Surficial Geology of the Hallam 7.5 Minute Quadrangle, Nebraska

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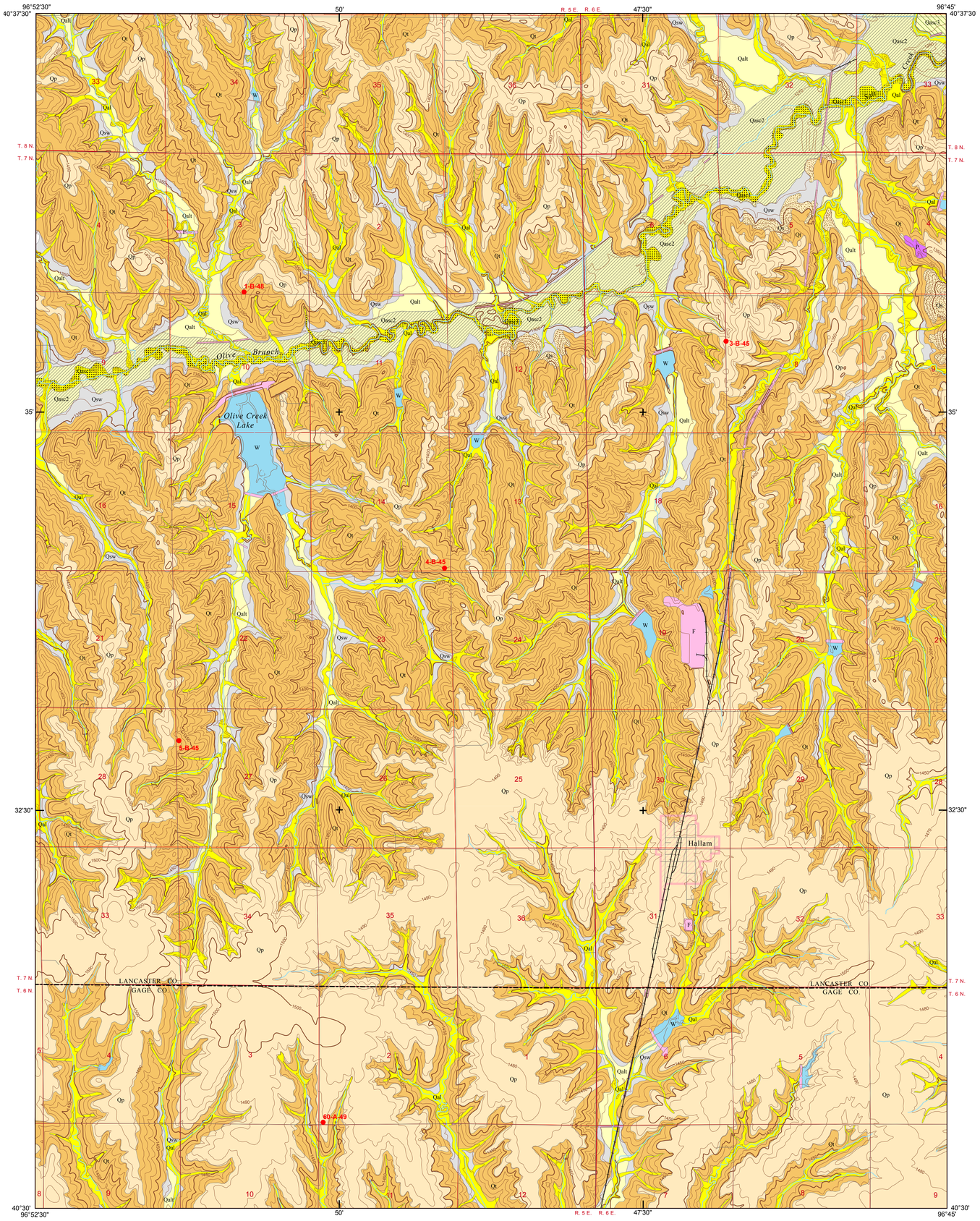

SCALE 1:24,000

Miles

Feet

Kilometers

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

Magnetic North Declination Approximately 4°1', 2009

Projection: UTM zone 14 North, NAD83

Contours from the Nebraska Department of Natural Resources, compiled from USGS 7.5 minute topographic quadrangles

Additional base data derived from 2005 second edition TIGER/line files

QUADRANGLE LOCATION

CRETE NORTH	DENTON	ROCA
CRETE SOUTH	HALLAM	CORTLAND
WILBER	CLATONIA	PICKRELL

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Description of Mapping Units:

Qsw **Slopewash (Holocene to modern)**

Thin, silty to clayey sediments produced by the erosion of unconsolidated materials upslope and deposition downslope.

