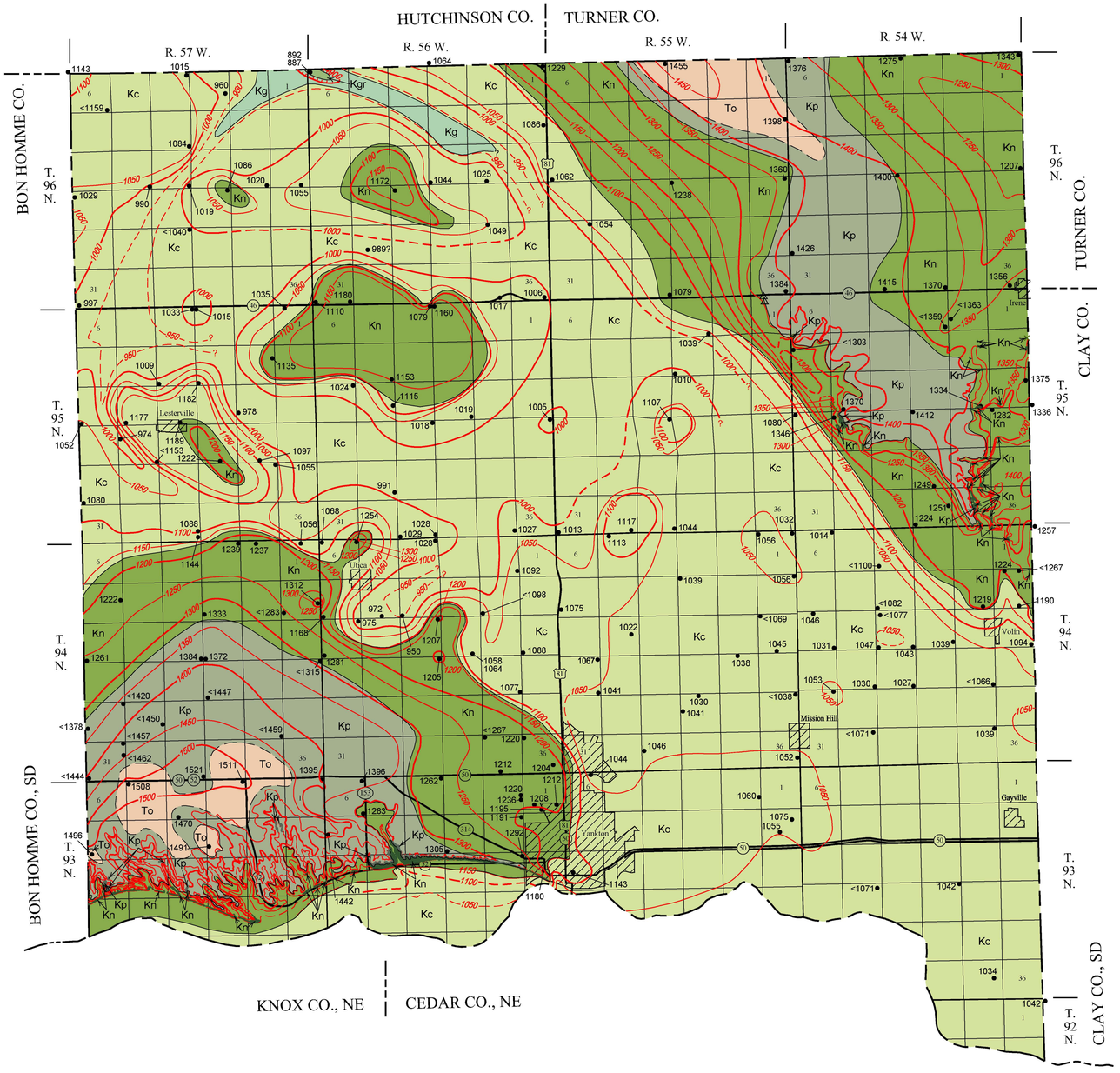


Plate 1. Bedrock map of Yankton County, South Dakota.

