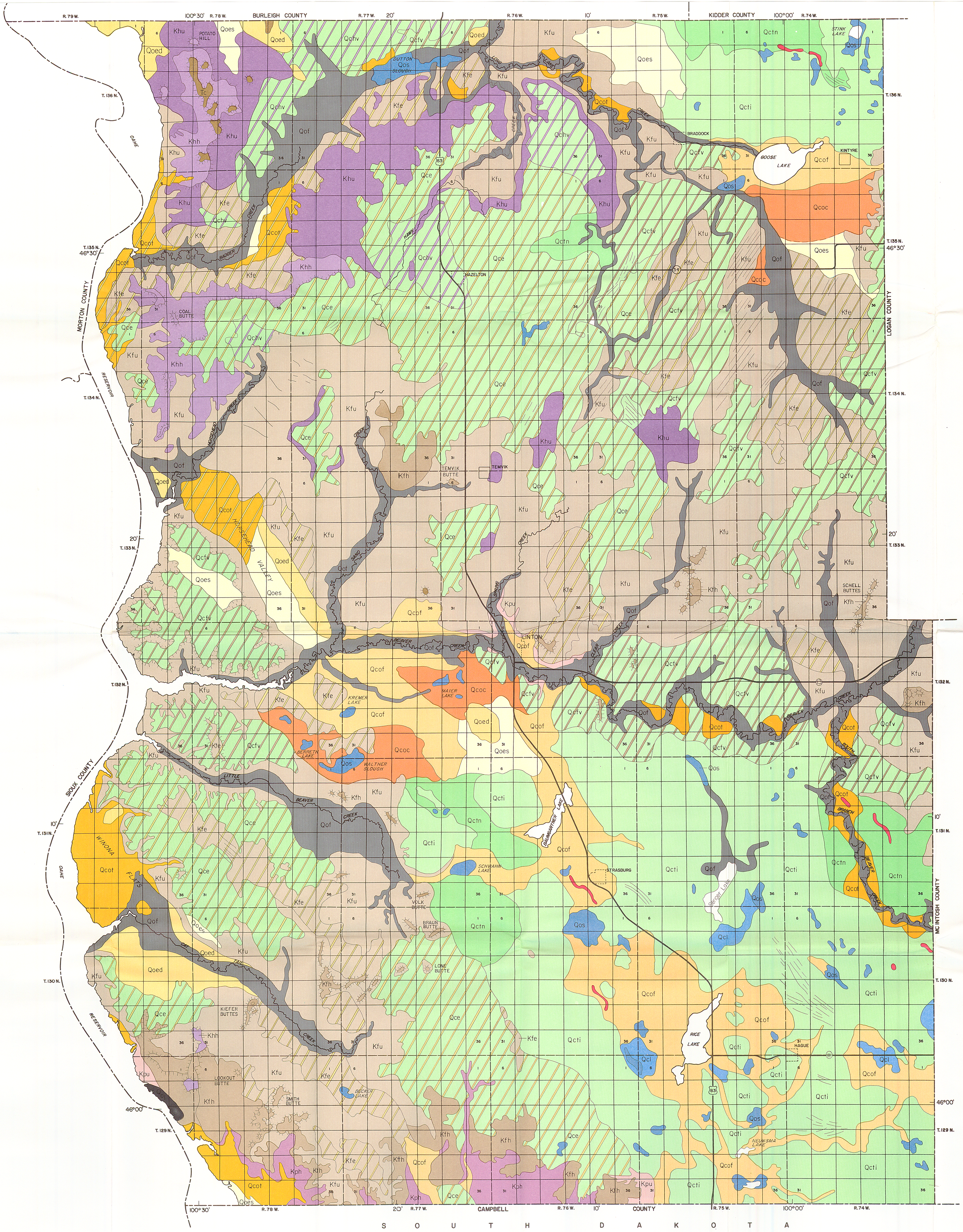
PLATE 1. GEOLOGIC MAP OF EMMONS COUNTY

PART 1 PLATE 1
BULLETIN 66

NORTH DAKOTA GEOLOGICAL SURVEY
NORTH DAKOTA STATE WATER COMMISSION



LEGEND

ROCK UNITS		DESCRIPTION
FORMATION AND FACIES		
	Symbol	Texture, color, topography or landform, and origin.
QUATERNARY SYSTEM		
OAHE FORMATION	Qo	Clay, sand, silt, and gravel with dispersed organic material.
	Qoes	Windblown sediment. Fine sand. Lineated surface with low relief and some low dunes.
	Qoed	Windblown sediment. Fine sand. Dunes and blowouts with moderate relief.
	Qof	River sediment. Dark, obscurely bedded clay and silt, generally overlying crossbedded sand; on flat plains of modern streams.
	Qol	Landslide material. Mainly jumbled masses consisting of blocks of shale and sandstone derived from the Pierre and and Fox Hills Formations. Extremely irregular topography with moderate to high relief.
	Qos	Pond and slough sediment. Dark, obscurely bedded clay and silt; in modern ephemeral ponds. Low relief.
COLEHARBOR GROUP	Qc	Pebbly, sandy, silty clay with limestone, dolomite, granite, gneiss, basalt, sandstone, and shale pebbles and associated nonorganic, bedded clay, silt, sand, and gravel.
Silt Facies		Lake sediment. Laminated silty clay, clayey silt, and fine sand of glacier-dammed lakes; yellowish-brown to dark-gray in exposures depending on weathering intensity.
	Qcl	Offshore to nearshore lake sediment. Silt to fine sand with some clay. Materials deposited in lakes in contact with stagnant glacial ice. Low relief.
Sand and Gravel Facies		River sediment. Moderately well-sorted, crossbedded sand and plane-bedded gravel, including sediment of meltwater rivers.
	Qcot	Terrace deposits. Gravel, sand, and silt. Elevated or abandoned stream terraces with low relief. Lines denote a veneer of loess on the surface.
	Qcof	Flat fluvial plains. Flat-bedded sediment of nearly level plains, commonly with braided channel scars; relief of 1 to 10 feet.
	Qcoc	Collapsed fluvial plains. Faulted and contorted sediment with hilly topography; relief up to 40 feet.
