SOUTH DAKOTA GEOLOGICAL SURVEY
BULLETIN 19
PART 2
PLATE I

HYDROGRAPHS OF DISCHARGE OF VERMILLION RIVER,
PRECIPITATION AT VERMILLION AND CENTERVILLE,
AND SELECTED WELLS IN CLAY COUNTY, S. DAK.

EXPLANATION
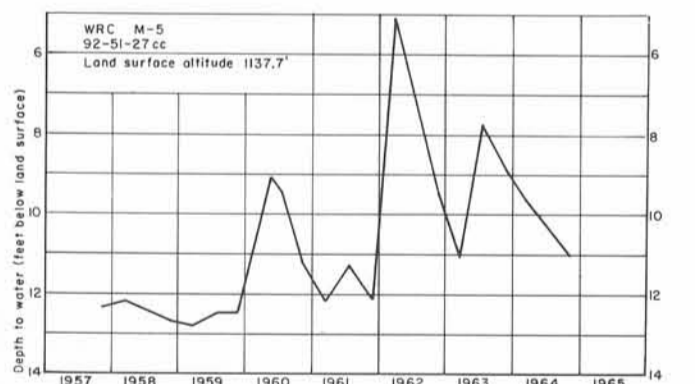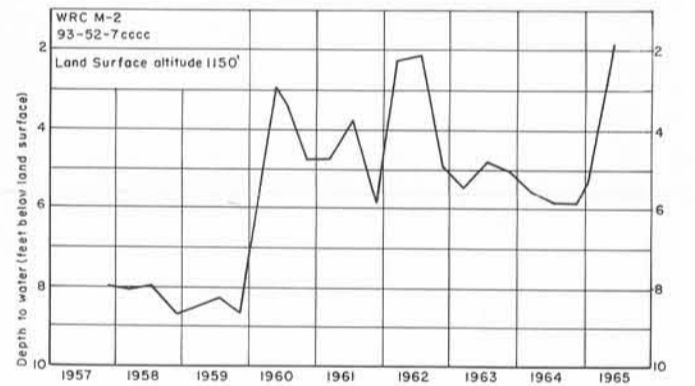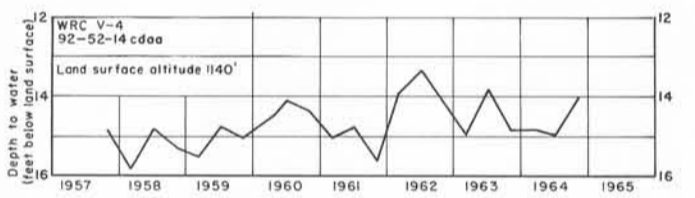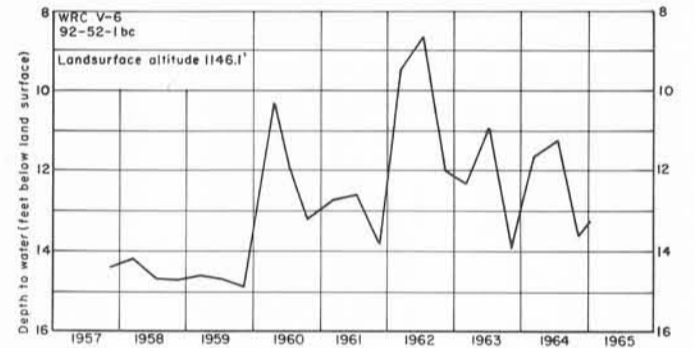
USWB   U.S. Weather Bureau
USGS   U.S. Geological Survey
SDGS   South Dakota Geological Survey
WRC   South Dakota Water Resources Commission

(All observation wells except SDGS 38 are completed in
the Lower Vermillion-Missouri aquifer. SDGS 38 is
completed in an isolated outwash lens. Dashed lines
on well hydrographs represent long-term water level
fluctuation based on widely spaced measurements.)

Index to location of data collection points.

TURNER
R.53W.   R.52W.   LINCOLN R.51W.

Wakonda

SDGS 47

USWB Centerville Sta.

USGS Gage

WRC V-5

Hub City

SDGS 38

WRC M-2

Meckling

WRC V-6

WRC M-3   USWB Vermillion Sta.

WRC V-4   Vermillion

SDGS 48   WRC M-5

NEBRASKA

YANKTON   UNION

T.95 N.   T.94 N.   T.93 N.   T.92 N.   T.91 N.

