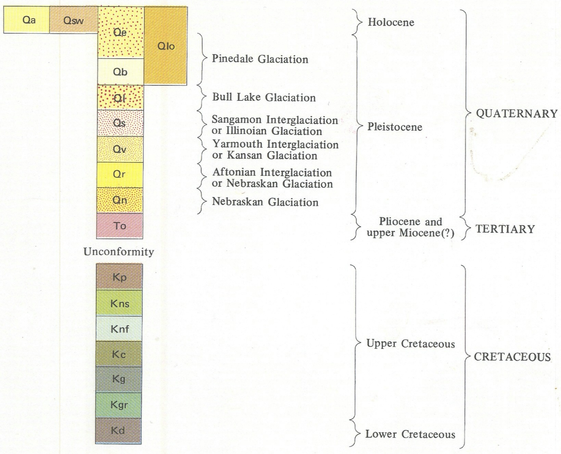
CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qa ALLUVIUM (HOLOCENE) – Silt, sand, and gravel of modern flood plains and streams, dark-yellowish-gray to yellowish-tan, crossbedded, unconsolidated. Equivalent to Piney Creek Alluvium and post-Piney Creek alluvium

Qsw SLOPEWASH (HOLOCENE) – Material deposited on slopes by sheetwash and ephemeral rills; mostly sandy silt but may include any material upslope from site of deposit such as gravel or chips of limestone or shale

Qe EOLIAN SAND (HOLOCENE AND PLEISTOCENE) – Yellowish-brown very fine to medium silty quartz sand; generally more silty toward top

Qlo LOESS (HOLOCENE AND PLEISTOCENE) – Brown silt, sandy silt, and very fine sand. Mostly equivalent to Peoria Loess (Pleistocene) of Kansas and Nebraska but includes some Holocene windblown silt; may in places include equivalents of Bignell Loess (Holocene and Pleistocene) and Loveland Loess (Pleistocene) of Kansas and Nebraska

Qb BROADWAY ALLUVIUM (PLEISTOCENE) – Gravel, sand, and silt; in terraces which are 20–50 feet (6–15 m) above the Arkansas River in western part of quadrangle and 15–40 feet (4–12 m) above in eastern part. Pebbles have a very thin caliche coating. Unconsolidated

Ql LOUVIERS ALLUVIUM (PLEISTOCENE) – Gravel and sand containing very little silt; in terraces which are 50–70 feet (15–20 m) above the Arkansas River in western part of quadrangle and 30–55 feet (7–16 m) above in eastern part. Caliche coating on pebbles is rarely more than 1/2 mm thick. Unconsolidated

Qs SLOCUM ALLUVIUM (PLEISTOCENE) – Cobbly and bouldery gravel containing silty sand; in terraces which are 80–100 feet (24–30 m) above the Arkansas River in western part of quadrangle and 65–100 feet (20–30 m) in eastern part. Caliche rind on pebbles and cobbles is 3–12 mm thick

Qv VERDOS ALLUVIUM (PLEISTOCENE) – Cobbly gravel and silty sand; in terraces which are 130–180 feet (40–55 m) above the Arkansas River in western part of quadrangle and 120–180 feet (37–55 m) in eastern part. Caliche rind on pebbles and cobbles is 3–12 mm thick. In places basal part is cemented by caliche

Qr ROCKY FLATS ALLUVIUM (PLEISTOCENE) – Cobbly gravel and silty sand; in terraces which are 240–340 feet (73–103 m) above the Arkansas River in western part of quadrangle and 210–285 feet (64–87 m) in eastern part. Caliche rind on pebbles and cobbles is 3 mm to more than 12 mm thick. Basal part is generally cemented by caliche

Qn NUSSBAUM ALLUVIUM (PLEISTOCENE) – Cobbly gravel and silty sand; in terraces along Arkansas River and widespread on uplands. Terraces are 375–410 feet (114–125 m) above the Arkansas River in western part of quadrangle and 320–390 feet (97–120 m) above in eastern part. Formation on uplands was deposited as a broad alluvial fan not related to present drainage; it is finer grained and more sandy, and contains a higher proportion of sedimentary rock fragments than that deposited near the Arkansas River. Thickness of caliche deposit on pebbles and cobbles is generally 12 mm or more. Lower part is cemented by caliche and in places forms ledge as much as 5 feet (1.5 m) thick

To OGALLALA FORMATION (PLIOCENE AND UPPER MIOCENE?) – Chiefly sandy gravel containing interbedded silt; caliche cemented in part; in places capped by thin hard limestone. Underlies most of area northeast of Big Sandy Creek. Formation ranges in thickness from a few feet (about 1 m) at east end of Lake Albert, where the capping limestone rests on the Smoky Hill Shale Member of the Niobrara Formation, to 390 feet (120 m) in the area where U.S. Highway 40 crosses the Colorado-Kansas State line. Not well exposed. For more detailed description see Elias (1931)

Kp PIERRE SHALE (UPPER CRETACEOUS) – Typically brownish-gray to dark-gray shale approximately 3,900 feet (1,190 m) thick in northwest corner of quadrangle, beveled by erosion southeastward to zero thickness. From top down, consists of:

Dark-gray shale about 1,000 feet (300 m) thick containing a few reddish-brown fine-grained sandstone beds

Dark-gray shale about 1,600 feet (490 m) thick containing a brownish-gray fossiliferous limestone bed near top; also contains, in places, thin beds of cone-in-cone limestone and thin reddish-brown calcareous shale beds