		Eskers (shown as red areas on the map). Ridges or hills of gravel and sand; cobbles and boulders common; chunks of till common; local relief up to 20 feet. Ice-contact fluvial deposits.
Till Facies		Glacial sediment. Unsorted, unbedded mixture of angular, subangular, and rounded blocks of rock, gravel, and sand, generally in a stiff matrix of silt and clay; yellowish-brown to olive-gray in exposures depending on weathering intensity; contains discontinuous lenses of gravel and sand.
	Qce	Undulating to rolling till surface veneered to covered by loess; integrated to unintegrated drainage and low to moderate relief.
	Qctn	Undulating to rolling till surface with nonintegrated drainage and low to moderate relief.
	Qcti	Undulating to rolling till surface with integrated drainage and low to moderate relief.
	Qchv	Veneer of till on Cretaceous Hell Creek Formation bedrock; integrated drainage and moderate relief.
	Qcfv	Veneer of till on Cretaceous Fox Hills Formation bedrock; integrated drainage and moderate relief.
TERTIARY SYSTEM		
CANNONBALL FORMATION	Tc	Interbedded, yellowish brown, fine-grained sand and medium gray and brownish gray clayey shale; moderate to high relief.
CRETACEOUS SYSTEM		
HELL CREEK FORMATION	Khu	Somber colored, fine-grained sand, silt, and carbonaceous and bentonitic clays; petrified wood and minor lignite zones; undulating to rolling topography.
	Khh	Areas of Hell Creek Formation with badlands topography.
FOX HILLS FORMATION	Kfu	Upper part: yellowish brown to light gray, fine- to medium-grained sand. Lower part: banded beds of light gray and brownish gray silt, sand, and clay with beds of yellowish-brown, fine-grained sand; undulating to rolling topography.
	Kfh	Areas of Fox Hills Formation with badlands topography; includes buttes topped by the Linton Member sandstone.
	Kfe	Areas of Fox Hills Formation veneered with loess; undulating topography.
PIERRE FORMATION	Kpu	Medium to dark-gray shale.
	Kph	Areas of Pierre Formation with hilly topography.