SDGS 47
95-52-2 cbbb
Land surface altitude 1148'

WRC V-5
94-52-14 cbbb
Land surface altitude 1152'

U.S. Geological Survey Gaging Station
94-52-2
0 - no flow

42,730 47,620 49,850 63,950 66,750 78,900 58,870 186,000 115,300 45,510

U.S. Weather Bureau Station
(6 miles southeast of Centerville)

27.23 20.66 28.49 23.68 42.53 22.99 24.67 24.28 18.81 29.00 30.21 15.04 14.87 26.63 15.07 30.73 32.33 27.04 33.97 21.41 23.57

(x = no record)

WRC V-6
92-52-1 bc
Landsurface altitude 1146.1'

WRC V-4
92-52-14 cdaa
Land surface altitude 1140'

WRC M-2
93-52-7 cccc
Land Surface altitude 1150'

WRC M-3
92-53-15 bbbb
Land Surface altitude 1154.7'

WRC M-5
92-51-27 cc
Land surface altitude 1137.7'

U.S. Weather Bureau Station (2 miles north of Vermillion)
ANNUAL TOTAL
23.19 25.71 20.48 23.53 37.81 22.73 24.09 22.79 26.17 29.24 21.74 38.60 21.62 34.62 25.58 16.80 12.76 22.23 15.51 26.22 26.35 20.11 28.66 18.76 24.93

SDGS 48
92-52-25 da
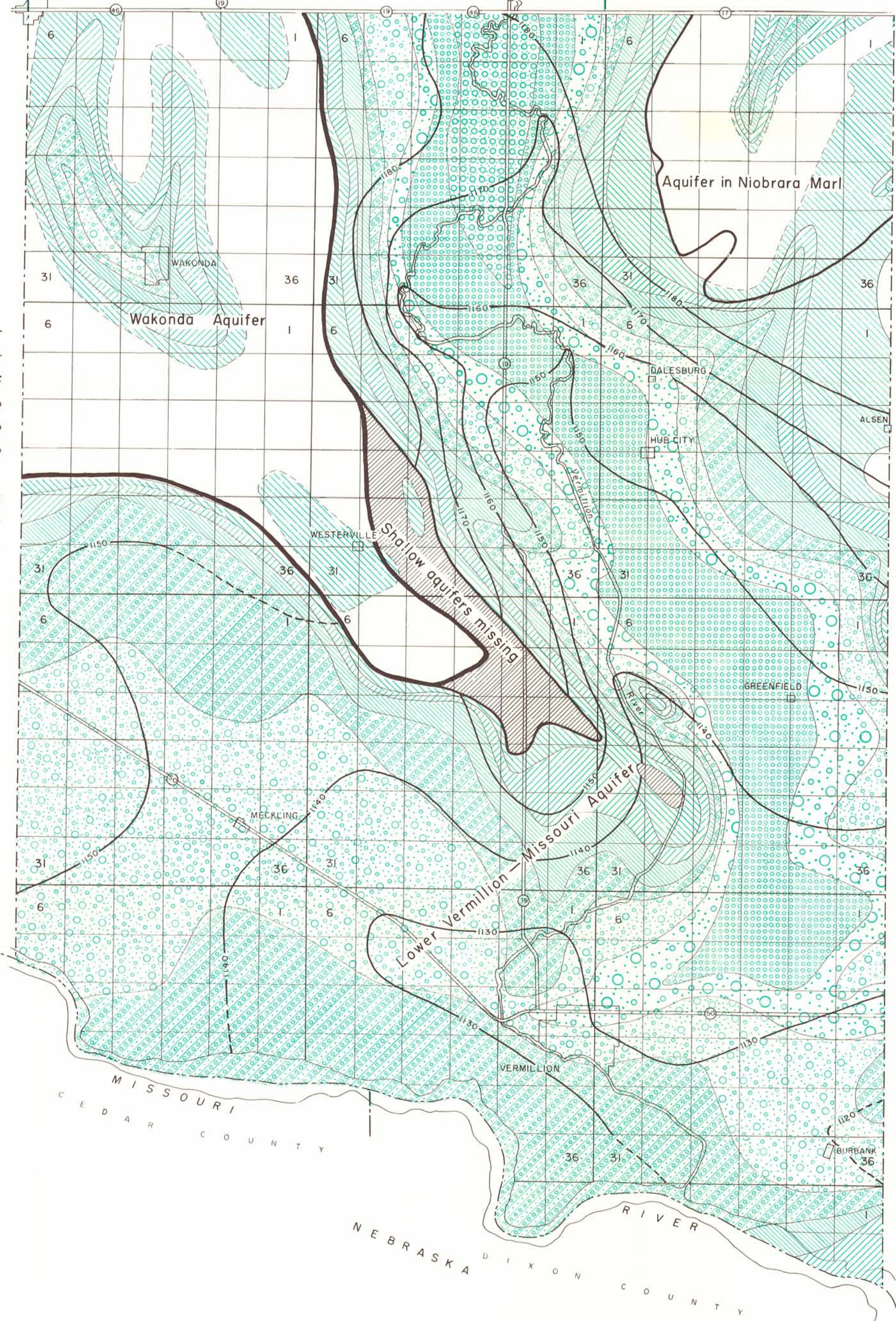Land Surface altitude 1143'

