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Regional Hydrogeologic Summaries from Domestic Well-water Quality in Rural Nebraska -- Southwestern Tablelands

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Southwestern Tablelands Hydrogeologic Summary from *Domestic Well-water Quality in Rural Nebraska*

(A data-analysis report for the Nebraska Department of Health compiled by D. C. Gosselin and others, 1996)

Groundwater Region 5

Groundwater Region 5 occupies the gently rolling, relatively flat dissected plains of the Southwestern Tableland (fig. 1). The base of the principal groundwater-bearing units is the Cretaceous Pierre shale in the south and the silts, siltstones, clay and claystones of the Tertiary White River Group in the north. Overlying these rocks is the Tertiary Ogallala Group. It consists of sand, sandstones, gravel, silt, and clay. Where the sandstones are very well cemented, it is referred to as "mag rock." The materials were deposited by meandering streams, which has resulted in variable thicknesses, some of which differ dramatically over short distances. The group thins from almost 400 feet in the north to being absent in the south. Its thickness ranges from 300 feet on the west side of the region to 100 feet on the east. Pleistocene wind-deposited silts (loess) overly the Ogallala Group. Loess is absent along the Republican River and in parts of Chase County, but elsewhere it attains thicknesses of more than 100 feet in Dundy and Keith counties. A veneer of Holocene dune sand covers much of western Dundy County and significant parts of Chase, Perkins, and southern Lincoln counties. (Geologic cross sections are available on request from the Conservation and Survey Division.*)

Groundwater is primarily derived from the Ogallala Group. Saturated thicknesses range from about 50 feet or less in the south to about 400 feet or more in the north and east (table 1). Depths to groundwater vary from about 50 feet or less in western Dundy County to about 200 feet or more in northwestern Perkins County. Semi-artesian conditions exist in parts of Chase and Perkins counties. The general water quality in the region is good; total dissolved solids range from 200 to 500 milligrams per liter.

***Cross sections for this or other regions of the state (fig. 1—*Locations of geologic cross sections*) are available from the Conservation and Survey Division for a small fee. The report *Domestic Well-water quality in Rural Nebraska* is available from the Nebraska Department of Health and Human Services.** Photocopies are available at CSD; write: Map and Publications Sales/Conservation and Survey Division/113 Nebraska Hall/University of Nebraska-Lincoln/68588-0517; or call: (402) 472-7523.

Sources of Information

Goeke, J.W., J.M. Peckenpaugh, R.E. Cady, and J.T. Dugan, 1992, Hydrogeology of Part of the Twin Platte and Middle Republican Natural Resources Districts, Southwestern Nebraska: Nebraska Water Survey Paper No. 70, Conservation and Survey Division, University of Nebraska - Lincoln, 89 p.

Soil Conservation Service, 1982, Soil Survey of Chase County, Nebraska, U.S. Department of Agriculture, 187 p.

Conservation and Survey Division

Institute of Agriculture and Natural Resources **University of Nebraska-Lincoln**

