The Greene 7.5' Quadrangle is located in Polk and Marshall counties, south-central Iowa. This area is underlain by two separate groups of strata: the Upper Devonian Lime Creek Formation and the Lower Devonian Shell Rock Formation. The uppermost part of the Lime Creek Formation is comprised of marine fluvial and pedogenic facies succession characterized by a variety of lithologies, commonly dominated by quartzose sandstones with minor gray to light green shale and/or argillaceous carbonates. Fossiliferous layers, especially characterized by abundant bryozoans, brachiopods (Lime Creek Formation) Upper Devonian. This map unit occurs on the bedrock surface near the center of the study area.

The Lower Devonian Shell Rock Formation forms a low-lying subaqueous plain, with a maximum thickness of 37 m (120 ft). This unit is shown only on the cross-section, not on the map.

Recent studies of the Devonian Iowa Basin are represented by Witzke and Bunker (1984), Anderson (1987), and Powner and Bunker (2002). Results from these geologic studies and bedrock geologic surveys in Floyd and Butler counties (Voy, 1995; Buckner, 1974) were used for delineating potential geologic hazards. The land surface of this mapping area is mostly covered by Quaternary sediments, including loess, glacial sediments, colluvium, and alluvial deposits. The thickness of the Quaternary usually varies between 9 and 24 m (30 and 80 ft), with a maximum up to 37 m (120 ft). These deposits are mainly high-loess deposits on the upland areas and loess in the lower areas.

The sandstone and shale beds are generally horizontal, while the topography is controlled by the bedrock topography. The bedrock surface of the Greene 7.5' Quadrangle is dominated by Devonian strata, with local variations in thickness and lithology. The strata are typically conformable, with minor resting surfaces and/or angular unconformities. The topography is generally low-lying, with a maximum relief of about 37 m (120 ft). The bedrock surface is characterized by a combination of gently undulating to flat areas, with occasional small hills and knobs.

Legends and symbol key:
- Lithology: Conglomerate, Sandstone, Shale, Limestone
- Symbol: Dolomite, Chart, Shelly, Stromatolites

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