SDGS 38
94-52-35 badd2
Land Surface altitude 1210'

SOUTH DAKOTA GEOLOGICAL SURVEY
BULLETIN 19
PART 2
PLATE 2

HYDROGEOLOGIC
MAP OF THE
MAJOR SHALLOW
AQUIFERS IN
CLAY COUNTY
SOUTH DAKOTA

Aquifer in Niobrara Marl

Wakonda Aquifer
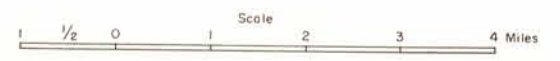
Shallow aquifers missing

Lower Vermillion – Missouri Aquifer

EXPLANATION
Thickness (feet) of water-saturated
aquifer material

less-than 10

10-25

25-50

50-75

75-100
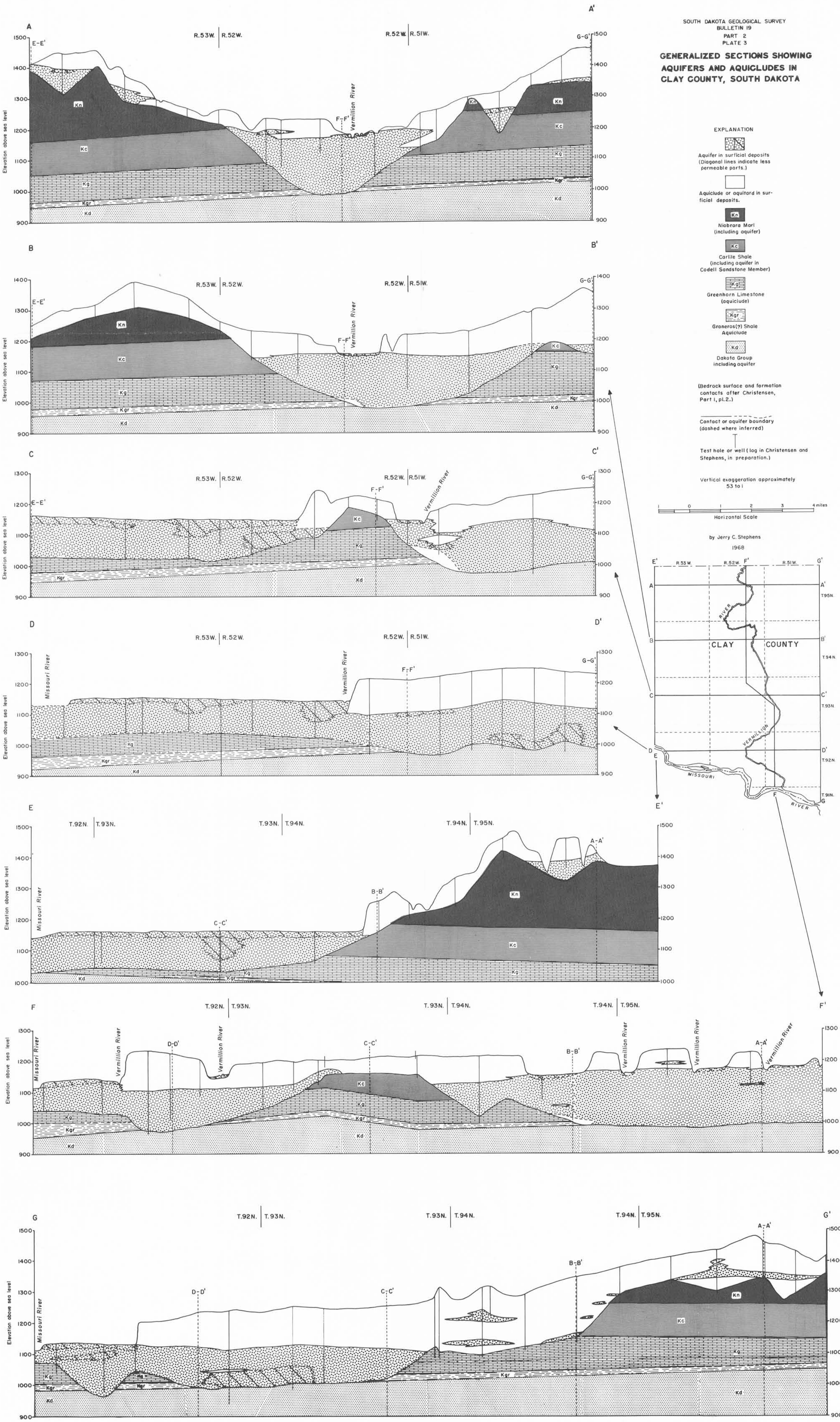
100-125

125-150

150-175