Slopewash forms extensive deposits under foot slopes and toe slopes along the margins of several valleys. It merges under under toe slopes with the alluvium of streams.

Qal **Quaternary alluvium of smaller streams and the active channels of larger streams (Holocene to modern)**

Silty clay to very fine sand, with minor gravels derived from glacial till or sub-till sands and gravels.

Late Holocene to modern alluvium along small tributary streams in the general region of the Hallam Quadrangle includes the Camp Creek and Roberts Creek members of the DeForest Formation. This mapping unit also includes sediment that has accumulated in channelized streams and in other engineered drainageways.

Qalt **Quaternary alluvium in terraces of smaller streams (Holocene)**

Silty clay to very fine sand, with minor gravels derived from glacial till or sub-till sands and gravels.

Sediments included in this mapping unit underlie terrace surfaces produced by the entrenchment and headward erosion of smaller streams. Alluvial sediments physically separated from the active channel of their source drainage by channelization and filling, which therefore cannot be included in mapping unit Qal, are included in Qalt by default. Qalt sediments are probably in large measure of late Holocene age and locally merge with slopewash under toesploes at valley margins. Qalt may include the Camp Creek, Roberts Creek and Honey Creek Members of the DeForest Formation.

Qasc1 **Younger proximal alluvium of Salt Creek and major tributaries (latest Holocene to modern)**

Silty clay and silt to very fine sand, with minor gravels derived from local bedrock and/or glacial till.

This unit includes the historic meander belt and the more recent entrenched or engineered channel of Salt Creek and its major tributaries, such as Olive Branch in the Hallam Quadrangle. Qasc1 is distinguished from Qasc2 largely by the growth of woody riparian vegetation and generally includes areas of historic sedimentation dating to the early 20th century. Qasc1 includes sediments within the relatively narrow, entrenched channel belts of Salt Creek and its major tributaries, which have incised since the early 20th century. These streams can be considered to be dynamic and only partially controlled by engineering efforts. Qasc1 is underlain by Holocene and Late Pleistocene alluvium.

Qasc2 **Older proximal alluvium of Salt Creek and major tributaries (latest Holocene)**

Silty clay and silt to very fine sand, with basal gravels containing pebbles and cobbles derived from local bedrock and/or glacial till.

Qasc2 can be distinguished from Qasc1 because areas mapped as Qasc2, along streams such as Olive Branch in the Hallam Quadrangle, have been geomorphically stable for a length of time sufficient to encourage widespread agricultural use. Sites mapped as Qasc2 should be considered to be more geomorphically stable than sites mapped as Qasc1, but portions of areas mapped as Qasc2 include evidence of recent fluvial activity, such as channel scars and flood chutes, indicating that they have been subject to infrequent, but widespread flooding in historic times.

This map unit corresponds to the informally-named T-1 surface of some authors, which makes up the bulk of the valley bottom along many streams in southeastern Nebraska. It is composed of Late Holocene deposits (Roberts Creek and Honey Creek members of the DeForest Formation), mantled by latest Holocene to historic sediments in places (Camp Creek Member of the DeForest Formation). Qasc2 is underlain by Late Pleistocene alluvium.

Qasc3 **Distal alluvium of Salt Creek and major tributaries (Early to Middle Holocene)**

Silty clay to very fine sand, in some places with basal gravel beds and lenses of pebbles to cobbles derived from local bedrock and/or glacial till

Qasc3 is mapped on the distal floodplains of Salt Creek and its major tributaries, such as Olive Branch in the Hallam Quadrangle. This portion of the valley bottom stands slightly higher (< 1 m) than Qasc2, but this rise is gradual and a scarp is generally absent. Evidence of recent fluvial activity, such as channel scars and flood chutes, is also absent in Qasc3. Sites mapped as Qasc3 should be considered to be more geomorphically stable than sites mapped as Qasc2. Regular flooding is extremely unlikely, but areas mapped as Qasc3 are still subject to very low-frequency flood events. Qasc3 sediments are Early to Late Holocene in age (Gunder Member of the DeForest Formation) and merge laterally with slopewash under toeslopes abutting floodplains. Qasc3 is underlain by Late Pleistocene alluvium

Qp **Peoria Loess and associated units (Late Pleistocene)**

Eolian silt.