Department of Environment and Natural Resources
Division of Financial and Technical Assistance
Geological Survey

Bulletin 34 - 2005
Gary D. Johnson
Kelli A. McCormick

TERTIARY

- To — **OGALLALA GROUP**

CRETACEOUS

- Kp — **PIERRE SHALE** *Outcrops are represented by darker fill*
- Kn — **NIOBRARA FORMATION** *Outcrops are represented by darker fill*
- Kc — **CARLILE SHALE**
- Kg — **GREENHORN LIMESTONE**
- Kgr — **GRANEROS SHALE**

<1291 • Data point; number is elevation of bedrock surface in feet above mean sea level. A "less than" symbol (<) indicates elevation is less than the number shown. A "question mark" (?) indicates elevation is uncertain

892 / 887 • Data point where two test holes were drilled; numbers are elevation of bedrock surface in feet above mean sea level

× Niobrara Formation outcrops of very limited extent

△ Pierre - Niobrara Formation contact outcropping of very limited extent

1350 / 1300 –? Contour on bedrock surface. Number is elevation above mean sea level. Dashed where approximate. A "question mark" (?) indicates that insufficient data are available for continuation of the contour. Contour interval = 50 feet

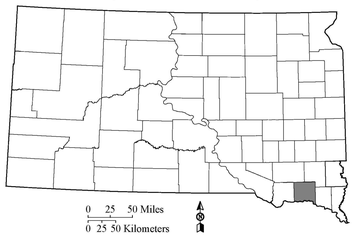
–? Geologic contact. Dashed where approximate. A "question mark" (?) indicates the location of the contact is unknown

