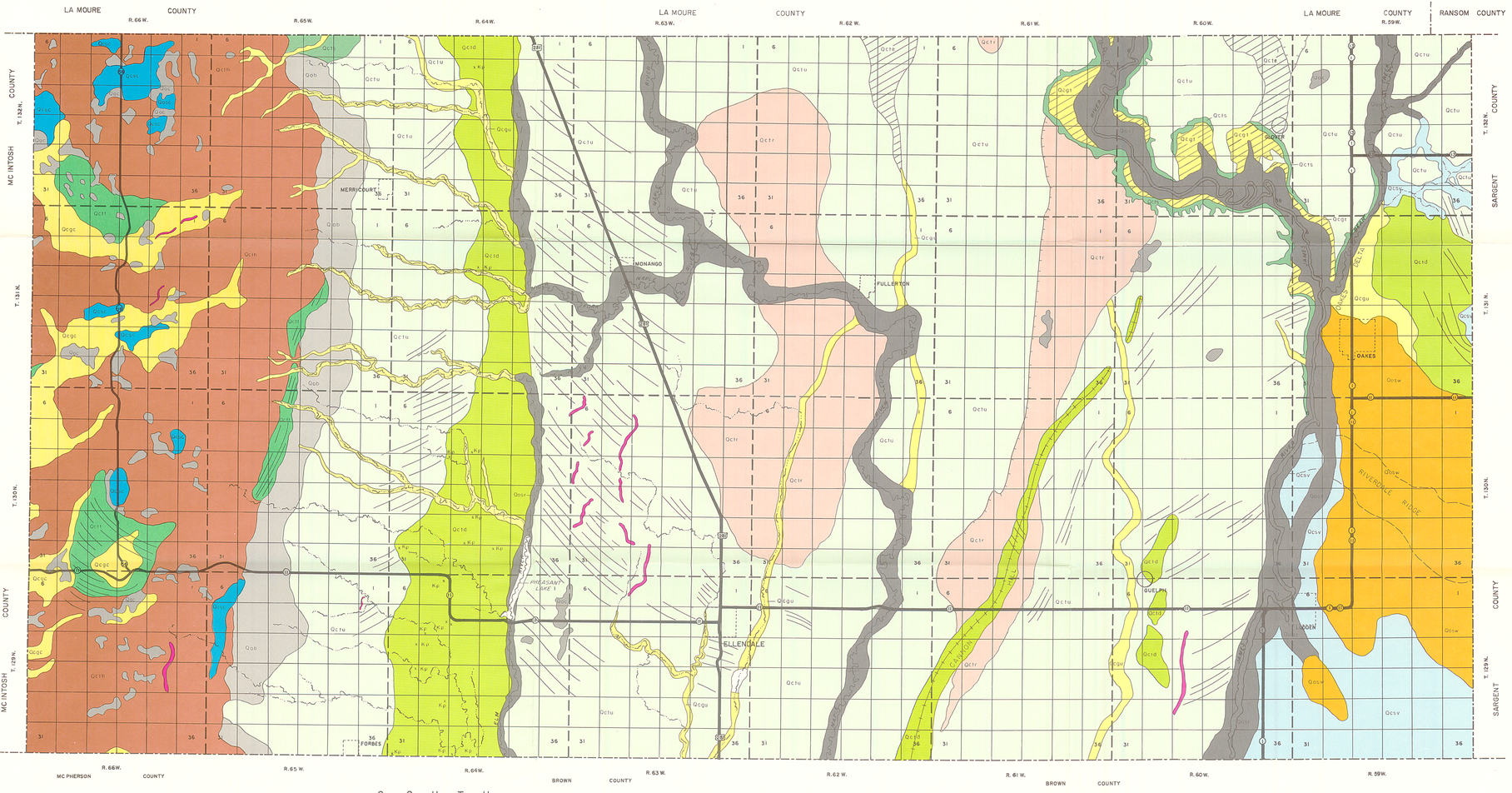
PART 1 PLATE 1
COUNTY GROUND WATER STUDIES 28
BULLETIN 70

PLATE 1.- GEOLOGIC MAP OF DICKEY COUNTY

NORTH DAKOTA GEOLOGICAL SURVEY
NORTH DAKOTA STATE WATER COMMISSION



DICKEY-LAMOURE EXPLANATION

Oahe Formation	**Qo**	Clay, sand, silt, and gravel with dispersed organic material.
Clay facies	Qoc	Pond and slough sediment. Dark, obscurely bedded clay and silt; in modern ephemeral ponds.
Bouldery, gravelly clay facies	Qob	Colluvial sediment. Mixture of sandy gravel, some gravelly sand, clay, and boulders; high percentage of shale in places.
Sand and silt facies	Qosr	River sediment. Dark, obscurely bedded clay and silt (overbank sediment); generally overlying crossbedded sand (channel sediment); on floodplains of modern streams.
	Qosw	Windblown sediment. Well-sorted fine sand and black silt with obscure bedding and weak paleosols, commonly with knobby topography consisting of inactive transverse or longitudinal dunes nearly obliterated by more recent blowouts.
Coleharbor Group	**Qc**	Pebbly, sandy, silty clay with limestone, dolomite, granite, gneiss, and basalt pebbles and associated nonorganic, bedded clay, silt, sand, and gravel.
Silt and clay 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. All areas with a Qcs prefix belong to the silt and clay facies.
	Qcsv	Proglacial lake plain. Veneer of near-shore lake silt and fine sand found on low-lying plains. Largely flat, but may be rolling in areas where silt and clay are too thin to completely cover the underlying topography. The plain of glacial Lake Dakota consists of thick, flat-bedded silt and clay.
	Qcse	Elevated lake plain. Near-shore and offshore lake silt and clay; largely flat areas, but in places the margins of the lake plains are slightly raised and slope to a flatter central area.
	Qcsc	Collapsed lake plain. Near-shore and offshore lake silt with some fine sand; rolling to hilly topography with some flat areas.
Sand and gravel facies		River sediment. Moderately well-sorted, crossbedded sand and plane-bedded gravel, including sediment of melt-water rivers. All areas with a Qcg prefix belong to the sand and gravel facies as do the unlabeled red lines (eskers).
	Qcgu	Uncollapsed floodplains. Flat-bedded sediment of nearly level plains (Qcgu) and river terraces (Qcgt) commonly with braided-channel scars; relief of 1 to 10 feet. Different terrace levels are distinguished by dashed lines on the map.
