

Historical Review of the International Water-Resources Program of the U.S. Geological Survey 1940-70

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the U.S. bilateral program to provide the services of a specialist in limestone geohydrology to evaluate the potential of the Cenomanian-Turonian aquifer of central Israel with respect to further development as well as for underground storage. Robert Schneider, USGS hydrogeologist, was assigned to the work between April and June 1962. During his stay and in concert with Israeli colleagues, Mr. Schneider studied available data on the geologic environment of the Upper Cretaceous Cenomanian-Turonian limestone aquifer, the development of permeability, the flow regime of the aquifer, the storage characteristics and sources of pumped water, the use of the aquifer for underground storage, and temperature distribution in the aquifer system. Based on his studies, Mr. Schneider recommended additional test drilling to define the boundaries of the aquifer, statistical evaluations of aquifer porosity, pumping tests, three-dimensional scale models for study of ground-water flow in parts of the aquifer system, and an electrical analog model of the entire system. The technical findings of Mr. Schneider were described in USGS Water-Supply Paper 1608-F.

Between 1962 and 1970, five USGS specialists in various aspects of hydrology visited Israel for short-term advisory assignments under technical-assistance programs of United Nations agencies. The scope and nature of these activities are described elsewhere in this report under "Multilateral Activities."

References

- Schneider, Robert, 1964a, Relation of temperature distribution to ground-water movement in carbonate rocks of central Israel: *Geol. Soc. America Bull.*, v. 75, no. 3, p. 209-216, 4 figs.
- 1964b, Cenomanian-Turonian aquifer of central Israel—its development and possible use as a storage reservoir: *U.S. Geol. Survey Water-Supply Paper 1608-F*, 20 p., 3 pls., 2 figs.
- 1967, Geologic and hydrologic factors related to artificial recharge of the carbonate-rock aquifer system of central Israel: *Internat. Assoc. Sci. Hydrol. Pub. no. 72*, Symposium Haifa, p. 37-45.

JAPAN

Japan, foremost modern industrial power in the Far East, occupies a 3,200-km arc of 4 principal and 400 smaller islands off the coast of East Asia. Although the U.S. has never provided formal technical assistance to Japan, the USGS furnished technical consultation on water-supply problems for installations of U.S. Forces in Japan on several occasions since World War II, including a general review of ground-water problems in Japan for the U.S. Forces.

Most of this work has not been recorded in available form. Where documentation exists, however, for the work of USGS hydrologists in Japan, it is described in the following paragraphs.

During January-March 1951, M. L. Brashears, USGS hydrogeologist, was assigned to evaluate ground-water problems for the General Headquarters, Supreme Commander for the Allied Powers, and to make general recommendations with respect to institutional needs for ground-water investigations in Japan. Mr. Brashears' report of May 1951 pointed out the high level of ground-water use for irrigation, industrial processing, public-water supply, and domestic use; the deleterious effects of over pumping in the Osaka, Nagoya, and Tokyo areas, resulting in reduced artesian flow, increased pumping lifts, salt-water encroachment and land subsidence; possibilities for artificial recharge of aquifers to check these problems and to recover wasted surface water; and the need for upgrading ground-water technology, surveillance, and management. He also outlined a broad program of investigations to achieve these objectives.

At the request of the U.S. Air Force, J. T. Callahan, USGS hydrogeologist, was assigned in October 1964 to make a brief evaluation of ground-water development problems at Misawa Air Base in Aomori Prefecture near the north end of Honshu Island. Mr. Callahan pointed out that the base lies in an artesian basin underlain by alluvial deposits of water-bearing sand and gravel separated by layers of clay and silt and that successful water wells have been drilled to depths of 200 to 400 m to the north, south, and west of the base. He concluded that construction of one or more production wells was feasible in the base area, but, because of the high vertical and lateral variability of the alluvial aquifers, "slim holes" should be put down at all proposed production well sites to determine the position and lithology of water-bearing zones for proper emplacement of casings and screens of production wells.

Reference

- Brashears, M. L., 1952, Ground-water situation in Japan: *U.S. Geol. Survey open-file rept.*, 40 p., 4 figs.

JORDAN

Jordan, centrally located among the Arab nations, sustained a steady economic growth for the 15 years prior to 1970. An important base for this growth has been U.S. economic aid, which aggregated more than \$£40 million during 1955-70. Moreover, this aid has emphasized water-resources development, notably