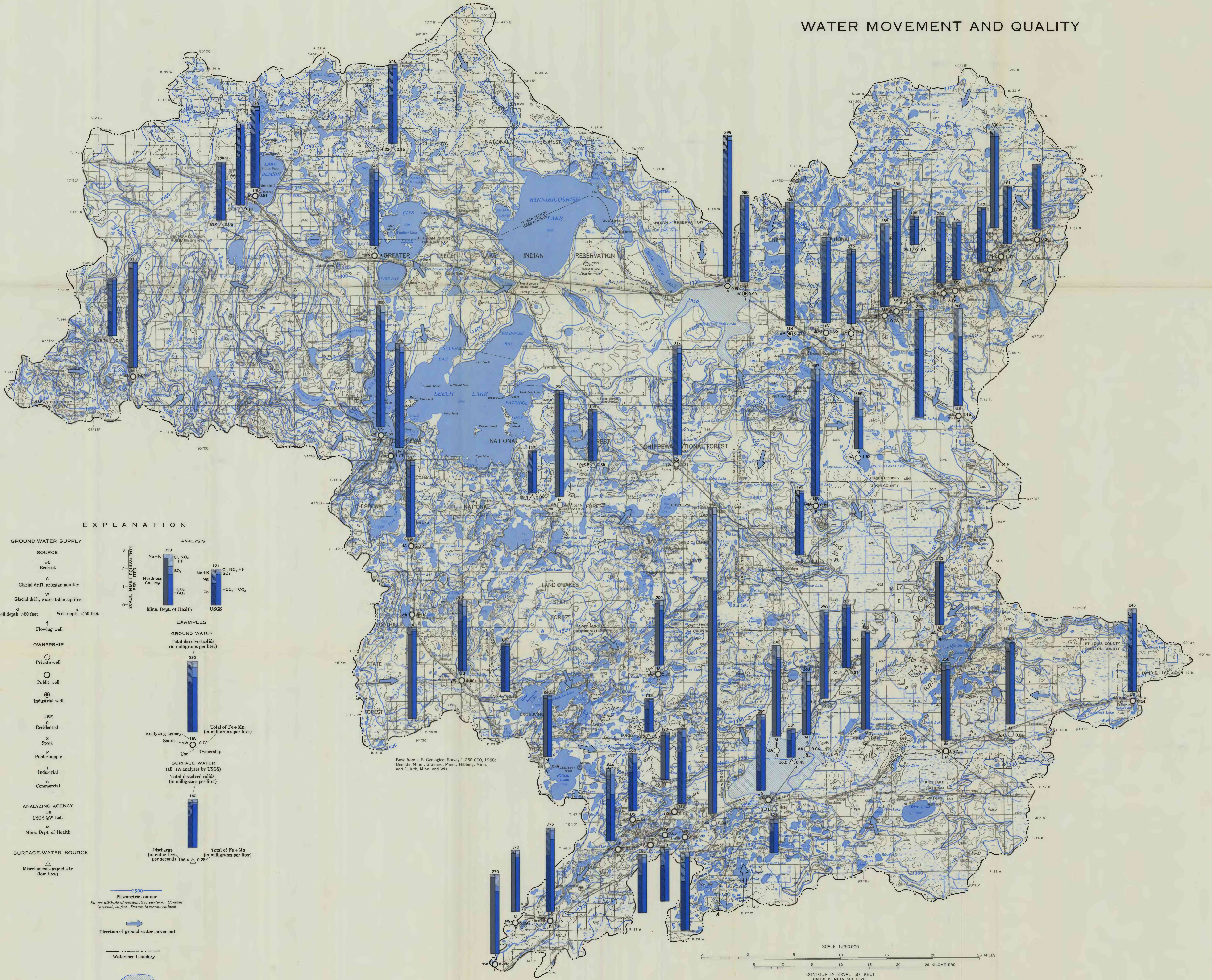
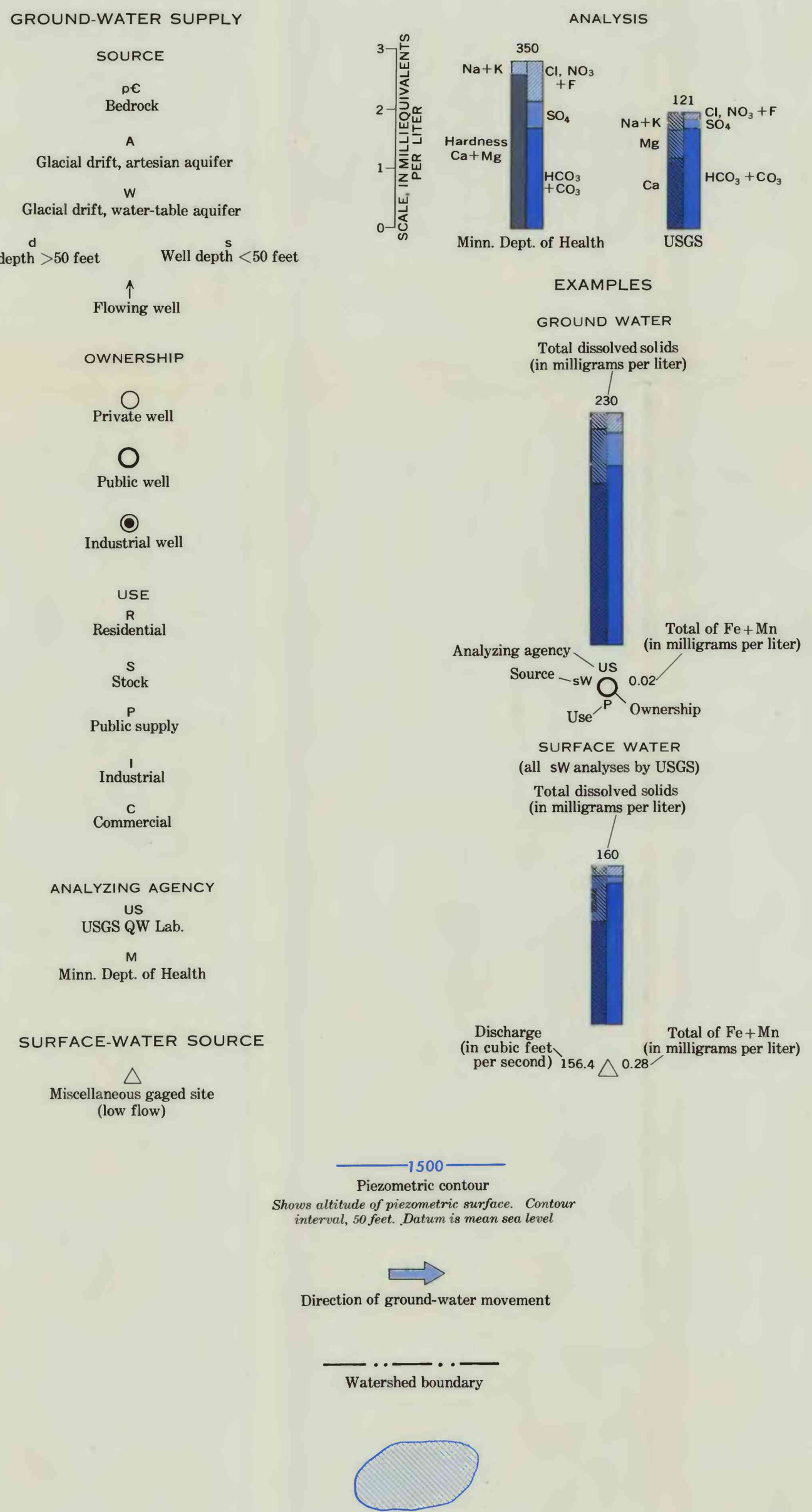


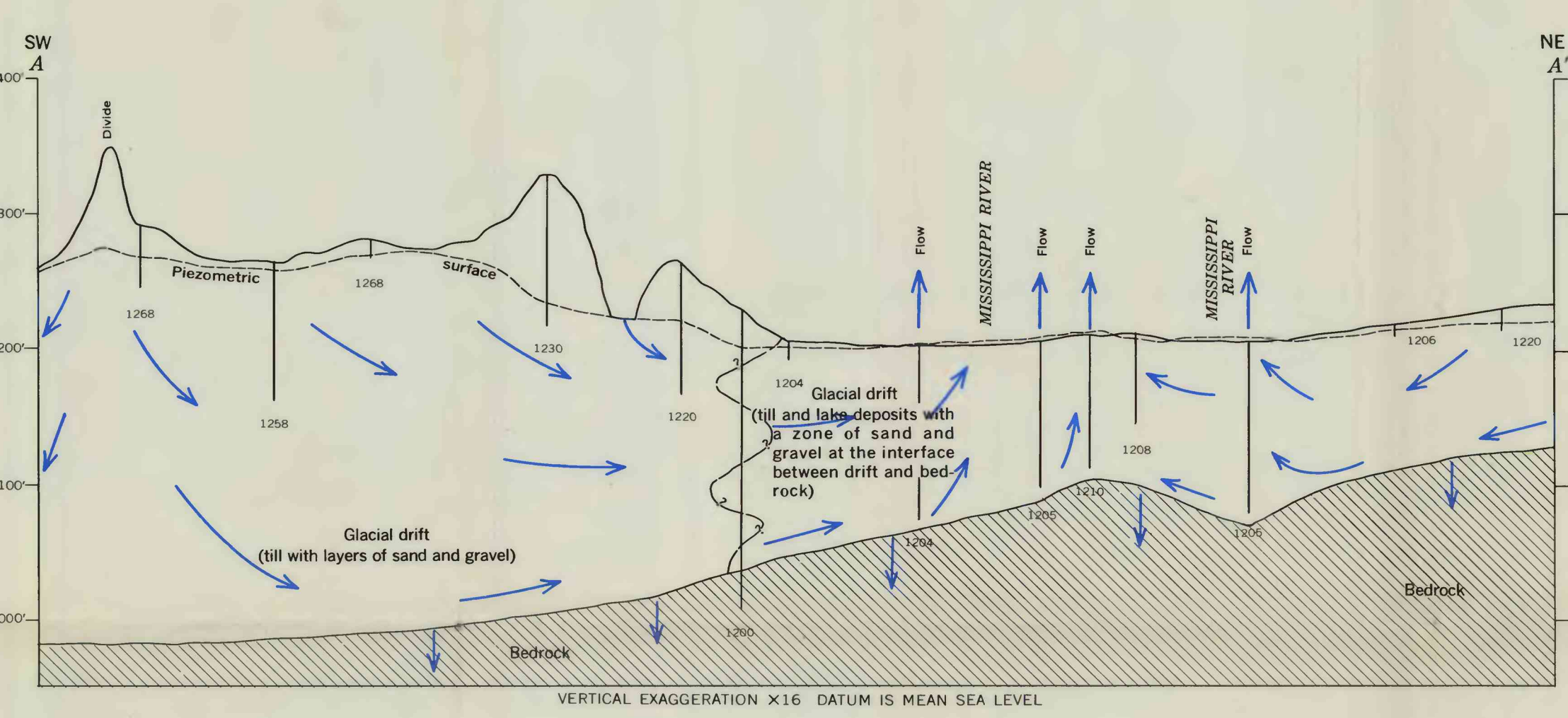
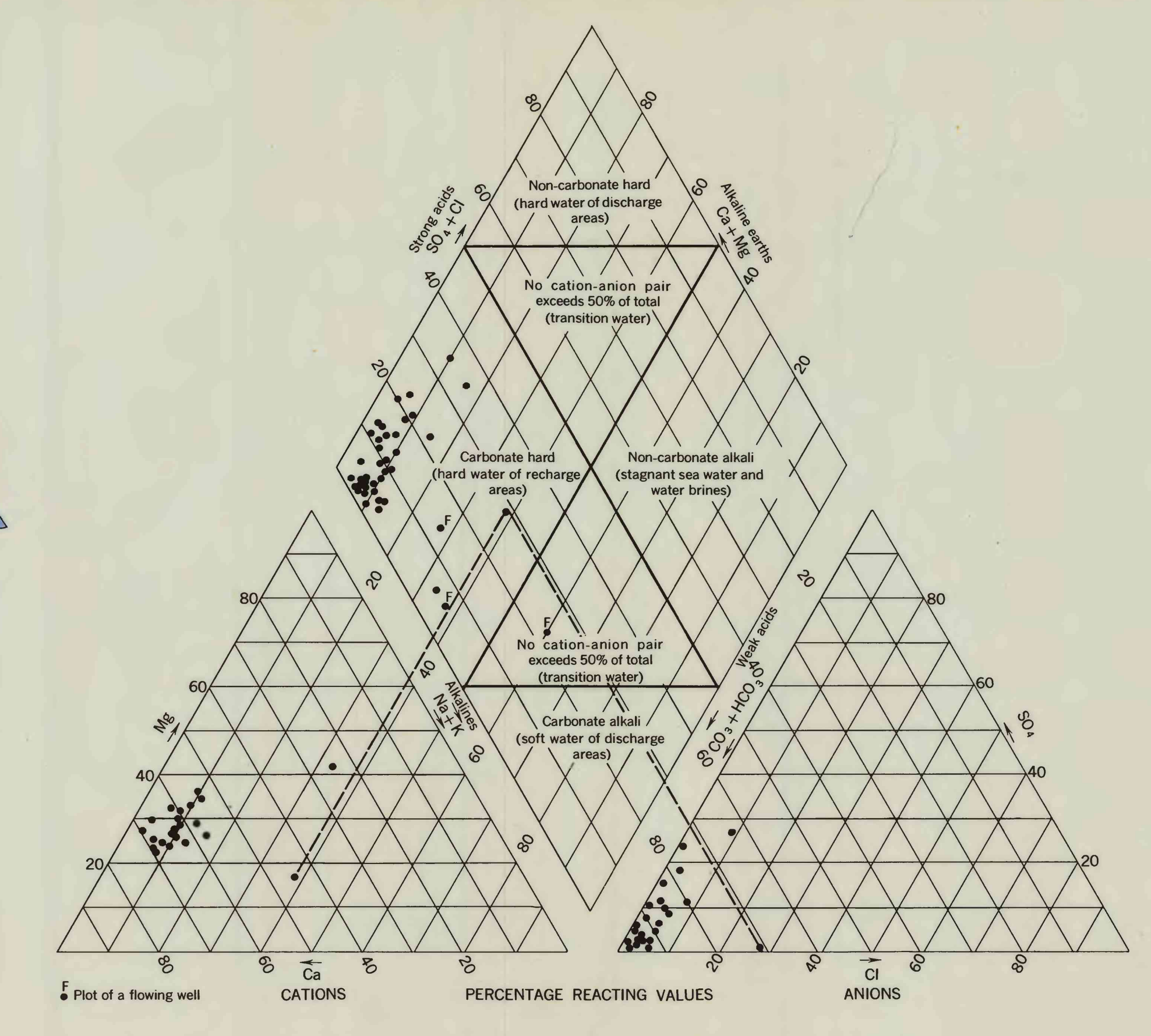
WATER MOVEMENT AND QUALITY



EXPLANATION



MOST GROUND-WATER MOVEMENT IS FROM AREAS OF LOCAL RECHARGE TOWARD LOCAL SURFACE WATER (LAKES AND STREAMS), AND THE QUALITY OF ALL WATER IS GENERALLY VERY SIMILAR. Regional movement, particularly of deeper water, is toward the Mississippi River. Lake levels and streamflow are maintained during periods of no precipitation by the continuing