

# Surficial Geology of the Cresco NE (Iowa) 7.5' Quadrangle

## LEGEND

### CENOZOIC

#### QUATERNARY SYSTEM

##### HUDSON EPISODE

- Qal** - **Alluvium** (De Forest Formation-Undifferentiated) One to four meters (3 - 13 ft) of massive to weakly stratified, grayish brown to brown loam, silt loam, clay loam, or loamy sand overlying less than three meters (10 ft) of poorly to moderately well sorted, massive to moderately well stratified, coarse to fine feldspathic quartz sand, pebbly sand, and gravel and more than three meters (10 ft) of pre-Wisconsin or late Wisconsin Noah Creek Formation sand and gravel. Also includes colluvium derived from adjacent map units in stream valleys, on hillslopes, and in closed depressions. Seasonal high water table occurs in this map unit.
- Qallt** - **Upper Iowa River Valley - Low Terrace/Modern Channel Belt** (DeForest Formation-Camp Creek Member and Roberts Creek Member) Variable thickness of less than 1 m to 5 m (3 - 16 ft) of very dark gray to brown, noncalcareous, stratified silty clay loam, loam, or clay loam, associated with the modern channel belt of the Upper Iowa River valley. Ox-bow lakes and meander scars are common features associated with this terrace level. Post-settlement alluvium thickness varies from 0.5 m (1.5 ft) in higher areas to 2 m (6.5 ft) along the river course and in lower lying areas. Seasonal high water table and frequent flooding potential.
- Qalit** - **Upper Iowa River Valley - Intermediate Terrace** (DeForest Formation-Camp Creek Member, Roberts Member and Gunder Member) Variable thickness of less than 1 m to 5 m (3 - 16 ft) of very dark gray to brown, noncalcareous, stratified silty clay loam to loam that overlies calcareous, medium- to coarse-grained sand and gravel of Wisconsin (Noah Creek Formation) and/or pre-Wisconsinian age. Occupies low terrace position. Seasonal high water table and frequent flooding potential.

##### HUDSON AND WISCONSIN EPISODE

- Qmw2** - **Sand and Gravel** (Noah Creek Formation) Two to eighteen meters (6.5-59 ft) of yellowish brown to gray, poorly to well sorted, massive to well stratified, coarse to fine feldspathic quartz sand, pebbly sand and gravel with few intervening layers of silty clay. Along many valleys a thin mantle of loess, reworked loess, or fine-grained alluvium (Qal) may be present. This unit includes silty colluvial deposits derived from the adjacent map units. In places this unit is mantled with one to three meters of fine to medium, well sorted medium to fine sand derived from the alluvium. This unit encompasses deposits that accumulated in low-relief stream valleys during the Wisconsin Episode and Hudson Episode. Seasonal high water table and some potential for flooding.

##### WISCONSIN EPISODE

- Qpt** - **Loess Mantled High Terrace** - either Late Phase or Early Phase (Peoria Formation - silt and/or sand facies) Two to seven meters (6.5-23 ft) of yellowish brown to gray, massive, jointed noncalcareous silt loam and intercalated fine to medium, well sorted sand. May grade downward to poorly to moderately well sorted, moderately to well stratified, coarse to fine feldspathic quartz sand, pebbly sand, loam, or silt loam alluvium (Late Phase) or may overlie a Farmdale Geosol developed in Roxanna Silt which in turn overlies a well-expressed Sangamon Geosol developed in poorly to moderately well sorted, moderately to well stratified, coarse to fine sand, loam, or silt loam alluvium (Early Phase).
- Qps** - **Loess** (Peoria Formation-silt facies) Generally 2 m to 8 m (6 - 27 ft) of yellowish to grayish brown, massive, jointed noncalcareous silt loam to silty clay loam. May be loamy near the boundary with the erosion surface. Overlies massive, fractured, loamy glacial till of the Pre-Illinoian Wolf Creek or Albemarle formations with or without intervening clayey Farmdale-Sangamon Geosol. In most areas the Pre-Illinoian till is 1 m to 5 m (3 - 16 ft) thick, but may be up to 8 m (27 ft) thick locally. This mapping unit encompasses upland divides, ridge-tops and convex-side slopes. Well to somewhat poorly drained landscape.
- Qpsr** - **Loess over bedrock** (Peoria Formation-silt facies) Generally 2 to 8 m (6 - 27 ft) of yellowish to grayish brown, massive, jointed noncalcareous grading downward to calcareous silt loam to silty clay loam. Overlies bedrock units or colluvium. This mapping unit encompasses upland divides, ridge-tops and convex-side slopes. Well to somewhat poorly drained landscape.
- Qwa2** - **Loamy and Sandy Sediment Shallow to Glacial Till** (sediment associated with erosion surface) One to three meters (3 - 10 ft) of yellowish brown to gray, massive to weakly stratified, well to poorly sorted loam, sandy and silty erosion surface sediment. Map unit includes some areas mantled with less than two meters (6.5 ft) of Peoria Formation-silt (loess) or sand facies. Overlies massive, fractured, firm glacial till of the Wolf Creek and/or Albemarle formations. Seasonally high water table may occur in this map unit.
- Qwa3** - **Till** (Wolf Creek or Albemarle Formations) Generally one to ten meters (3 to 33 feet) of very dense, massive, fractured, loamy glacial till of the Wolf Creek or Albemarle Formations with or without a thin loess mantle (Peoria Formation-loess less than 2 meters) or thin loamy sediment mantle (namely or silty surface sediment) may overlie intervening clayey Farmdale-Sangamon Geosol. This mapping unit can be buried by unmaned erosion surface sediments, loess or alluvium and is shown only in the cross-section.

