

of groundwater depth and of power consumption are all necessary to the long term development. The size and complexity of the project may ultimately justify the design of automatic equipment for recording and transmission of data to regional headquarters for automatic processing. However, this should not be a requirement in the beginning.

Supervisory staff and supporting personnel will be required. We estimate the number as 25. The figures are shown in Table 3.3 in the over-all estimate of personnel needed for each million-acre Project. The breakdown in Table 3.3 was made functionally to give the order of magnitude of personnel required, rather than in accordance with the organizational pattern outlined in Chapter 4, in which functions are combined in administratively practical units.

Fertilizer

Most of the soils in the irrigated areas of the Indus Plain have been cropped for many years without returning nutrients to the soil. Consequently, given an adequate amount of irrigation water, the addition of nitrogen and phosphorous to the soil can produce large increases in crop yields. Details of experiment station tests and field trials on farms are summarized in Chapter 2. Estimates of economic benefits from the use of chemical fertilizers are given in Chapter 5. Widespread use of chemical fertilizers, together with sufficient water and improved plant varieties, is essential to the establishment of modern agriculture in West Pakistan. Between 40 and 50 million pounds of nitrogen fertilizer will be needed for each million-acre project.

According to our estimates, it is economical to provide fertilizer plant capacity in West Pakistan, rather than to rely on imports. Furthermore, we believe it would be economically sound to locate plants producing the required amount of nitrogen for one to four million-acre projects in cities near the project areas. In this way, use of natural gas for power and as a source of raw material for nitrogen fertilizers could be combined with other projected uses of gas, while at the same time the intrinsically economic pipeline method of transportation could be fully utilized. Present plans call for an extension of the present main pipeline through the Former Punjab; this should give easy access to many of the projected million-acre areas.

In an emerging area such as West Pakistan, where large reserves of natural gas exist, economics of administration and maintenance can be secured by bulk shipment of raw material - in this case, gas. Once installed, a pipeline operates with a minimum of supervision, independent