movement of ground water toward surface water bodies. In areas of coarse permeable material where gradients are moderate, ground-water inflow to a lake exceeds losses from the lake by evaporation. Significant diversion of ground water from its present position by pumping may result in substantial changes in the regimen of lakes and streams.



WATER MOVEMENT TOWARDS AN AREA OF ARTESIAN FLOW IS SHOWN ON SECTION. Movement is from recharge areas toward the Mississippi River. Figures plotted at well bottoms are the altitudes to which water will rise in a well finished at that depth. Artesian flow results from low surface topography in the discharge area combined with a rising bedrock surface under the area.

NEARLY ALL GROUND WATER IN THE WATERSHED IS CARBONATE-HARD WATER. The biplot ratio graph compares waters by relative proportions of constituents. Actual amounts of any constituent are not indicated. USGS analyses are plotted on each triangular cation and anion graph, then compared on the biplot graph. Minn. Dept. of Health analyses are plotted on the biplot graph only. Carbonate-hard water is characteristic of ground-water recharge areas where water moves from local recharge to local discharge. The widespread occurrence of carbonate-hard water in the watershed may indicate one or both of the following conditions: that rapid water movement occurs through highly permeable glacial drift; or that movement from recharge to discharge is through short distances. The surface water low-flow analyses have not been plotted on this graph. However, all of these are carbonate-hard water, which originated as ground-water contribution to streamflow.