	Qcgt	
	Qcgc	Collapsed floodplains. Faulted and contorted sediment with hilly topography; relief up to 50 feet.
		Eskers (shown as red lines on the map). Ridges of gravel and sand; cobbles and boulders common; chunks of till common; local relief up to 50 feet.
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 color in exposures depending on weathering intensity; contains discontinuous lenses of gravel and sand. All areas with a Qct prefix belong to the till facies.
	Qctu	Gently undulating to undulating surface with poorly integrated drainage; thin layer of till; relief generally less than 10 feet.
	Qctr	Rolling surface with kettles, partially to nonintegrated drainage, and numerous ice-disintegration features; few linear trends; moderately thick layer of till; relief of 30 to 60 feet locally.
	Qcth	Hilly surface with numerous kettles, nonintegrated drainage, and abundant ice-disintegration features; linear trends lacking; thick layer of till; relief of 50 to 150 feet locally.
	Qctl	Rolling to hilly surface with kettles, ridges, ice-disintegration features, and poorly integrated drainage; has both overall and internal linearity; moderately thick layer of till; relief of 50 to 100 feet locally.
	Qctt	Thrust moraine. Glacial sediment that has been draped over glacial or preglacial sediment or rock that has been sheared up into thrust slabs or folds near the ice margin; hilly area with intense internal linearity; local concentrations of gravel and boulders; local relief exceeds 150 feet.
	Qctd	Areas covered by a thin layer of till. Veneer of till draped over and only slightly modifying the pre-existing (Cretaceous Pierre shale bedrock or older till or gravel surface) topography; relief up to 100 feet locally.
	Qcte	River-eroded surface. Glacial sediment with flat to undulating topography (relief less than 5 feet) resulting from stream erosion by glacial melt water; patches of sand and gravel; covered by abundant boulders in places.
	Qcts	Slopewash-eroded till surface. Glacial sediment on the sides of valleys and on the face of the Missouri Escarpment eroded by slopewash and other hillslope processes; the bases of slopes are overlain by alluvium of the Oahe Formation; relief of 50 to 100 feet locally; grades into Oahe Formation bouldery clay (Qob).
Pierre Formation	**Kp** x	Marine shale. Dark gray, fissile, highly jointed shale; bentonitic clay lenses; iron staining on joint faces; relief is negligible.