Major highway

Township boundary

Section line

Index map showing location of Yankton County, South Dakota



Sectionized Township

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

N

0 1 2 3 4 5 6 MILES

0 1 2 3 4 5 6 7 8 9 10 KILOMETERS

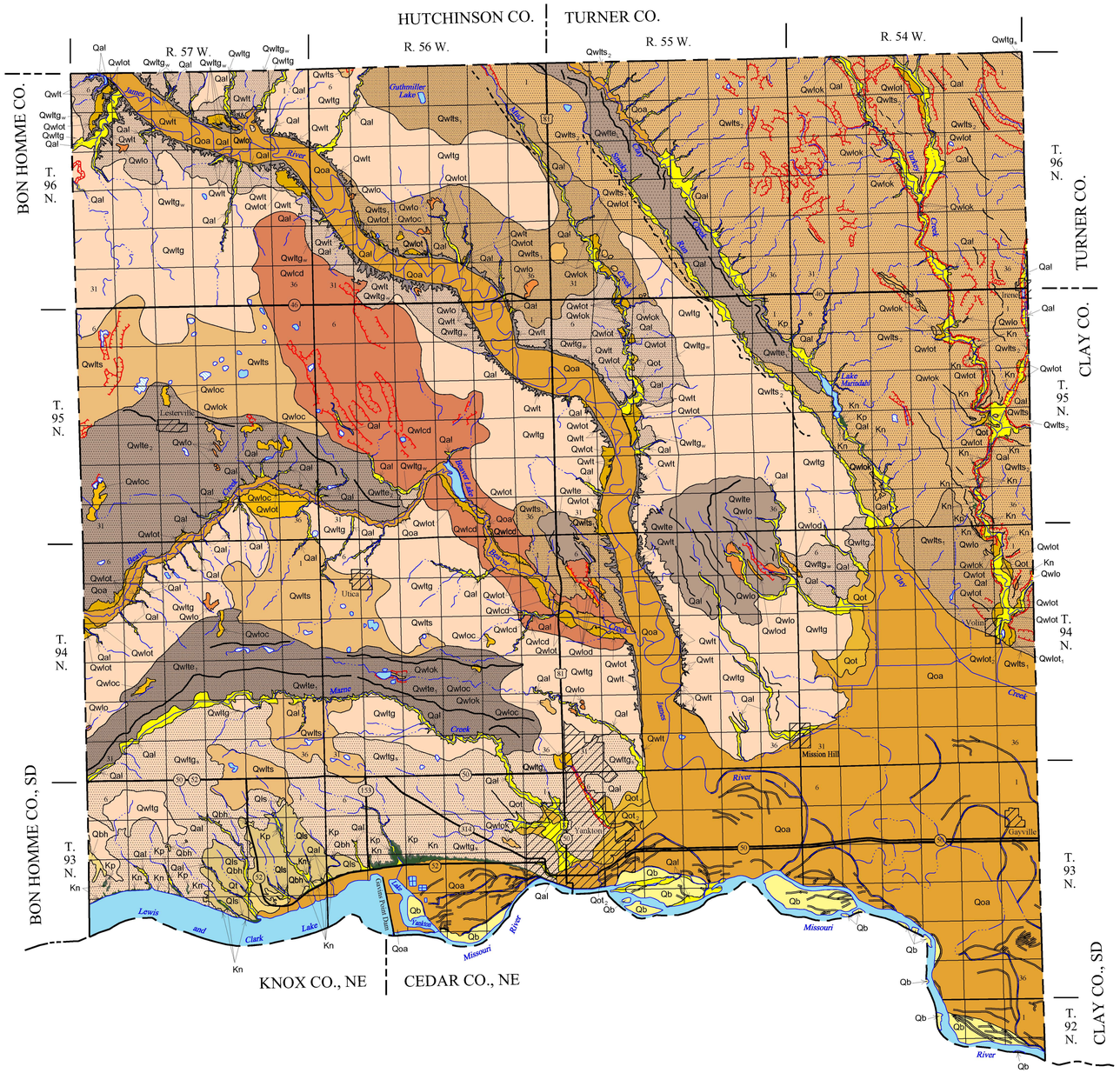


Plate 2. Geologic map of Yankton County, South Dakota.

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Explanation

QUATERNARY

HOLOCENE

- **Qal** — **ALLUVIUM** - *Stream deposits of silt and clay with minor amounts of sand and gravel*
- **Qb** — **BAR** - *Sand with minor gravel, silts and clay deposited as part of the active river system; usually bedded*
- **Qt** — **TERRACE** - *Mainly clay forming a flat to gently sloping surface adjacent to streams; likely an erosional surface formed on underlying strata*
- **Qoa** — **OUTWASH AND ALLUVIUM** - *Sand and gravel of glaciofluvial origin with minor alluvial overburden; confined to valleys; sloping to relatively flat surface*