This mapping unit consists of the Peoria Loess, but also includes the underlying Gilman Canyon Formation and the Sangamon Geosol or a generally equivalent Wisconsinan paleosol. The Peoria Loess in itself is generally 3-5 m in thickness in the area, being thickest on flat ridgetops where minimal erosion has occurred. The Peoria Loess is typically a massive to faintly laminated, pale brown to light gray silt. It typically has a strong surface soil developed in its upper 1-1.5 m. The lower portion of the Peoria Loess, particularly where it overlies pre-Illinoian glacial till without any intervening Loveland Loess, is typically reduced ("deoxidized"). The thin Gilman Canyon Formation (typically 1 m or less in thickness in the general area), also a loess, underlies the Peoria Loess in most areas and consists of dark brown to dark grayish brown silt with strong granular to subangular blocky soil structure (welded soil A horizons). The contact between the Gilman Canyon Formation and the overlying Peoria Loess may be abrupt or gradational. The Gilman Canyon Formation is typically welded to the underlying Sangamon Geosol or a generally equivalent Wisconsinan paleosol, which is developed regionally on weathered pre-Illinoian glacial till, slopewash, or any thin Loveland Loess that may be present in the subsurface.

Locally under uplands, Loveland Loess may underlie the Peoria Loess and Gilman Canyon Formation, as in nearby areas, but no definitive evidence for this unit has been found at the land surface in the Hallam Quadrangle.

Qt **Glacial till (Late Pliocene?-Pleistocene [pre-Illinoian])**

Silty to clayey diamictons, clays and clayey silts, and stone zones.

Tills in eastern Nebraska postdate ~2.5 Ma and predate the Lava Creek B tephra (~600 ka). Tills in the Hallam Quadrangle are very likely to date to the younger part of this time interval. The upper few tens of meters of pre-Illinoian tills under hillslopes in the map area are always strongly oxidized and contain abundant secondary carbonates associated with deep, reticulate cracks. Below the oxidized zone, tills are typically gray to dark gray in color. Stone zones (typically ≤ 1 m in thickness) are the erosional and depositional lags of boulders left behind at the eroded upper surfaces of tills under hillslopes. Pebbles, cobbles, and boulders of granite, gneiss, Sioux Quartzite, greenstone, and other crystalline rocks are common within the tills and are concentrated within stone zones.

Qs **Sands below, and possibly partially laterally-equivalent to, pre-Illinoian tills (Pliocene?-Pleistocene [pre-Illinoian])**

Well-sorted fine sand to poorly-sorted, very coarse sand, gravelly sand, and gravel, with thin lenses of silt to fine sand.

Large sand bodies at least 100 m in maximum dimension appear locally at the surface in southern Lancaster County and Gage County. In many cases, these sands clearly underlie pre-Illinoian tills, but in other cases their stratigraphic relationships with nearby till bodies are unclear. Some of these large sand bodies may actually be lateral equivalents of pre-Illinoian tills. Subsurface data indicate that some of these sand bodies are connected with thick sands that serve as local aquifers. Some sub-till sands may have been deposited as long ago as the Late Pliocene, but there is no control on the maximum age of such sediments. Some of the sand bodies may represent deposits of generally eastward-flowing preglacial or interglacial streams, whereas those in more intimate association with till bodies may be outwash sediments.

A sandpit extending onto the eastern edge of the mapped area in the S½ of section 4, T. 7 N., R. 6 E., east of Spring Branch, exposes nearly 20 m of cross-stratified very fine to very coarse sand to gravel. These alluvial sediments are overlain by wind-reworked sands yielding an optical age of 53.2 ± 4.3 ka and, above that, by the Gilman Canyon Formation (optical ages of 33.9 ± 2.7 and 34.6 ± 3.0 ka) and the Peoria Loess. The uppermost alluvial sediments at this site yielded an optical age in excess of 100 ka. Excavations in the quarried area have destroyed much of the laterally-equivalent strata, but some evidence suggests that glacial till may have originally been present as a lateral equivalent to the upper part of the alluvial sediments. Moreover, large, well-rounded armored till balls, some as large as 40 cm in diameter, exist within some of the very coarse gravelly sands and gravels of this deposit. These observations, together with the comparatively great contrast in sediment texture visible both vertically and laterally within the exposed sediments, are potentially compatible with a glacial outwash origin.

F **Artificial fill**

Landfills, dams, railroad grades, embankments, and other engineered ground.

P **Pits**

Bedded sand and gravel with sandy silt cover

W **Water**

● **Test hole location**

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.