Map units Qcse and Qctl are not inclued in Dickey County.

Map Symbols

Ridges in areas of till. In areas of gently undulating to undulating collapsed moraine (Qctu), lines represent washboard ridges. In areas of thrust moraine (Qctt), lines represent linearity along thrust slabs.

Surface washed by running water.

Kettle chain.

Scarp. Lower side corresponds to the tic-marked side of the line.

Crest of Cannon Hill.

Geologic contacts.

Ponds and lakes.

Roads.

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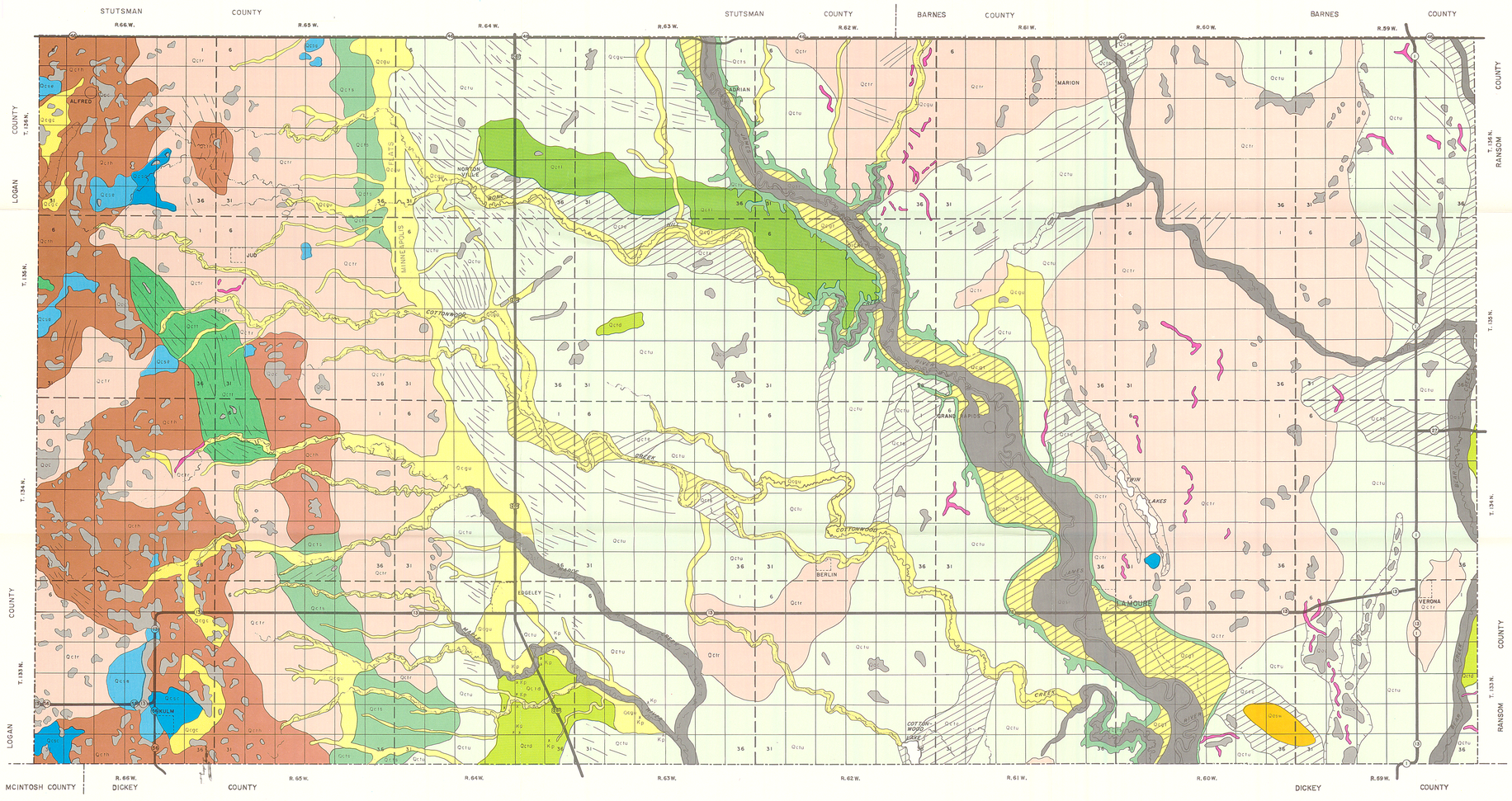
PLATE 2. - GEOLOGIC MAP OF LA MOURE COUNTY

