## BEDROCK GEOLOGIC MAP OF THE VINTON (IOWA) 7.5' LEGEND QUADRANGLE CENOZOIC **QUATERNARY SYSTEM** Qu 92°7'30"W 92°5'0"W 92°2'30"W 92°0'0"W not on the map. PALEOZOIC **DEVONIAN SYSTEM** 42°15'0"N <del>-</del> **-** 42°15'0"N stromatoporoid-rich. DIc Dcv Dpr quadrangle Dlc 54TH S Dpr (40-80 ft). Compared to other Devonian strata in the mapping area, this formation is usually unfossiliferous. Dpr the bottom of the unit. The thickness of this unit ranges from 6 to 15 m (20-50 ft) in the mapping area. Dob SILURIAN SYSTEM Dob | Slpc Devonian rocks) and green-gray shale. The thickness of the map unit varies and is up to 43 m (140 ft). OTHER FEATURES 💡 55TH ST 55TH ST 🔺 Wells drilled for this mapping project Bedrock outcrops IGS GEOSAM data points – records available at www.iowageolocialsurvey.org Incorporated city boundary \_...... DIc

Qu - Undifferentiated Unconsolidated Sediments (Quaternary System). The Quaternary deposits consist of loamy soils developed in loess, glacial till, and colluvium of variable thickness, and alluvial clay, silt, sand, and gravel. These deposits cover most of the land surface except in areas of shallow bedrock along the valley of the Cedar River and major tributaries. The thickness of the Quaternary deposits usually varies between 12 and 30 m (40-100 ft), with a maximum more than 60 m (200 ft) in deep bedrock valleys. This unit is shown only on the cross-section,

Dlgc - Limestone, Dolomite, and Shale (Lithograph City Formation) Middle to Upper Devonian. This map unit has been mostly eroded and occurs only as a small spot on the bedrock surface in southwest corner of the quadrangle. Although the thickness of this unit is regionally around 23 m (75 ft), erosional remains of this unit are much thinner than regular in the mapping area. This unit consists of limestone, dolomitic limestone, dolomite, and shale. Regionally, this unit is characterized by interbeds of laminated lithographic and sub-lithographic limestone and dolomitic limestone, in part argillaceous. "Birdseye" structures, vugs and calcite vug-fills are common. Some intervals are fossiliferous and

Dcv - Limestone and Dolomite (Coralville Formation) Middle Devonian. This map unit consists of limestone, dolomitic limestone, and dolomite, in part argillaceous or shaly. The thickness of this unit varies between 12 and 21 m (40-70 ft) in the mapping area. Brachiopods, echinoderm debris and corals are usually found in the limestone facies. This unit usually occurs as separated patches at the bedrock surface of the

Dlc - Dolomite, Limestone, and Shale (Little Cedar Formation) Middle Devonian. As the dominating bedrock unit, this formation occupies most of the bedrock surface in the mapping area. This unit mostly consists of limestone, dolomitic limestone and dolomite, slightly argillaceous, and partially laminated and/or cherty. Some minor shale may occur in the upper part of this formation. The thickness of this unit ranges from 27 to 52 m (90-170 ft) in the mapping area. This formation is commonly fossiliferous, and brachiopods are especially abundant in the limestone facies.

Dpr - Dolomite and Dolomitic Limestone (Pinicon Ridge Formation) Middle Devonian. This map unit occurs at the bedrock surface of the deep bedrock valleys in the south-central and northeastern parts of the map. This formation consists of dolomite and dolomitic limestone with varying textures (shaly, laminated, brecciated, sandy, and/or cherty), and occasional evaporites. The thickness of this unit usually ranges from 12 to 24 m

Dob - Limestone and Dolomite (Otis and Bertram formations) Middle Devonian. This map unit only occurs at the bedrock surface of the bedrock surface valleys. These two formations are not differentiated because the Bertram Formation is only identified from a few wells with a thickness less than 3 m (10 ft). This map unit usually consists of limestone and dolomite, laminated or thick bedded. Sand and shale may occur at

Slpc - Limestone, Chert, and Dolomitic Limestone (LaPorte City Formation) upper Llandovery-lower Wenlock. This unit occurs in a bedrock valley through the quadrangle. It is a limestone facies that correlates with the upper Hopkinton-lower Scotch Grove formations of the Silurian. These rocks are unconformably overlain by Devonian strata. The formation is dominated by dense, fossiliferous limestone and dolomitic limestone, commonly cherty to very cherty. Minor lithologies include argillaceous to shaly chert residuum at the top of the interval (may be basal

