or conformably overlain by Permian rocks; widespread in New Mexico and West Texas. The Magdalena Group is 900 to 2,700 feet thick in the field conference area.

MANCOS SHALE — Upper Cretaceous

1) Western Colorado.
2) C. W. Cross, 1899.
3) Mancos Valley near town of Mancos, in southwestern Colorado.
4) Dark-gray sdy. sh. with ss. lenses and fossiliferous calcareous sh. and thin ls. lenses. 2,000 feet thick.
5) Montanan and Coloradoan; conformably or disconformably overlies the Dakota Ss. It is overlain conformably and gradationally by the Mesaverde Gp. or unconformably by Tertiary sediments; gray to black calcareous fissile sh. interbedded with a few thin beds of ls., near top thin beds of buff, qtzose. ss.; 4,600 to 4,700 feet thick in the field conference area. Widespread in New Mexico.

MESAVERDE GROUP — Upper Cretaceous

1) Western Colorado and northwestern New Mexico.
2) W. H. Holmes, 1877.
3) Mesa Verde, Montezuma Co., Colorado.
4) Divided into three units which in descending order are: an upper ss. (190 feet of massive ss.), a middle coal-bearing group of 800 to 900 feet of ss., sh. marl and lignite, and a lower ss. consisting of 120 feet of massive ss. The Mesaverde has a total thickness of about 1,200 to 1,500 feet.
5) Carlile to Pierre; rests conformably on the Dakota Ss. or Mancos Sh.; overlain conformably and gradationally by latest Upper Cretaceous and/or early Tertiary rocks including the McRae Fm. and the Cub Mountain Fm.; or disconformably overlain by these fms.; three units recognized in field conference area, and has a total thickness of 500 to 550 feet. The Mesaverde is widespread in New Mexico.

OGALLALA FORMATION — Upper Miocene and Pliocene

1) Kansas and Colorado into Nebraska.
2) N. H. Darton, 1898.
3) Feldt Ranch, in the vicinity of Ogallala, Keith Co., Nebraska designated by C. J. Hesse, 1935.
4) Calcareous grit or soft ls., sdy. clay, ss., with local basal cgl. About 150 to 300 feet thick in the type area; Elias, 1931, restricted the Ogallala to the interbedded buff to pink, unsorted ss. and gravel with fine clay and siltst. that underlie the "Plains marls" and other Pleistocene units.
5) In the field conference area it lies unconformably on the San Andres Fm. up to the Dakota (?) Fm.; overlain unconformably by Quaternary sediments or volcanics; poorly cemented cgl. with fine-grained sdy., calcareous matrix and about 50 feet thick in field conference area. Lateral equivalent of the "Panhandle Fm."

SAN ANDRES FORMATION — Permian

1) San Andres Mtns. of central New Mexico.
2) W. T. Lee, 1909; also see Needham and Bates, 1943 and Kottlowski, and others, 1956.
3) Rhodes Canyon, San Andres Mtns., in sec. 29, T. 12 S., R. 2 E.
4) Lt. to drk. gray, massive-bedded, often cherty, poorly fossiliferous ls. About 600 feet thick.
5) Leonardian; rests conformably on the Glorieta Ss.; disconformably overlain by the Bernal Fm. or its stratigraphic equivalents; lower 350 feet of ls., a few beds of dolo. with interbeds of qtz. ss. (15-30 feet thick) and siltsts., upper 400 feet composed of interbedded dark petroliferous ls., dolo, and gyp.; widely distributed in southeastern, central, and north-central New Mexico.

SANDIA FORMATION (of Magdalena group) — Pennsylvanian

1) Central New Mexico.
2) C. L. Herrick, 1900.
3) Southern end of the Sandia Mtns. — no type section.
4) Ss., cgl., and sh. with occasional sdy. ls., about 150 feet thick.
5) Morrowan — Desmoinesian; unconformably rests on Mississippian ls. or Precambrian rocks, conformably and gradationally overlain by Madera Ls., Sandia Fm. is now used as defined by C. H. Gordon, 1907 (see Magdalena Gp.); widespread in New Mexico.

SANTA ROSA SANDSTONE (of Dockum Group) — Upper Triassic

1) Northeastern New Mexico.
2) D. Hager and A. E. Robitaille, 1919; defined by N. H. Darton, 1922.
3) Along Pecos River at Santa Rosa, Guadalupe Co.
4) Coarse-grained, gray, massive-bedded, cliff-forming ss.; cgl. at base. 50 to 100 feet thick near type locality.
5) Equivalent to interval C of the Chinle Fm.; unconformably overlies Bernal Fm., conformably and gradationally or disconformably overlain by Chinle Fm.; red to red-brown, coarse to medium-grained, cross-bedded ss. and peb. cgl. with clayst. and siltst. partings; locally there is a buff-white coarse-grained ss. at the top of the unit. 150 to 250 feet thick in the field conference area.

Sierra Blanca Volcanics — Tertiary

1) Lincoln Co. and Otero Co., New Mexico.
2) T. B. Thompson, 1964, and R. H. Weber, 1964.
3) Northern Sierra Blanca.
4) Interbedded andesite and basaltic andesite flow breccias, flows, tuff breccias, and lapilli tuffs,

gray, bluish-gray, purple-gray, pink to red, some volcanic cgl.

5) Miocene(?); lies unconformably on the Cub Mountain Fm. (McRae? Fm.); unconformably overlain by younger latites; possible equivalent of the basal part of the Datil Fm. according to Weber, 1964.

YESO FORMATION — Permian

1) Central New Mexico.
2) W. T. Lee, 1909.
3) 11.2 miles N. 46° E. of Socorro, at point where eastern edge of the Socorro quadrangle intersects the 34°10' parallel; from this point northeast in secs. 4 and 5, T. 2 S., R. 2 E., and in sec. 33, T. 1 S., R. 2 E., Socorro Co.
4) Variegated ss., soft, coarse-grained, friable to hard, fine-grained, pink-yellow, often gypsif. sh., earthy ls., massive white beds of gyp. In field conference area the Yeso is 1,000 to 2,000 feet thick.
5) Leonardian; rests conformably and gradationally on the Abo Fm., conformably and gradationally or disconformably overlain by the Glorieta Ss.; 4,255 feet of Yeso encountering in Standard of Texas-Heard Oil test including over 1,000 feet of halite beds as well as a thick gypsum section; Carrizozo dome probably the site of a persistant evaporite basin during Yeso time (Kottlowski, 1963); widespread in New Mexico and subsurface of West Texas.

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