NORTH DAKOTA GEOLOGICAL SURVEY
NORTH DAKOTA STATE WATER COMMISSION



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Map units Qob and Qcsv are not included in LaMoure County.

Map Symbols

- Ridges in areas of till. In areas of gently undulating to undulating collapsed moraine (Qctu), lines represent washboard ridges. In areas of thrust moraine (Qctt), lines represent linearity along thrust slabs.
- Surface washed by running water.
- Kettle chain.
- Scarp. Lower side corresponds to the tic-marked side of the line.
- Crest of Cannon Hill.
- Geologic contacts.
- Ponds and lakes.
- Roads.

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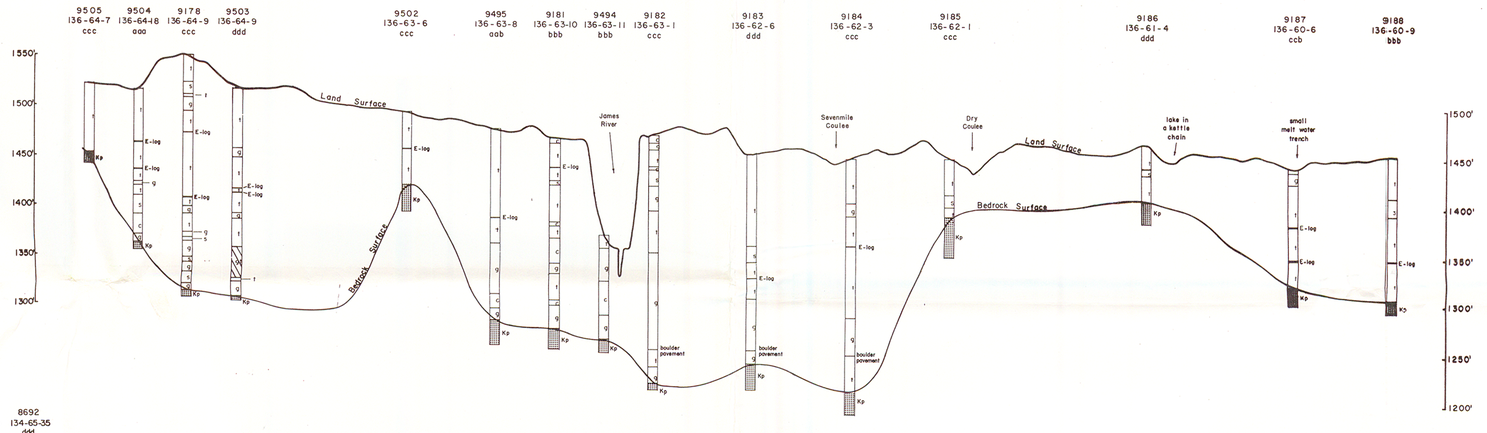
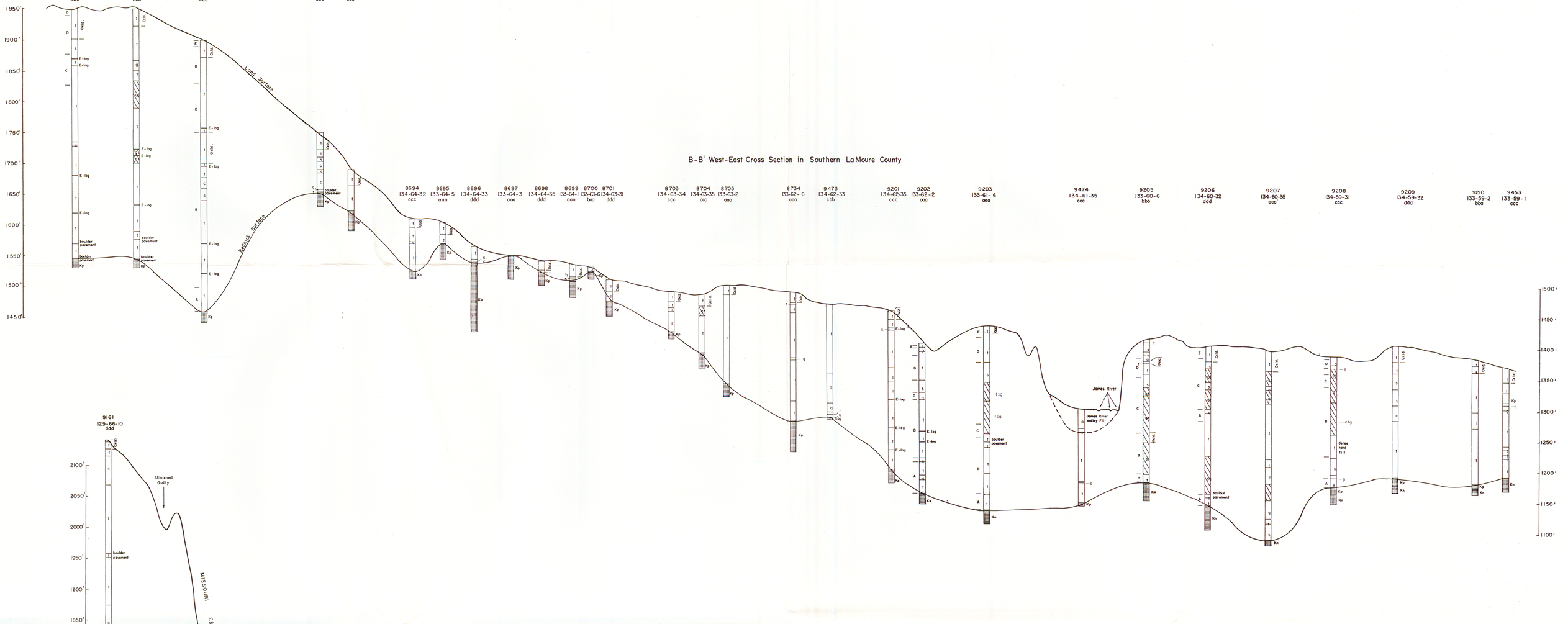
PLATE 3.- GEOLOGIC CROSS-SECTIONS THROUGH DICKEY AND LA MOURE COUNTIES

