BEDROCK GEOLOGIC MAP OF THE ATALISSA 7.5' QUADRANGLE, MUSCATINE AND CEDAR COUNTIES, IOWA





Iowa Geological Survey

Open File Map: **OFM-23-5** Keith Schilling, State Geologist Published June, 2023

INTRODUCTION

The Atalissa 7.5' Quadrangle in Muscatine and Cedar counties, Iowa, is located within the Southern Iowa Drift Plain (SIDP) and Iowa-Cedar Lowland (ICL) landform regions. There are no bedrock exposures in the map area due to burial by Quaternary materials. The SIDP is an area with surface topography defined by loess-mantled uplands and slopes, whereas the ICL is a low-relief floodplain consisting of sediment deposited by the Cedar River. The top of the till package of the SIDP in the map area is likely Pre-Illinoian-age diamicton of the Wolf Creek/Alburnett formations. The ICL is a broad, flat lowland that is comprised of outwash deposited during the Late Wisconsin Episode and the Cedar River has formed Holocene terraces in this valley. The shape of the ICL does not directly correspond with the underlying bedrock channel (Cleona Channel).

The Cleona Channel is a buried bedrock valley that trends in a southwest – northeast direction across the southeastern portion of the map area, and this channel can be up to 325 feet deep below the modern surface. Although entirely buried by Quaternary deposits, the bedrock surface of the Atalissa 7.5' Quadrangle is dominated by Middle Devonian strata of the Little Cedar Formation (Cedar Valley Group) and the Pinicon Ridge Formation (Wapsipinicon Group). Silurian strata of the Gower and Scotch Grove formations make up the bedrock surface of the Cleona Channel. Just to the east of the mapping area these Paleozoic stratigraphic units are exposed in the Moscow Quarry (Wendling Quarries Inc. in the Wilton 7.5' Quadrangle). Due to sparse well data and the lack of bedrock exposures within the quadrangle, the contacts between these stratigraphic units are concealed and have been dashed on the map and the contact between the Gower and Scotch Grove formations is concealed and its location is inferred. Further detail about the bedrock elevation and Quaternary thickness in the Atalissa 7.5' Quadrangle can be found on the accompanying map (Open File Map OFM-23-06).

STRATIGRAPHIC COLUMN AND LEGEND





The Pinicon Ridge Formation (lower to middle Givetian) is comprised of the Kenwood, Spring Grove, and Davenport members (in ascending order). The basal Kenwood Member is an unfossiliferous argillaceous dolostone with interbeds of gray to green shale (both lithologies contain abundant sand- to silt-sized grains of quartz and chert). This member includes gypsum and anhydrite evaporite units and where these facies are absent brecciated beds may be common. The Spring Grove and Davenport members consist primarily of unfossiliferous limestone and dolostone; the dolostone is interpreted to be a diagenetic facies transition, as such the boundary between the two units is gradational. Strata of the Spring Grove Member are predominantly thinly-laminated, vuggy to porous dolostone (which is petroliferous to varying degrees). A dense 'sublithographic' limestone characterizes the Davenport Member, however, discontinuous dolostone or thin argillaceous to shaly units may be present locally. In some areas the limestone is interbedded with evaporite facies and well-developed breccia is very common within the Davenport Member.

The Gower Formation (mid-Wenlock to Ludlow?) is comprised of the Anamosa, LeClaire, and Brady members, and the base of this unit is usually marked by a laminated dolostone layer. Strata of the Anamosa Member consist of flat-lying, laminated dolostone interbedded with dense, unfossiliferous dolostone layers, with occasional low diversity brachiopod- or coral -rich layers representing inter-reef and inter-bank facies. The LeClaire Member is a complex carbonate bank and reef facies that consists of both horizontal and variably dipping mound and inter-mound facies composed of dolomitic mudstone to skeletal wackestone, with occasional skeletal packstones in mound flank facies. The LeClaire Member is laterally equivalent to the Anamosa Member, however the fauna of the LeClaire is very diverse, and vugular porosity is common. The Brady Member is a skeletal dolowackestone to dolopackstone, interbedded with dense laminated and nonlaminated dolomudstones and contains an abundant, low-diversity fauna (brachiopods and corals); this facies also forms mounds and is at least in part laterally equivalent to the Anamosa Member. The strata of the Brady Member exhibit flanking and over-stepping relationships with the mound facies of the Palisades-Kepler (P-K) Member (Scotch Grove Formation). Notably, the Gower Formation is truncated by pre-Middle Devonian erosion.

The Scotch Grove Formation (upper Telychian to Sheinwoodian) is comprised of the Johns Creek Quarry (JCQ), Welton, Buck Creek Quarry (BCQ), Waubeek, and Palisades-Kepler (P-K) members - the latter four members may, locally, be lateral equivalents of one another. The basal JCQ Member (upper Telychian) consists of mound and inter-mound facies with dense dolomudstone cores and coral fossils, flanked by crinoidal dolowackestone/dolopackstone or flat-lying strata that are dense and well-bedded and may be either sparsely fossiliferous, porous with large brachiopods, or have argillaceous partings. The JCQ may be a partial facies equivalent of the BCQ and Welton members. Strata of the BCQ Member (upper Telychian) are dense, fine to microcrystalline, very cherty (chalky dolomitized 'tripolitic' chert nodules), skeletal mudstone/wackestone with local dolopackstone containing large moldic pentamerid brachiopods and occasionally abundant silicified corals. The Welton Member (upper Telychian, lower Sheinwoodian) is often the dominant Scotch Grove lithology and is a thick-bedded to massive unit of porous (fossil-moldic), abundantly crinoidal dolowackestone with a diverse brachiopod fauna. A dense to vuggy (including quartz-lined vugs), finely crystalline dolomudstone to skeletal-moldic dolowackestone that is sparsely fossiliferous but contains a diverse fauna of brachiopods characterizes the Waubeek Member (Sheinwoodian). The uppermost P-K Member (Sheinwoodian) is a complex mound and inter-mound facies composed largely of skeletal (dominantly crinoidal) dolowackestone to dolopackstone flanked by crinoidal dolopackstone with some dolograinstone; the P-K may be a partial facies equivalent to the BCQ and Waubeek members.

North American Regional Chronostratigraphic Unit Names





Figure 1. The location of the Atalissa Quadrangle in Iowa.

-800

700

· 600

500

400

300

-200

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