Dark-gray shale about 350 feet (105 m) thick containing very large limestone concretions that form small conical hills known as tepee buttes

Brownish-gray to dark-gray shale 800 feet (245 m) thick bearing rust-colored ironstone concretions and many thin rust-colored shale beds

Dark-gray to medium-gray thin-bedded shale about 180 feet (55 m) thick containing fossiliferous concretions at top

NIOBRARA FORMATION (UPPER CRETACEOUS)

Kns Smoky Hill Shale Member – Thin-bedded yellowish-orange chalky fissile shale. More chalky in upper part; more shaly and less resistant in middle 300 feet (90 m). Beds of hard platy limestone present in basal 50 feet (15 m). Weathers to distinctive yellowish-gray regolith. About 500–700 feet (150–215 m) thick

Knf Fort Hays Limestone Member – Hard yellowish-gray massive-bedded limestone. Forms ledges and bluffs north of Arkansas River from La Junta to McClave. About 75–100 feet (23–30 m) thick

Kc CARLILE SHALE (UPPER CRETACEOUS) – Consists of four members. Total thickness 125–200 feet (38–60 m)

Juana Lopez Member – Hard rust-brown calcarenite bed. Thickness 0–3 feet (0–1 m)

Codell Sandstone Member – Soft yellowish-gray to light-gray silty sandstone and sandy shale. Thickness 0–30 feet (0–9 m)

Blue Hill Shale Member – Black fissile shale containing a zone of large yellow septarian limestone concretions. Thickness 50–60 feet (15–18 m)

Fairport Chalky Shale Member – Calcareous shale, black at top, grading to yellowish gray at base; more calcareous toward base. Thin interbeds of chalk in lower 30 feet (9 m). Thickness about 110 feet (33 m)

Kg GREENHORN LIMESTONE (UPPER CRETACEOUS) – Consists of three members, all of which contain thin beds of bentonite. Thickness about 135 feet (41 m)

Bridge Creek Limestone Member – Interbedded thin beds of limestone and calcareous shale. About 70 feet (21 m) thick

Hartland Shale Member – Calcareous shale. About 25 feet (8 m) thick

Lincoln Limestone Member – Mostly calcareous shale, but contains many thin hard gray limestone beds. About 35 feet (11 m) thick

Kgr GRANEROS SHALE (UPPER CRETACEOUS) – Dark-gray to black fissile shale, sandy in lower few feet. Contains thin beds of bentonite. About 125 feet (38 m) thick

Kd DAKOTA SANDSTONE (LOWER CRETACEOUS) – Yellowish-brown crossbedded resistant quartz sandstone. Only upper 50 feet (15 m) exposed

(To) / (Kns) CONTACT – Dotted where concealed. Symbols in parentheses indicate concealed bedrock

FAULT – Dashed where approximately located; short dashed where inferred; dotted where concealed. Bar and ball on downthrown side

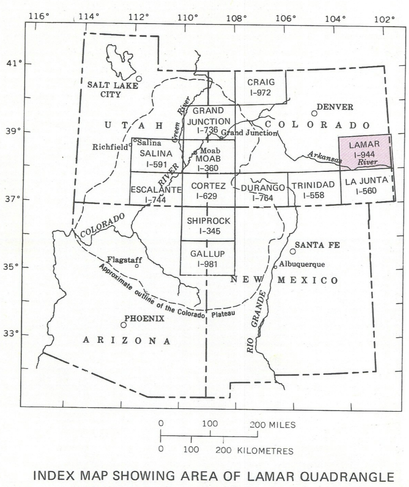
3000 STRUCTURE CONTOURS – Drawn on top of Dakota Sandstone. Hachures indicate closed basin. Contour interval 100 feet (30.5 m). Vertical accuracy is within 50 feet (15 m) generally within 6 miles (13 km) of the Arkansas River east of North La Junta; it is generally between 50 and 100 feet (15–30 m) from that area north to State Highway 96; elsewhere it may not be within 100 feet (30 m). Data are from selected well logs of Rocky Mountain Well Log Service and from Water Resources Division, U.S. Geological Survey

FOSSIL AMMONITE ZONE IN PIERRE SHALE – Zone line is drawn through principal collections of ammonites in faunal assemblage zones. The collections through which a zone line is drawn are not always at the same horizon; therefore the line may rise or fall within that ammonite zone

MESOZOIC FOSSIL LOCALITY – Showing catalog numbers

D6745 USGS Denver catalog number

15847 USGS Washington catalog number – Relocated as accurately as possible from original description or map



INDEX MAP SHOWING AREA OF LAMAR QUADRANGLE AND OTHER PUBLISHED QUADRANGLES

REFERENCES

Dane, C. H., Pierce, W. G., and Reeside, J. B., Jr., 1937, The Stratigraphy of the Upper Cretaceous rocks north of the Arkansas River in eastern Colorado: U.S. Geol. Survey Prof. Paper 186–K, p. 207–232.

Darton, N. H., 1906, Geology and underground waters of the Arkansas Valley in eastern Colorado: U.S. Geol. Survey Prof. Paper 52, 90 p.

Elias, M. K., 1931, The geology of Wallace County, Kansas: Kansas State Geol. Survey Bull. 18, 254 p.

Interior—Geological Survey, Reston, Va.—1976

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