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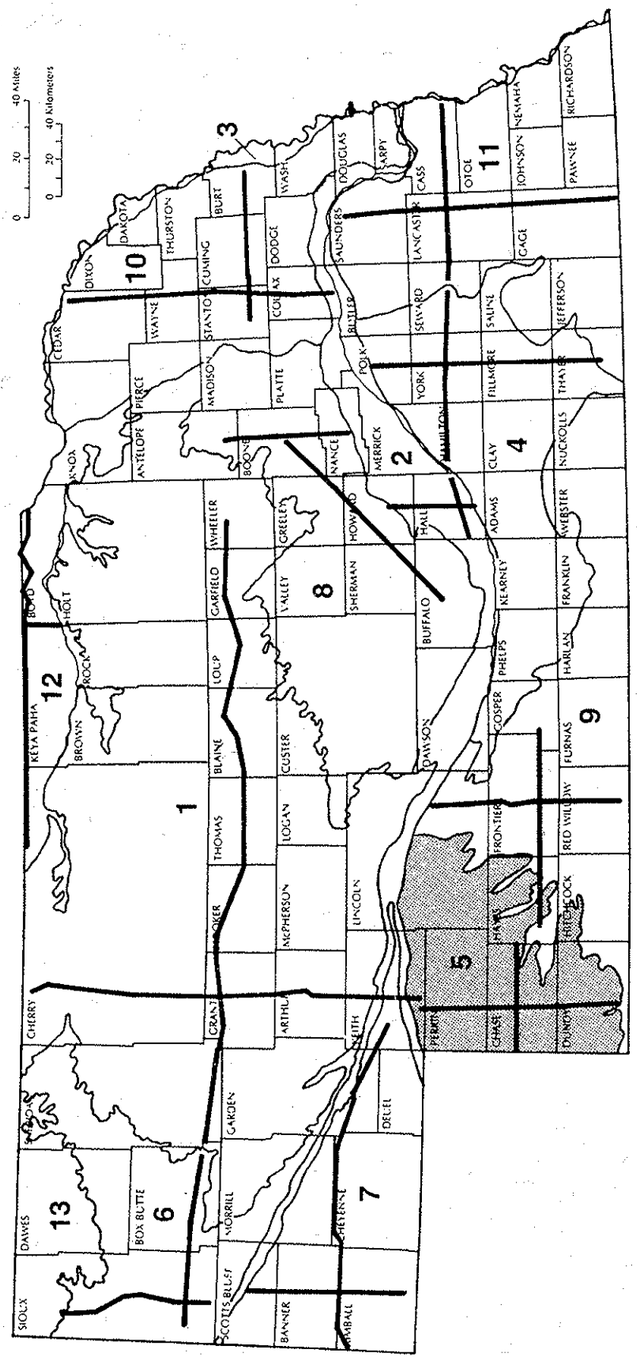


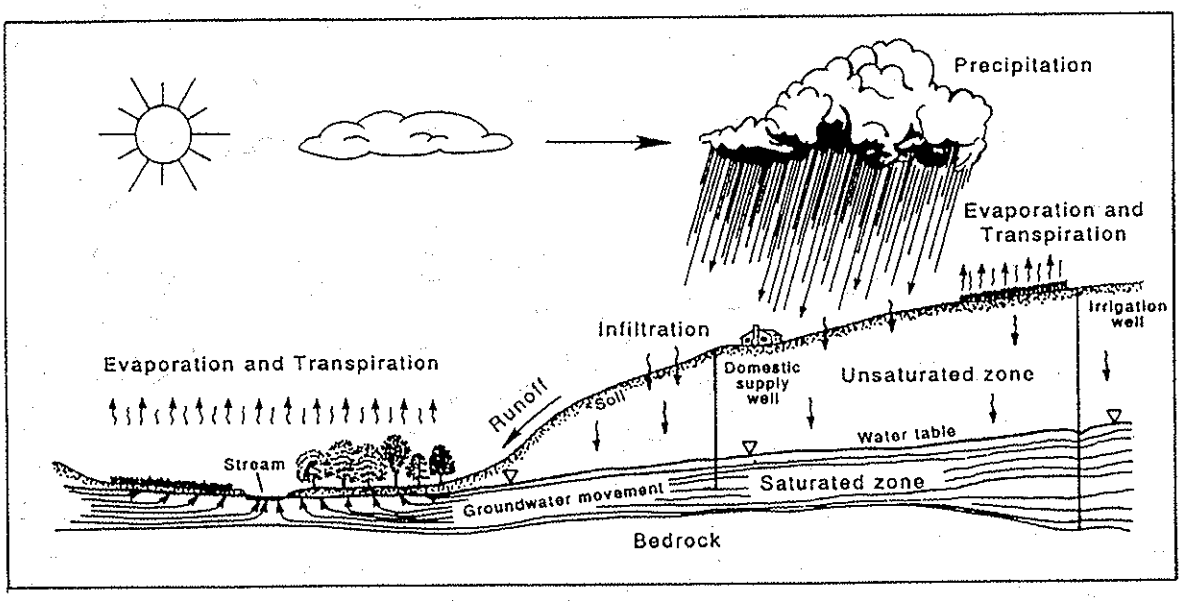
Fig. 1—*Locations of geologic cross sections* (Region 5 in gray)