Map Symbols

- Geologic contacts.
- Transverse ridges on till (areas of Qcti). Probably mainly washboard ridges.
- Lineations on areas of Fox Hills Formation.
- Buttes.
- Scarps. Tic marks point to down side.
- Ponds and lakes.
- Streams.

SCALE
1 0 1 2 3 4 MILES

PLATE 2. BEDROCK SURFACE CONFIGURATION AND GEOLOGY OF EMMONS COUNTY

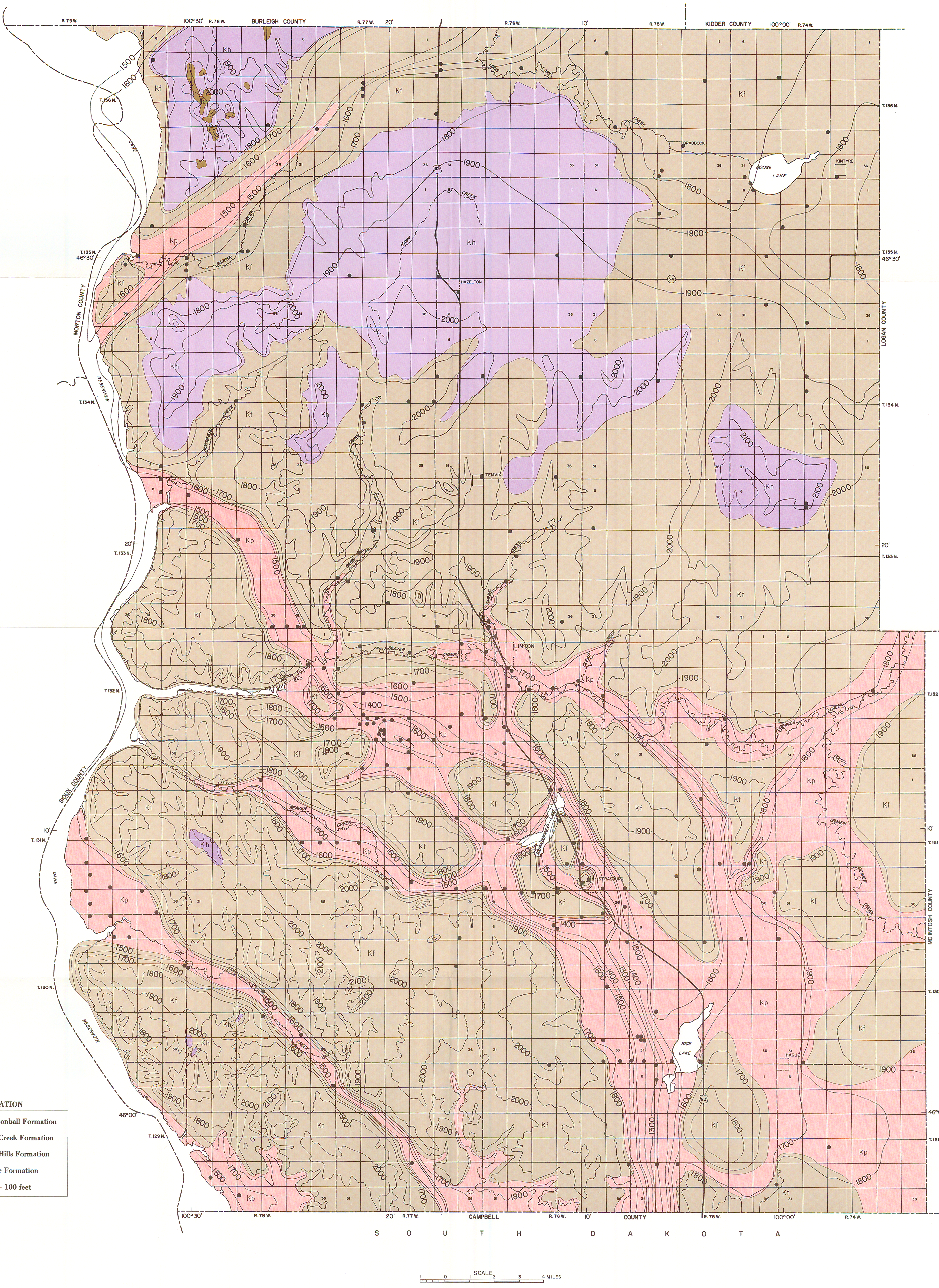


PLATE 3. THICKNESS OF GLACIAL SEDIMENT IN EMMONS COUNTY

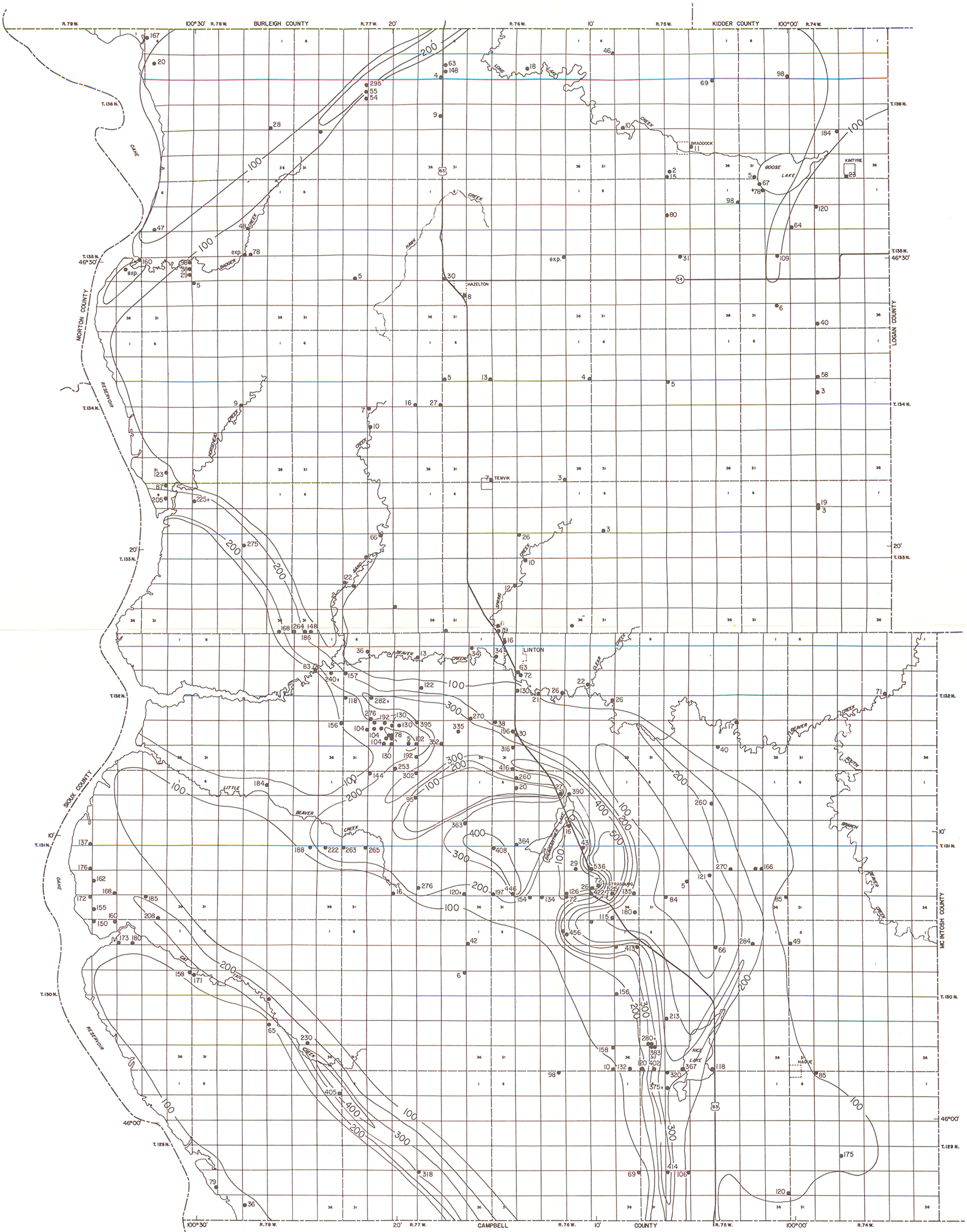


PLATE 4. DISTRIBUTION OF SURFACE TILL UNITS IN EMMONS COUNTY