more than 175

Aquifer boundary

1140
Piezometric contour Lower Vermillion–
Missouri aquifer, datum mean sea level,
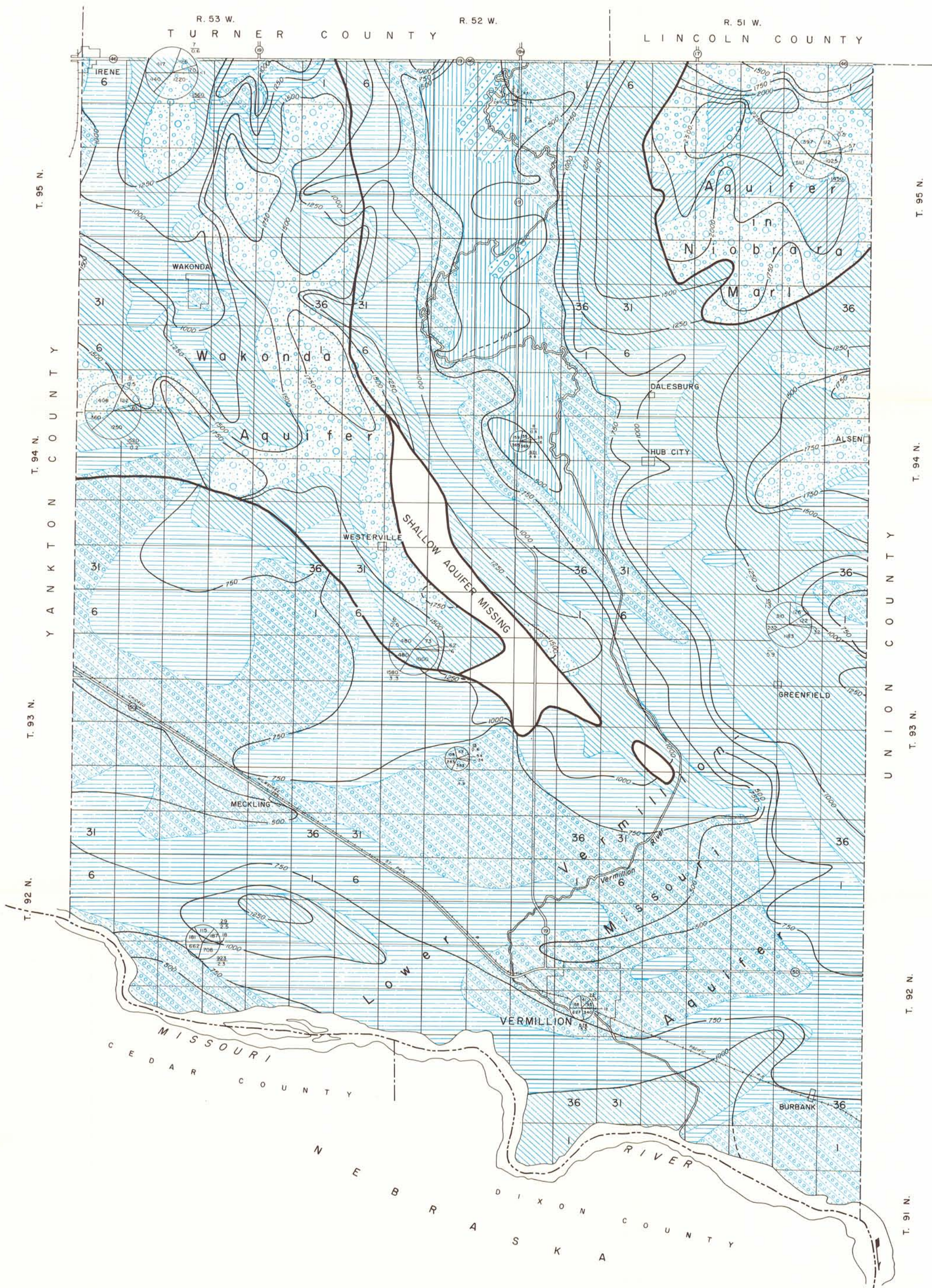dashed where inferred, (Interval = 10 feet)

November, 1965

Scale
1/2 0   1   2   3   4 Miles

by
J.C. Stephens

SOUTH DAKOTA GEOLOGICAL SURVEY
BULLETIN 19
PART 2
PLATE 3

GENERALIZED SECTIONS SHOWING
AQUIFERS AND AQUICLUDES IN
CLAY COUNTY, SOUTH DAKOTA

EXPLANATION

Aquifer in surficial deposits.
(Diagonal lines indicate less
permeable ports.)