Water-bearing Properties of Major Rock Units in Nebraska

From *The Groundwater Atlas of Nebraska* — Conservation and Survey Division, University of Nebraska-Lincoln

Era	Period	Epoch	Millions of years	Group or Formation	Lithology	Water-bearing Properties
Cenozoic	Quaternary	Holocene	0.01		Sand, silt, gravel and clay	Principal groundwater reservoir; Ogallala is absent in east and northwest. Arikaree is present primarily in west.
		Pleistocene	~2.0			
		Pliocene	5		Sand, gravel and silt	
		Miocene		Ogallala	Sand, sandstone, siltstone and some gravel	
			24	Arikaree	Sandstone and siltstone	
		Oligocene		White River	Siltstone, sandstone and clay in lower part	Secondary aquifer in west; water may be highly mineralized.
			37			
		Eocene		Rocks of this age are not identified in Nebraska.		
		Paleocene	58			
Mesozoic	Cretaceous	Late Cretaceous	67	Lance	Sandstone and siltstone	Generally not an aquifer; yields water to few wells in west.
				Fox Hills		
				Pierre	Shale and some sandstone in west	Generally not an aquifer; sandstones in west yield highly mineralized water to few industrial wells.
				Niobrara	Shaly chalk and limestone	Secondary aquifer where fractured and at shallow depths, primarily in east.
				Carlile	Shale; in some areas contains sandstones in upper part	Generally not an aquifer; sandstones yield water to few wells in northeast.
				Greenhorn-Graneros	Limestone and shale	Generally not an aquifer, yields water to few wells in east.
		Early Cretaceous	98	Dakota	Sandstone and shale	Secondary aquifer, primarily in east; water may be highly mineralized.
	Jurassic		144		Siltstone and some sandstone	Not an aquifer
	Triassic		208		Siltstone	Not an aquifer
Paleozoic	Permian		245		Limestone, dolomites, shales and sandstone.	Some sandstone, limestone and dolomites are secondary aquifers in east. Water may be highly mineralized.
	Pennsylvanian		286			
	Mississippian		320			
	Devonian		360			
	Silurian		408			
	Ordovician		438			
	Cambrian		505			
Precambrian			570			

Table 1—Hydrostratigraphic chart (showing water-bearing rock units) of Nebraska
Time divisions are not to scale.



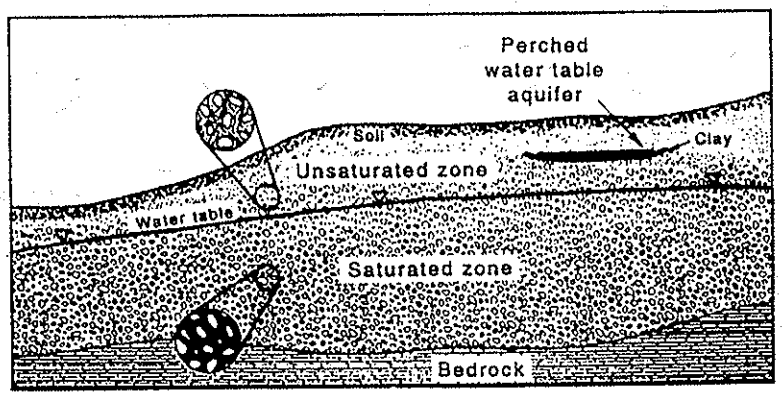


Fig. 2—*Groundwater cycle and idealized cross section*