3. In our re-examination of some of the older field and stream observations, we have reached conclusions regarding numerical values of soil parameters that differ considerably from the conclusions reached by the original investigators. An important example of this is the range of values of the specific yield or storage coefficient of the subsoil of the northern plain. Mohammad and Beringer(3) cite previous soil sampling studies in West Pakistan and state that the specific yield of the aquifers of the Indus basin is about 0.1 or 10 percent. It is undoubtedly true that there are some regions, particularly in the southern plain, where the storage coefficient is as low as 10 percent. However, we have used larger values of 0.2 to 0.3 in this chapter in predicting the rate of drawdown by pumping from deep mining wells. In adopting these higher figures we concur with the conclusions of Jacob(4) who reanalyzed results from many observation wells and pumping tests in Rechna Doab and found that in previous analyses canal leakage had been overestimated and specific yield underestimated. Jacob's studies and our own conclusions were done with new theoretical models of unsteady flow in aquifers that were not available when the original investigations were made.(5) The reanalysis, furthermore, indicated that the hydraulic transmissivity of the deep subsoil of the northern plain is high compared to that in other regions such as the Imperial Valley in California.

Runoff and Reservoir Storage-Yield Relations

The estimates of canal diversion and river flows presented in the water budget do not have a high degree of precision for several reasons which are discussed below. It is difficult to predict average diversions that will be available with construction of dams on the rivers; it is even more difficult to quantify the annual variation in diversions that may be expected with augmented surface storage. Despite the difficulty, however, we have attempted to estimate "firm" diversions (canal-head flows that will be exceeded on the average during 80 percent to 90 percent of future years). It is important to do this in order to form a rational basis for decisions pertaining to large long-term investment in tubewells and other works for

(3)Review Article "Waterlogging and Salinity in West Pakistan" Pakistan Development Review, 3, No. 2 (1963).

(4)Jacob, C.E., "Supplement to A Review of Project Number One Salinity Control Program in West Pakistan" Tipton and Kalmbach, Inc. (June 1959).

(5)Ferris, J.G., D.B. Knowles, R.H. Brown, and R.W. Stallman. "Theory of Aquifer Tests" USGS Water Supply Paper 1536e (1962).