NORTH DAKOTA GEOLOGICAL SURVEY
NORTH DAKOTA STATE WATER COMMISSION

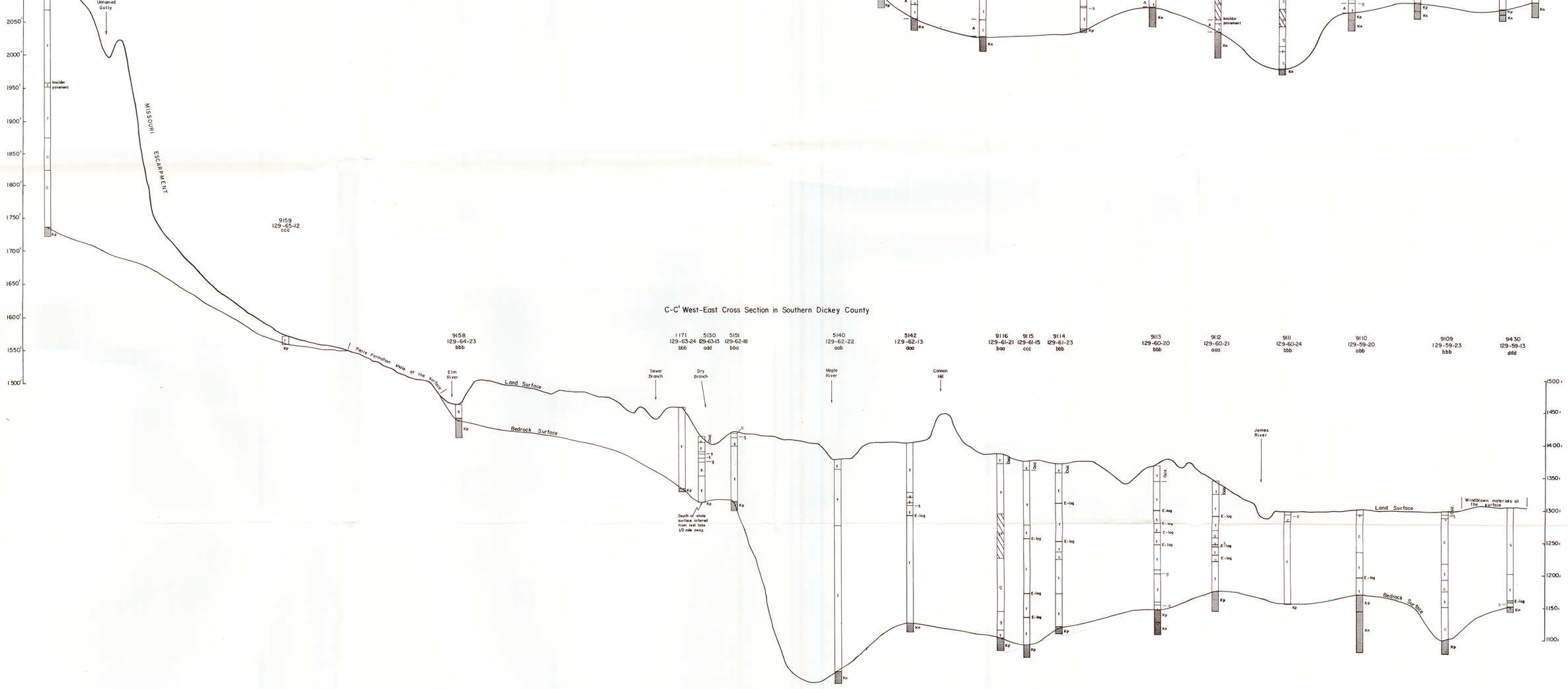
A-A' West-East Cross Section in Northern LaMoure County