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**-** 42°12'30"N

<del>-</del> 42°10'0"N

• 42°7'30"N

# **BEDROCK GEOLOGIC MAP OF THE VINTON 7.5'** QUADRANGLE, BENTON COUNTY, IOWA

**IOWA GEOLOGICAL SURVEY OPEN FILE MAP OFM-19-7** JUNE 2019

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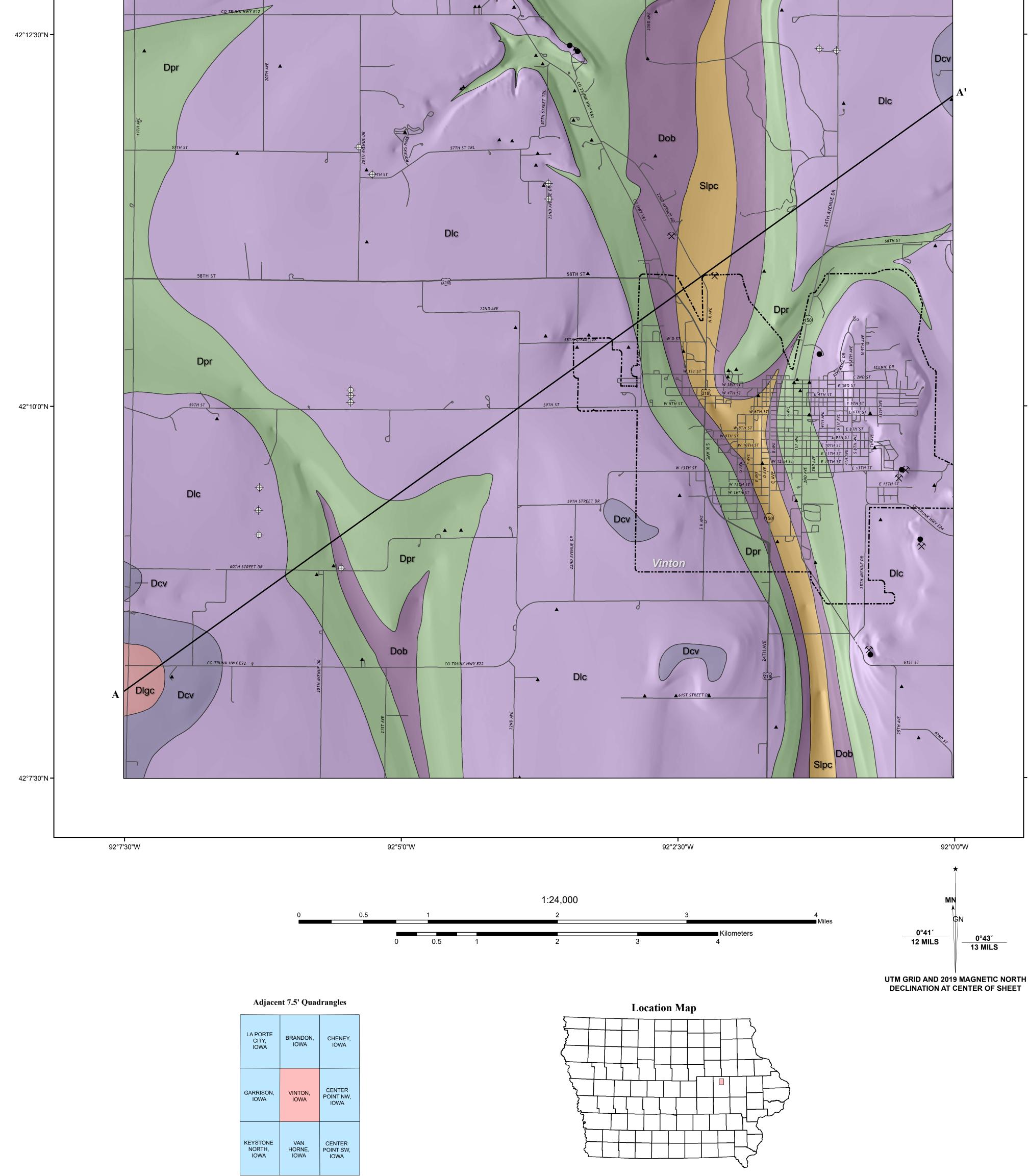
#### ACKNOWLEDGMENTS

