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Regional Hydrogeologic Summaries from Domestic Well-water Quality in Rural Nebraska – Republican River Valley and Dissected Plains

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Republican River Valley and Dissected Plains 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 9

Groundwater Region 9 occupies the Republican River valley and dissected plains of south-central Nebraska (fig. 1). The principal groundwater-bearing units in this region are the Tertiary Ogallala Group and the overlying Quaternary sand and gravel deposits. The Ogallala Group is underlain by the relatively impermeable consolidated deposits of chalk and shale of the Cretaceous Niobrara and Pierre formations and the siltstone and clay of the Tertiary White River Group.

The Ogallala Group has been removed by erosion along the Republican River valley and also in the lower reaches of its tributaries. Consisting of a poorly sorted mixture of clays, silts, sands, sandstones, and gravels, the Ogallala Group is cemented in part by calcium carbonate and silica. Quaternary deposits consisting of loess (wind-deposited silt and clay) that are up to 200 feet thick, and also terrace deposits (lenses of gravel, sand, silt, and clay as much as 90 feet thick) overlie the Ogallala Group. (Geologic cross sections are available by request from the Conservation and Survey Division.*)

Because of its areal extent, accessibility, and extent of saturation, the Ogallala Group is the major source of groundwater in this region (table 1). Alluvium and terrace deposits are an important source of groundwater, yielding small to large quantities of water in the Republican River valley and its major tributaries. Sand and gravel of Pliocene and Pleistocene age also fill some ancient valleys (paleovalleys). Depth to the regional water table ranges from about 50 feet or less in the Republican River valley to about 200 feet or more in the uplands. The saturated thickness of the principal groundwater-bearing units ranges from about 100 feet or less to about 300 feet or more.

***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.
- Link, M.L., 1991, A Study of Nonpoint Source Ground Water Contamination in Red Willow and Hitchcock Counties, Nebraska, A Special Protection Area Report: Nebraska Department of Environmental Control, 81 p.

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GIM-97



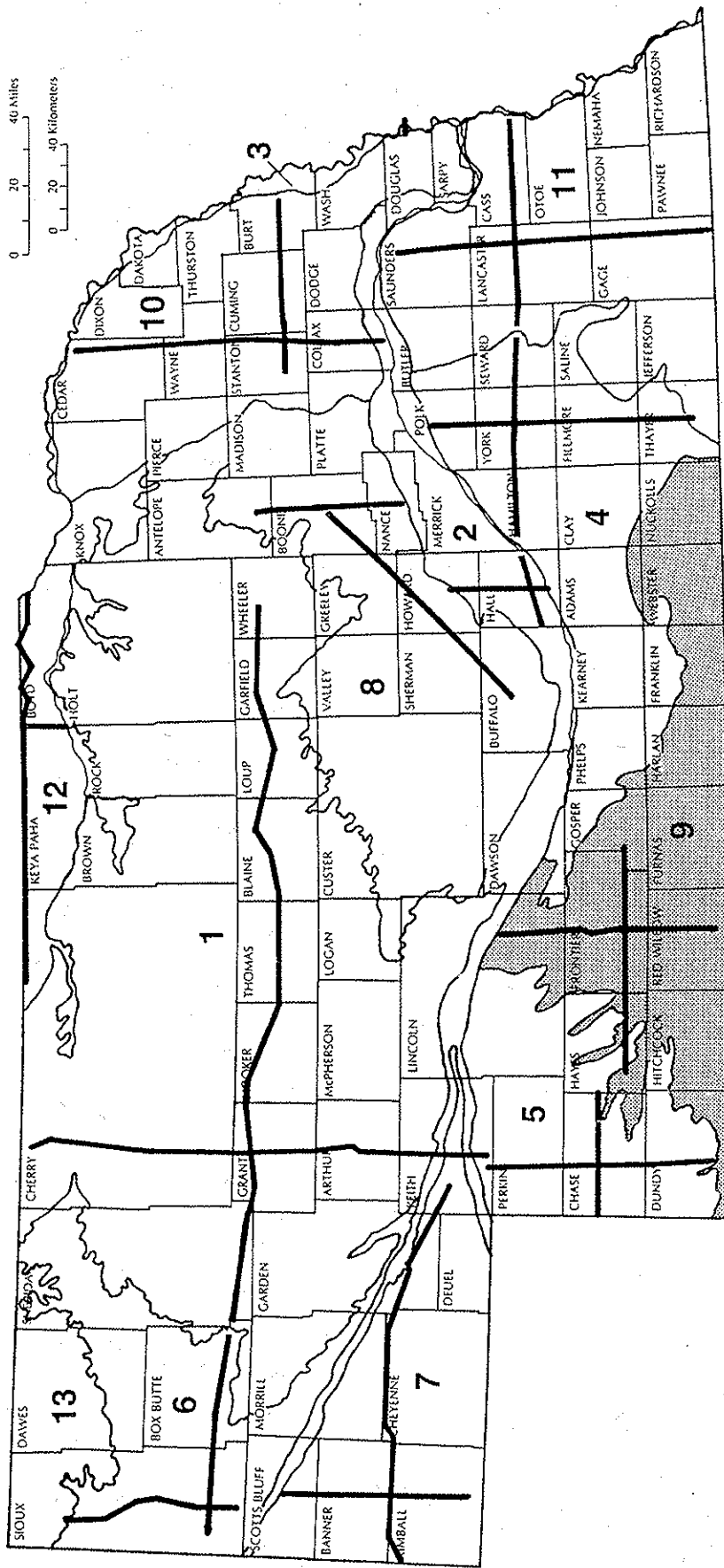


Fig. 1—Locations of geologic cross sections (Region 9 in gray)