B-B' West-East Cross Section in Southern LaMoure County



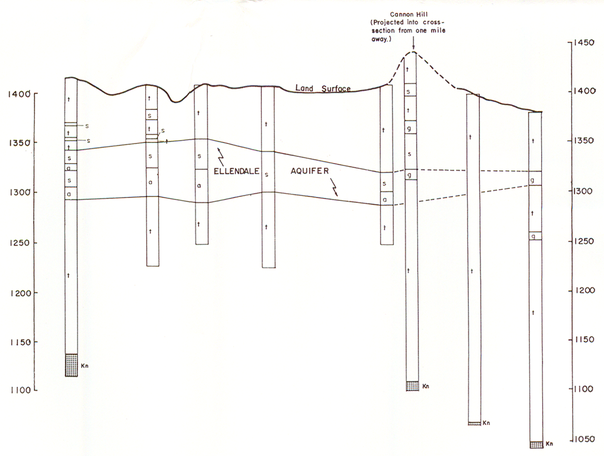
C-C' West-East Cross Section in Southern Dickey County



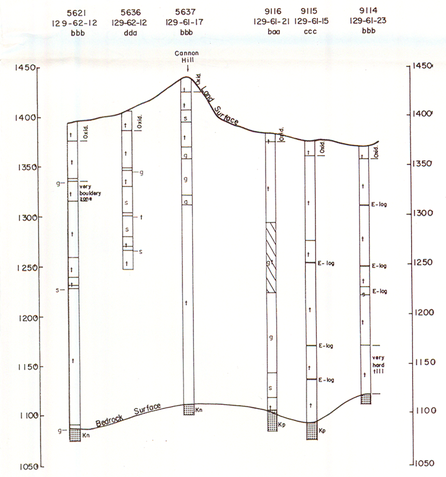
EXPLANATION

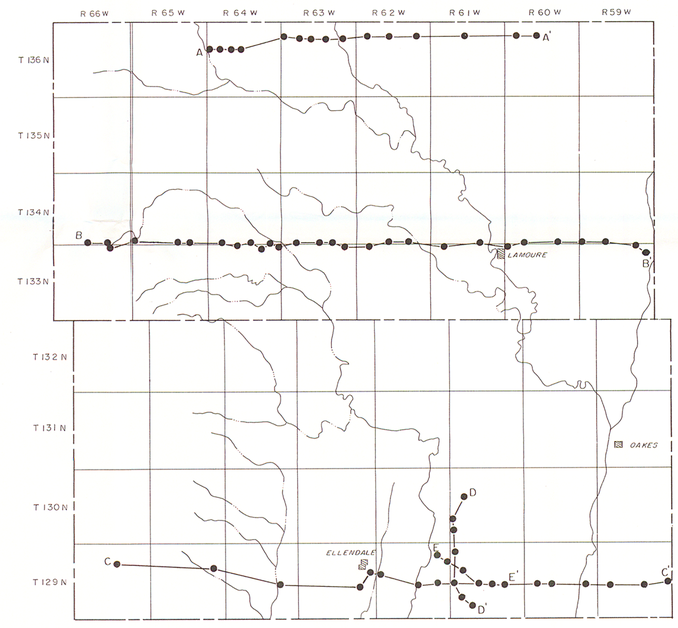
t	TILL
s	SAND
c	CLAY
g	GRAVEL
st	SANDY TILL
gt	GRAVELLY TILL
cs	SANDY CLAY
gs	SANDY GRAVEL
tsg	INTERBEDDED TILL, SAND, AND GRAVEL
ctg	INTERBEDDED GRAVELLY TILL AND CLAY
o	ALLUVIAL FILL
Kp	PIERRE FORMATION SHALE
Kn	NIOBRARA FORMATION SHALE

D-D' North-South Cross Section in Southern Dickey County through the Ellendale Aquifer



E-E' West-Northwest to East-Southeast Cross Section through Cannon Hill, Southern Dickey County





LOCATION OF CROSS SECTIONS