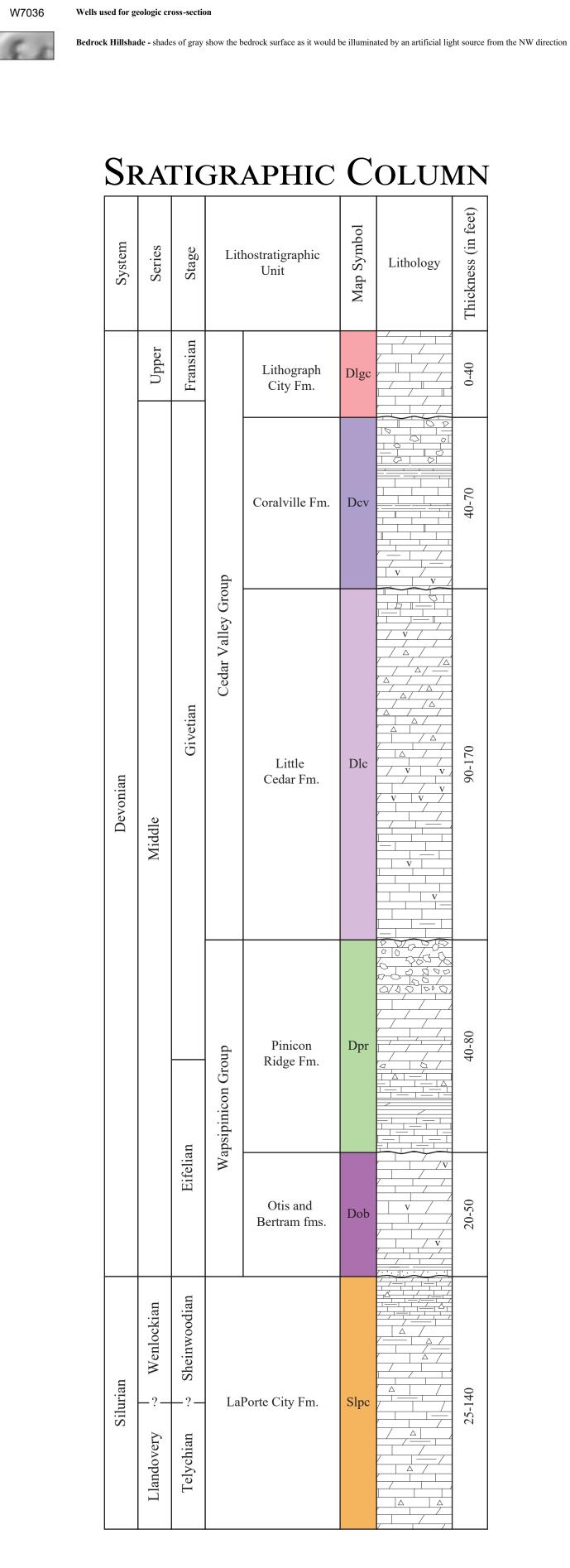
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### **INTRODUCTION TO THE BEDROCK GEOLOGY OF THE VINTON 7.5' QUADRANGLE, BENTON COUNTY, IOWA**

The Vinton 7.5' Quadrangle is located in Benton County in central Iowa. This area belongs to the southern portion of the Iowan Surface landform region, commonly called the Iowan Erosion Surface where the land surface had been modified by various episodes of erosion before and during the Wisconsin-age glacial events (Prior, 1991). Due to extensive glacial and erosional activities, the landscape of this area is characterized by relatively low topographic relief with common paha ridges and large fieldstones known as erratics, which have a glacial origin.

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 deposits usually varies between 12 and 30 m (40-100 ft), with a maximum more than 60 m (200 ft) in deep bedrock valleys in the quadrangle. These unconsolidated Quaternary sediments are undifferentiated in this map. For the detailed Quaternary stratigraphy and distribution, see the surficial geologic map of this quadrangle (Kerr et al., 2019).