##### PLEISTOCENE UNDIFFERENTIATED

- Qrc** - **Rock Core Meanders/Structural Benches** Includes rock core meanders associated with Pre-Wisconsin river development and terrace deposits overlying bedrock benches. Some areas occupy positions as much as 10m (33 ft) above the modern floodplain. Consists of undifferentiated alluvial and colluvial fill up to 6 meters (20 ft) in thickness of unknown age. May be mantled by 1 to 3 m (3-10 ft) of Peoria Formation-silt facies (loess).

### PALEOZOIC

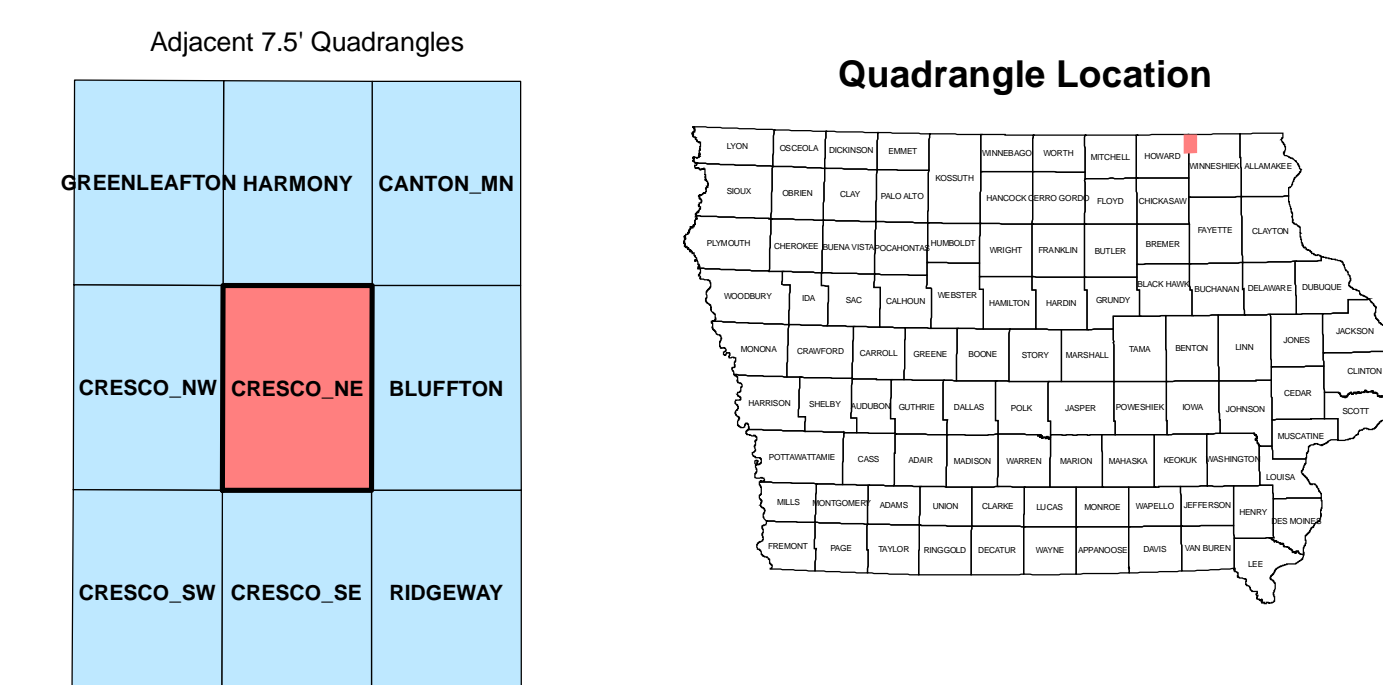
#### DEVONIAN SYSTEM

- Dc** - **Dolomite and Limestone** (Cedar Valley Group) The lowest subdivision of this map unit, the Little Cedar Formation, occurs in the southwest corner of the quad and attains a thickness up to 12 m (40 ft). It is dominated by slightly argillaceous to argillaceous dolomite and dolomitic limestone, commonly fossiliferous and vuggy, and partially laminated.
- Dw** - **Dolomite, Limestone, Shale, and minor Sandstone** (Wapsipicon Group) This map unit includes the Spillville Formation, up to 27 m (89 ft), overlain by the Pinicon Ridge Formation, up to 11 m (36 ft), for a maximum total thickness up to 38 m (125 ft). The Spillville Formation is dominated by medium to thick bedded dolomite, with scattered dolomitic, with abundant fossil molds, and vugs commonly filled with calcite crystals; basal portion is sandy or silty; a distinctive stromatolitic limestone facies occurs locally in the upper part. The Spillville is quarried for local aggregate and also hosts numerous small springs. The Pinicon Ridge Formation is dominated by shaly, laminated or brecciated, unfossiliferous limestone and dolomite.

#### ORDOVICIAN SYSTEM

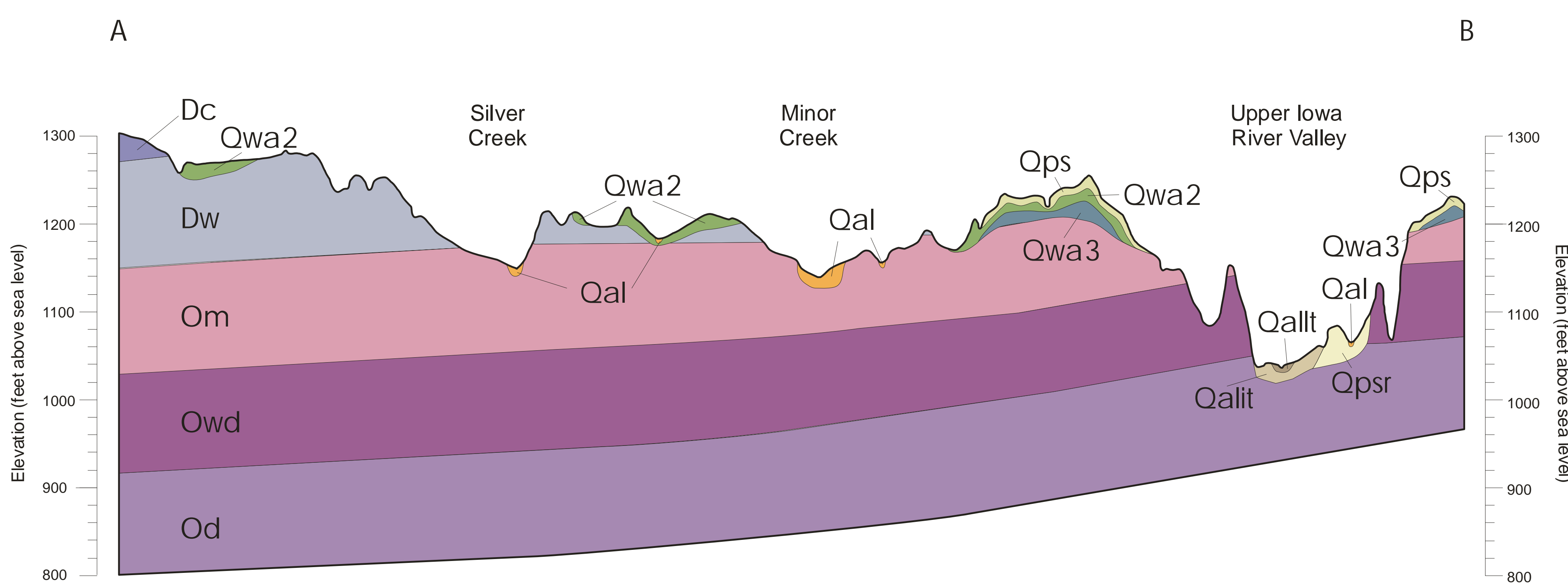