PLEISTOCENE

LATE WISCONSIN

- **Qot** (Qot_2, Qot_1) — **OUTWASH TERRACE** - *Sand and gravel of glaciofluvial origin that may have been reworked by recent streams; confined to valleys; sloping to relatively flat surface. Qot_2 - floored in clay; the lower of two adjacent terraces. Qot_1 - gravel rich; the upper of two adjacent terraces*
- **Qls** — **LOESS** - *Eolian deposits of mainly silt-sized angular grains; forms relatively steep slopes; calcareous; gray, weathers to yellow or tan*
- **Qwlt** — **TILL AND COLLUVIUM, UNDIFFERENTIATED** - *Heterogeneous mixture of boulders, pebbles, sand, silt, and clay; local slumping of deposits (colluvium) occurs; mapped only along steep valley walls of the James River and its tributaries*
- **Qwlo** — **OUTWASH** - *Sand and gravel of glaciofluvial origin; typically undulating surface; not always associated with a valley*
- **Qwlot** ($Qwlot_2$, $Qwlot_1$) — **OUTWASH TERRACE** - *Sand and gravel of glaciofluvial origin; confined to a valley; sloping to relatively flat surface. $Qwlot_2$ - the lower of two adjacent terraces. $Qwlot_1$ - the upper of two adjacent terraces*
- **Qwloc** — **OUTWASH, COLLAPSED** - *Sand and gravel of glaciofluvial origin; deposited on or in the ice and later deposited onto the ground as the ice melted; with highly variable till content; typically undulating to hummocky surface*
- **Qwlok** — **OUTWASH, KAME** - *A variety of collapsed outwash; typically forms mound-like, oval to elongate hills*
- **Qwlcd** — **DEBRIS, COLLAPSED** - *Oxidized clay with a significant component of sand and gravel*
- **Qwlod** — **TILL, DISINTERGRATION RIDGE** - *Heterogeneous mixture of boulders, pebbles, sand, silt, and clay; usually contains significantly more sand and gravel than typical till; forms linear ridges*
- **Qwltg** ($Qwltg_s$, $Qwltg_w$) — **TILL, GROUND MORAINE** - *Qwltg - Heterogeneous mixture of boulders, pebbles, sand, silt, and clay; flat to gently undulating topography. $Qwltg_s$ - slope; was deposited on significant slopes; due to the inclination of the terrain, the surface is commonly deeply incised by recent streams. $Qwltg_w$ - water modified; has had significant modification by meltwater during retreat of the late Wisconsin glacier; small, thin, discontinuous deposits of sand or gravel are common*
- **Qwlts** ($Qwlts_2$, $Qwlts_1$) — **TILL, STAGNATION MORAINE** - *Qwlts - Heterogeneous mixture of boulders, pebbles, sand, silt, and clay; undulating to hummocky topography characterized by poorly-developed drainages with numerous lakes and sloughs. $Qwlts_2$ - high relief; has a prominent hummocky surface, with minor lineations. $Qwlts_1$ - low relief; has a more subdued hummocky surface*
- **Qwlte** ($Qwlte_1$, $Qwlte_2$, $Qwlte_3$) — **TILL, END MORAINE** - *Qwlte - Heterogenous mixture of boulders, pebbles, sand, silt, and clay; relatively elevated topography. $Qwlte_1$ - Lateral end moraine. $Qwlte_2$ - Tripp Moraine; the southern extent of a large end moraine complex. $Qwlte_3$ - Colony Moraine; the southern extent of a large end moraine complex*

TERTIARY?

PLIOCENE?

- **Qbh** — **BON HOMME GRAVEL** - *Nonglacial fine sand to medium gravel; quartz- and feldspar-rich, often stratified and cross bedded; fossiliferous (a variety of western-derived sand)*

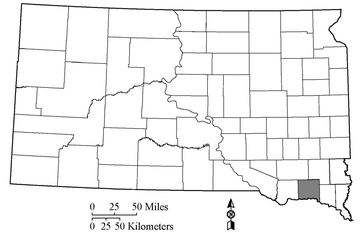
CRETACEOUS

LATE CRETACEOUS

- **Kp** — **PIERRE SHALE** - *Dark-gray to black shale and light-tan to pale orange calcareous marl, thin seams of bentonite common; fossiliferous; slumps commonly occur within this unit*
- **Kn** — **NIOBRARA FORMATION** - *Light- to dark-gray interbedded chalk, limestone, and calcareous shale, weathers to white and pale yellow, or orange; calcareous; fossiliferous*

- × Niobrara Formation outcrops of very limited extent
- \+ Pierre - Niobrara Formation contact outcropping of very limited extent
- Holocene abandoned meander channel
- Ridge
- Meltwater channel
- Geologic contact, dashed where approximate
- Lake
- Stream
- Major highway
- Township boundary
- Moraine crest
- Probable moraine crest
- Possible moraine crest
- Intermittent lake
- Intermittent stream
- Section line

Index map showing location of Yankton County, South Dakota



0 25 50 Miles
0 25 50 Kilometers

Sectionized Township

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
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31	32	33	34	35	36

N

0 1 2 3 4 5 6 MILES
0 1 2 3 4 5 6 7 8 9 10 KILOMETERS