Aquiclude or aquitard in sur-
ficial deposits.

Kn
Niobrara Marl
(including aquifer)

Kc
Carlile Shale
(including aquifer in
Codell Sandstone Member)

Kg
Greenhorn Limestone
(aquiclude)

Kgr
Graneros(?) Shale
Aquiclude

Kd
Dakota Group
including aquifer

(Bedrock surface and formation
contacts after Christensen,
Part I, pl.2.)

Contact or aquifer boundary
(dashed where inferred)

Test hole or well (log in Christensen and
Stephens, in preparation.)

Vertical exaggeration approximately
53 to 1

Horizontal Scale

by Jerry C. Stephens
1968

HYDROCHEMICAL
MAP OF MAJOR
SHALLOW AQUIFERS
IN CLAY COUNTY,
SOUTH DAKOTA

by Jerry C. Stephens

1968

R. 53 W.   R. 52 W.   R. 51 W.

T U R N E R   C O U N T Y   L I N C O L N   C O U N T Y

IRENE

WAKONDA

Aquifer in Niobrara Marl

T. 95 N.

W a k o n d a

A q u i f e r

DALESBURG

HUB CITY

ALSEN

T. 94 N.

WESTERVILLE

SHALLOW AQUIFER MISSING

GREENFIELD

MECKLING

Y A N K T O N   C O U N T Y

U N I O N   C O U N T Y

L o w e r   M i s s o u r i   A q u i f e r

Vermillion River

T. 93 N.

T. 92 N.

VERMILLION

C E D A R   C O U N T Y

M I S S O U R I

BURBANK

N E B R A S K A

D I X O N   C O U N T Y

R I V E R

T. 91 N.

EXPLANATION
Specific conductance in micromhos

500–750

750–1,000

1,000–1,500

1,500–2,000

2,000–2,500

2,500–3,000

3,000–3,500

more than 3,500
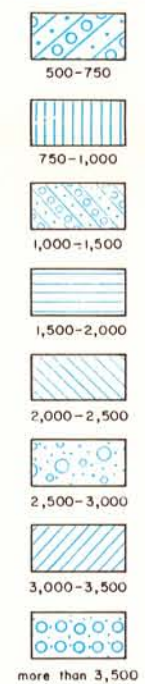
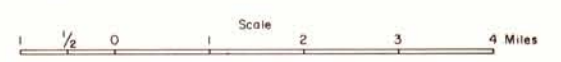— 1750 — — Line of equal hardness
(dashed where inferred;
interval 250 ppm as CaCO₃)

Aquifer boundary

Shallow aquifers missing

Representive chemical analysis:

Mg   Na+K
Ca
SO₄   Cl+F
HCO₃   NO₃

Percent sodium
Sodium adsorption ratio

Hardness as CaCO₃ (ppm)
Iron plus manganese (ppm)

Diameter of circle is in proportion
to dissolved solids concentration

Parts per million
0   1000   2000   3000
Scale of diameters
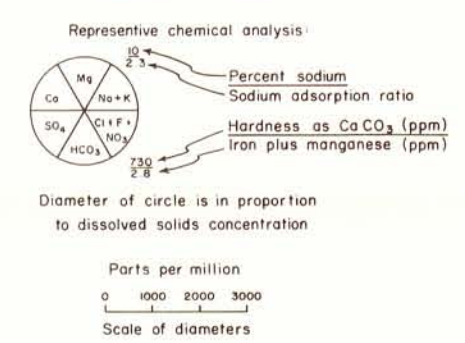
Upper half of circle represents cations:
Calcium – Ca, Magnesium – Mg, Sodium – Na
plus Potassium – K.
Lower half of circle represents anions:
Sulfate – SO₄, Bicarbonate – HCO₃, Chloride–
Cl plus Fluoride – F and Nitrate – NO₃.
Size of segment is proportional to con-
centration in equivalents per million. Fig-
ure in segment is concentration in parts
per million.

1 ½ 0   1   2   3   4 Miles
Scale

N