- Om** - **Shale, Limestone, and Dolomite** (Maquoketa Formation) A nonresistant slope-forming map unit up to 40 m (131 ft) composed of variably cherty, interbedded argillaceous limestone, dolomite and grey and brown shale. Fragmentary trilobite and graptolite fossils are common in the basal Elgin Limestone Member, and chert nodules are notable in the middle Fort Atkinson Member. It forms an upper confining unit that bounds a karst system in underlying Dubuque, Wise Lake and Dunleith formations of the Galena Group, and may host sinkholes in its lower portion.
- Owd** - **Limestone and minor Shale** (Wise Lake Formation and overlying Dubuque Formation, both of the Galena Group) A prominent ledge and cliff-forming unit of up to 31 m (102 ft) of limestone with notable thin interbedded shale in the upper 6 m. This map unit is the upper of two successive major cavern and karst-forming bedrock units in the area. The Wise Lake Formation consists of 21 m (67 ft) of medium to thick bedded relatively chert-free limestone portions of which exhibit a distinctive bioturbated fabric; serves as a source of concrete aggregate. The Dubuque Formation consists of 10 m (34 ft) of crinoidal limestones and thin interbedded shale. Sinkholes are common to abundant within this map unit.
- Od** - **Limestone** (Dunleith Formation of the Galena Group) A prominent ledge and cliff-forming unit of up to 42 m (137 ft) of limestone with minor thin interbedded shale. This is the lower of two successive major cavern and karst-forming bedrock units in the area. The formation consists of fossiliferous limestone and argillaceous limestone with common chert nodules; it is commonly quarried for aggregate. Major springs occur near the base, and sinkholes and karst features are common.

