Circular 182

Water-Level Trends and Pumpage in the Deep Bedrock Aquifers in the Chicago Region, 1991-1995

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Office of Ground Water Resources Evaluation & Management

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CIRCULAR 182

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Title: Water-Level Trends and Pumpage in the Deep Bedrock Aquifers in the Chicago Region, 1991-1995.

Abstract: The deep bedrock aquifer system in northeastern Illinois is encountered at depths ranging from about 200 feet in areas of central northern Illinois to an average of about 1,000 feet below land surface at Chicago. The aquifers have a collective thickness of 300 to 1,300 feet in the Chicago region, averaging 700 feet. They are composed chiefly of sandstones and dolomites, although most of the water is derived from the sandstone units. Pumpage from deep bedrock wells for public and self-supplied industrial supplies in the Chicago region increased from 200,000 gallons per day (gpd) in 1864 to a peak withdrawal of 182.9 mgd in 1979. Between 1991 and 1994, pumpage decreased from 112.7 mgd to 67.1 mgd, mostly due to a shift to Lake Michigan water, particularly in DuPage County. As a result, water levels in deep wells rose between 1991 and 1995, particularly in southern Lake, eastern DuPage, and western Cook Counties. Average annual water-level rises during the four-year period varied from one foot in Kendall County to 38 feet in DuPage County and averaged about 14 feet. This marked the first time that average water-level changes were upward in all eight counties of the Chicago area since detailed record-keeping began in the 1950s.

Reference: Visocky, Adrian P. Water-Level Trends and Pumpage in the Deep Bedrock Aquifers in the Chicago Region, 1991-1995. Illinois State Water Survey, Champaign, Circular 182.

Indexing Terms: Chicago, northeastern Illinois, Cook County, Lake Michigan diversion, Lake Michigan allocations, aquifers, Cambrian-Ordovician aquifers, deep sandstone wells, deep bedrock aquifers, ground water, public water supplies, water levels, potentiometric surface, water-level changes, pumpage, ground-water withdrawals, practical sustained yield.

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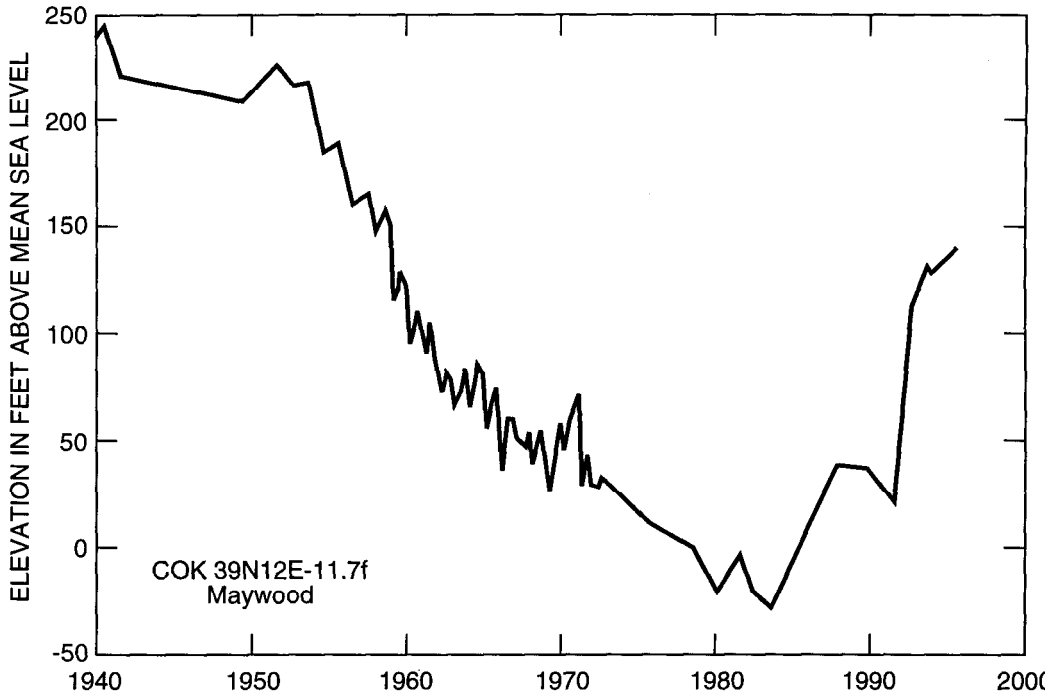

Figure 6. Representative trend of deep well water levels in Cook County since 1940

1991-1995

Between 1991 and 1995, average water-level changes in the 11 observation wells were all upward, with the exception of the well at Geneva. Water levels rose in these wells from 0.5 ft/yr south of Joliet to 30 ft/yr at Maywood, while water levels declined 16.5 ft/yr at Geneva.

Of the 364 wells that were measured in the eight-county Chicago region in fall 1995, 279 wells had also been measured in 1991. Water levels between 1991 and 1995 rose in 231 of these wells (83 percent), declined in 42 wells (15 percent), and showed no change in 6 wells (2 percent). This represents a considerable growth of the trend noted in the 1985-1991 period in which rises outnumbered declines by 54.4 to 43.8 percent. Rises and declines were observed in all eight of the Chicago-region counties, ranging from a rise of 320 feet in south-central Lake County to a decline of 190 feet in an industrial well south of Joliet. The largest percentages of rises were found in Cook, DuPage, Lake, and McHenry Counties, all with greater than 90 percent in rises, and the largest percentages of declines were found in Kane and Will Counties (36 and 30 percent).

Water-Level Changes - Regional Trends

Eight-County Chicago Region

A Chicago-region, county-by-county comparison of temporal water-level trends can be seen by comparing average annual water-level changes for the periods 1975-1980, 1980-1985, 1985-1991, and 1991-1995 (table 4).