Bedrock exposures commonly occur in the valleys along the Cedar River and Mud Creek in the mapping area. During the field investigation, previous geologic field work records and shallow bedrock locations from the digital soil surveys in Benton County (Brown and Highland, 1980) provided essential information to delineate potential bedrock outcrops. In the map area, eight bedrock outcrops including rock quarries were accessed and studied, which provided important regional stratigraphic information for the bedrock geologic map. Subsurface geologic information was mainly derived from the analysis of water well data stored in the Iowa Geological Survey (IGS) GeoSam database. Within the quadrangle, 120 private and public wells were studied, including 14 newly drilled holes especially for this mapping project. Among these studied wells, 24 have descriptive striplogs with cutting samples which are reposited at the Oakdale Rock Library of the IGS, and six of which were newly logged for this bedrock geologic mapping task. Bedrock stratigraphic information from the surrounding area, including bedrock outcrops, quarries, and well records, were also studied and utilized for this mapping project.

The bedrock surface of the Vinton 7.5' Quadrangle is dominated by Devonian strata. Some Silurian deposits also occur on the bedrock surface in a deep bedrock valley across the map area. Paleogeographically, the mapping area is within the Devonian Iowa Basin, a region of thickened shelf carbonate, shale and minor lithologies deposited from the late Eifelian to early Frasnian age (Witzke et al., 1988; Witzke and Bunker, 2006). The Middle and lower Upper Devonian carbonate rocks form the important upper bedrock aquifer in the mapping area (Libra et al., 1984, 1994). Due to its complex sedimentary lithology and depositional environments, the geology, paleoenvironments, paleontology and stratigraphy of the Devonian Iowa Basin have been intensively studied. Recent important studies of the Devonian Iowa Basin are represented by Witzke and Bunker (1984), Anderson (1984), Bunker et al., (1986), Witzke et al., (1988), Day and Bunker (1992), Bunker (1995), Anderson and Bunker (1998), Groves et al., (2008), McKay and Liu (2012), and Day et al., (2006, 2008, 2013). Studies on the regional Silurian stratigraphy and geology include the publications of Witzke (1981a, 1981b, 1992). Several geologic maps at 1:24,000 and 1:100,000 scales have been recently completed in nearby counties. The bedrock geologic map of east-central Iowa (1:250,000; Witzke et al., 2003) and the bedrock geologic map of Iowa (1:500,000; Witzke et al., 2010) have also been completed by the IGS. Results from these geologic studies and bedrock geologic mapping projects provide significant regional geologic information and new data for the present bedrock map.

The bedrock stratigraphic nomenclature and correlation follow the stratigraphic framework proposed by Witzke et al. (1988) for the Devonian strata and Witzke (1992) for the Silurian deposits of the map. Seven bedrock formations comprise the bedrock surface of the map area, in descending order: Devonian Lithograph City, Coralville, Little Cedar, Pinicon Ridge, Otis, and Bertram formations and the Silurian LaPorte City Formation. However, the Otis and Bertram formations of Devonian are not differentiated in the map because of their lithological similarity and distribution restriction. The general lithologic features and thickness of each map unit are shown in the Stratigraphic Column and described in the Legend section of this map.

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Lithology Key	Symbol Key
dolomitic limestone/ calcitic dolomite	<sup>-</sup> _ argillaceous
dolomite	dolomitic
limestone	$ \land \land $ chert
shale	sandy
lithographic limestone	unconformity
breccia	<sup>v</sup> v <sup>v</sup> v Vugs

scale map s	sheet.
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Base map from USGS Vinton 7.5' Digital Raster Graphic (IGS GIS file IA Vinton USGS topo.tif) which was scanned and modified from the Vinton 7.5' Topographic Quadrangle map, published by The US Geological Survey in 2019 Land elevation contours (10' interval). Bedrock topography raster created internally for this map project.

lowa Geological Survey digital cartographic file Vinton\_BedrockGeology.mxd, version 6/30/19 (ArcGIS 10.5) Map projection and coordinate system based on Universal Transverse Mercator (UTM) Zone 15N, datum NAD83.

The map and cross-section are based on interpretations of the best available information at the time of mapping. Map interpretations are not a substitute for detailed site specific studies.

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GARRISON, IOWA	VINTON, IOWA	CENTER POINT NW, IOWA	
KEYSTONE NORTH, IOWA	VAN HORNE, IOWA	CENTER POINT SW, IOWA	