- **Drill Holes**
- D **Outcrops**



1:24,000

## GEOLOGIC CROSS-SECTION A-B



## GEOLOGIC MAPPING OF THE UPPER IOWA RIVER WATERSHED: PHASE 4: Cresco NE 7.5' Quadrangle

Iowa Geological Survey  
Open File Map 08-2  
August 2008

prepared by  
**Stephanie Tassier-Surine, Huaibao Liu, Robert McKay and James D. Giglerano**

Iowa Geological Survey, Iowa City, Iowa

Iowa Department of Natural Resources, Richard A. Leopold, Director  
Iowa Geological Survey, Robert D. Libra, State Geologist

Supported in part by the U.S. Geological Survey  
Cooperative Agreement Number 07HQAG0087  
National Cooperative Geologic Mapping Program (STATEMAP)

### ACKNOWLEDGMENTS

We thank the staff of the Northeast Iowa RC & D for their efforts in helping to initiate this mapping project and for supporting our work in the Upper Iowa River watershed. New subsurface geologic data was generated by the University of Iowa students Thomas Marshall and Kelly Wilhelm who produced descriptive logs of water well drill samples. Luther College in Decorah actively participated in the project through subcontract 07-7380-01 for field mapping support. Luther College students Gabriel Demuth and Carl Haakenstad were participants in field and office work in support of the mapping effort. Brigitta Meade of Luther College was instrumental in accurately locating and elevating water wells in the map area. Drilling in selected sites was provided under contract by Aquadell, Inc. of Swisher, Iowa. Special thanks to the landowners who graciously allowed access to their land for drilling: Craig and Laurie Ollendieck, Randy Greenslade, John Smith, Ray Ferrie and Roger and Kari Ferrie. Deborah Quade, Iowa Geological Survey (IGS) lent support with Quaternary field and office expertise; Robert Rowden (IGS) participated in part of the field work; Amy Sabin (IGS) prepared well samples for stratigraphic logging; Brian Witzke (IGS) provided valued information concerning the Ordovician and Devonian stratigraphy of the area; and Andy Axel and Chris Kahle (IGS) provided GIS mapping technical help. Assistance obtaining drilling records and geologic information was provided by Dave Stanley and staff at Bear Creek Archaeology.

Base map from USGS Cresco NE 7.5' Digital Raster Graphic (IGS GIS file DRGB36.TIF) which was scanned from the Cresco NE 7.5' Topographic Quadrangle map, published by US Geological Survey in 1981. Topographic contours and land features based on 1975 aerial photography, field checked in 1977. Land elevation contours (20' interval) based on NGVD 1929.

Iowa Geological Survey digital cartographic file Cresco\_NEIquad08\_surficial.mxd, version 8/18/08 (ArcGIS 8.2). Map projection and coordinate system based on Universal Transverse Mercator (UTM) Zone 15, 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.