Preliminary biostratigraphy of the lower Cenomanian Buda Limestone from the U.S. Geological Survey GC-3 and GC-5 cores, Texas, USA

Jean M. Self-Trail
U.S. Geological Survey, Florence Bascom Geoscience Center, Reston, VA 20192, USA; jstrail@usgs.gov
Celeste D. Lohr
U.S. Geological Survey, Geology, Energy & Minerals Science Center, Reston, VA 20192, USA; clohr@usgs.gov
Jason A. Flaum
U.S. Geological Survey, Central Energy Resources Science Center, Denver, CO 80023, USA; jflaum@usgs.gov

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The lower Cenomanian Buda Limestone is a widely occurring formation found across the Texas Gulf Coast Basin and extending across the state and into southeastern New Mexico and northern Mexico. In central Texas, it overlies the Albian Del Rio Formation at its base and is unconformably overlain by the Eagle Ford Group at the top. Thickness of the Buda Limestone in central Texas typically ranges from 32.8–82.0 ft (10–25 m), except where it is absent along the apex of the San Marcos Arch (SMA) in the Austin area. The Buda Limestone was deposited in a shelf setting in the northern Gulf of Mexico during transgressive flooding of the platform in a period when the gulf's connection with the Western Interior Seaway was disrupted.

As part of ongoing research on Gulf Coast (GC) Basin Cenomanian–Turonian sections drilled by the U.S. Geological Survey, calcareous nannofossil biostratigraphic analysis of the resultant GC-3 and GC-5 cores, extending from the SMA to the eastern flank of the Maverick Basin, was performed. Calcareous nannofossil abundances are highly variable throughout the sections. Samples taken from white, chalky limestone typically had lower species abundance than those taken from the gray, silty stringers that are interspersed throughout the Buda Limestone. The base of the Buda Limestone in the GC-3 core at 331.5 ft (101.0 m) is considered to be earliest Cenomanian (Zone UC0) in age, based on (1) the last occurrence of *Crucicribrum anglicum* in the underlying Del Rio Formation, (2) the common occurrence of *Eiffelithus turriseiffelli*, and (3) the absence of any younger marker species. The last occurrence of *Gartnerago gammation*, which is commonly thought to occur in the early Cenomanian before the base of *Gartnerago segmentatum*, is at 321.3 ft (97.9 m) in GC-3 and may mark the top of Zone UC1. *Corollithion kennedyi* is absent throughout the Buda Limestone and only has its first appearance in the overlying Eagle Ford Group, suggesting that the depositional environment of the Buda Formation was not favorable for this species and thus making biostratigraphic analysis challenging. *Nannoconus* spp., a group thought to have preferred marginal to neritic carbonate platforms, and *Lithraphidites alatus* are frequent to common throughout the lower part of the Buda Limestone. The first occurrence of *Lithraphidites acutus* at 127.0 ft (38.7 m) in GC-3 is in the lower Eagle Ford Group and marks the base of Zone UC3.

Minor amounts of glauconite and pyrite are present in the basal Buda Limestone, and calcitic ooids are common, all of which increase in abundance up-section. Exceptionally low total organic carbon (TOC) values (<1%) are recorded throughout. The presence of ooids, extremely low TOC, and common nannoconids, along with the lack of marker species often associated with organic-rich shales, all corroborate that Buda Limestone deposition occurred in the early Cenomanian on a flooded carbonate platform with little sedimentary influence from the proximal shoreline.