Water-bearing Properties of Major Rock Units in Nebraska								
Era	From <i>The Groundwater Atlas of Nebraska</i>			Conservation and Survey Division, University of Nebraska-Lincoln				
	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						
		Pliocene	~2.0	Ogallala	Sand, gravel and silt			
		Miocene	5		Sand, sandstone, siltstone and some gravel			
		Oligocene	24		Arikaree		Sandstone and siltstone	
			White River		Siltstone, sandstone and clay in lower part		Secondary aquifer in west; water may be highly mineralized.	
		Eocene	37		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.		
			144		Siltstone and some sandstone	Not an aquifer		
	Jurassic		208		Siltstone	Not an aquifer		
	Triassic		245	Limestone, dolomites, shales and sandstone.	Some sandstone, limestone and dolomites are secondary aquifers in east. Water may be highly mineralized.			
Permian		286						
		Pennsylvanian	320					
Mississippian	360							
Devonian	408							
Silurian	438							
Ordovician	505							
Cambrian	570							
Precambrian								

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

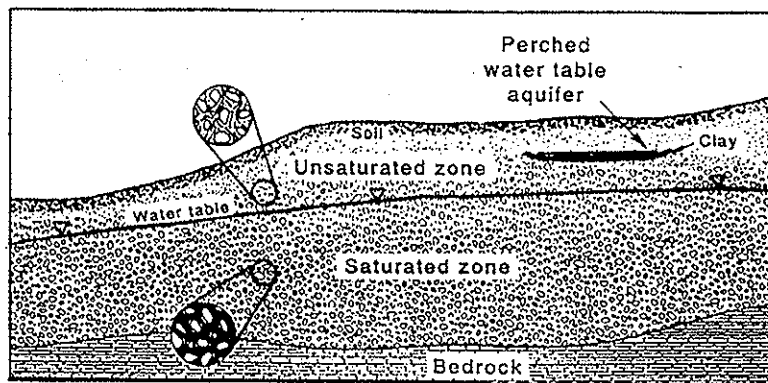
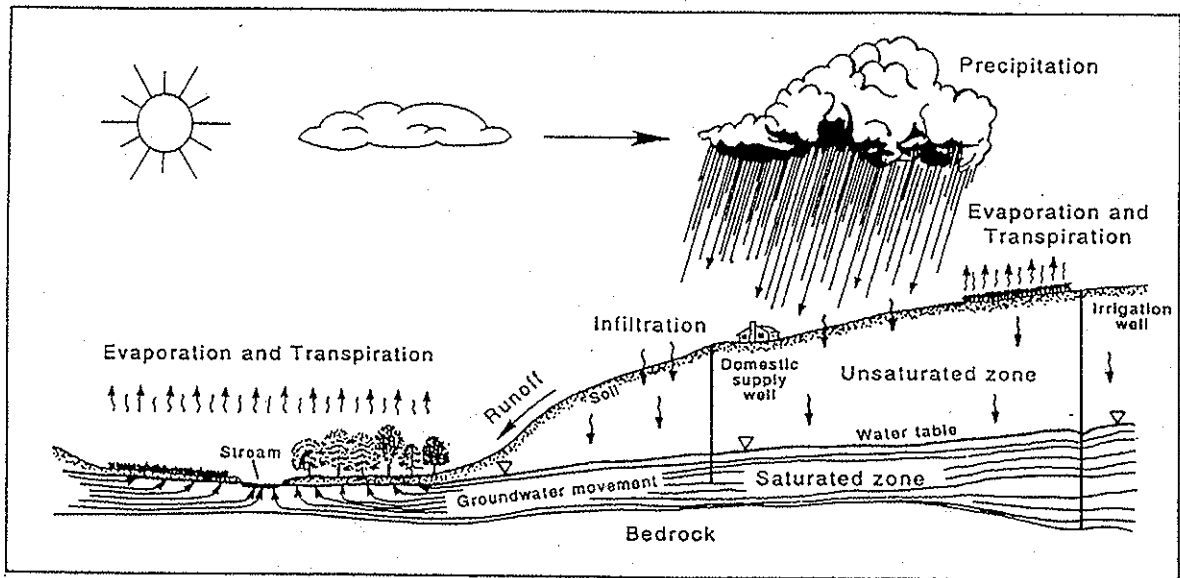


Fig. 2—Groundwater cycle and idealized cross section