

a half miles. The economics of tubewell spacing are discussed in Chapter 7. Local variations will occur depending on village location and diversion points from distributaries. Insofar as possible, the wells should also be developed as sources of safe water for use of the villagers. The operation of the tubewells will have to be planned and scheduled in each project area with particular reference to the agricultural development. Coordination with operation of the canal supply will be required. To a considerable extent, the tubewell water will be discharged into existing distributaries and minors, and nearly all of it will be carried in the same water courses as the canal water. If for no other reason, this will require continuous coordination with the agency responsible for the delivery of canal water.

At the present time, the responsibility for the surface supply system of barrages, canals, and irrigation outlets is in the Department of Irrigation. In addition, it assesses water charges. Tubewell construction is the responsibility of the Water and Power Development Authority (WAPDA). This duty is in addition to its over-all task of planning and developing the combined use of water and power resources in the Province.

We recommend that responsibility for operation and maintenance of the tubewells in those areas where drilling has already occurred be vested in the proposed authority for each project. The need for the most intimate association of planning and delivery of additional water with all the aspects of agricultural development precludes any other arrangement. An administrative breakdown between these two operations which caused failure in the delivery of the additional water on schedule would be intolerable. A year's effort could be wasted, with attendant collapse of morale of both staff and farmers. Furthermore, since many of the cultivators will have to borrow against projected increases in production, losses would be incurred which would either strain the limited resources of the farmers or require heavy subsidy payments by the Government.

The personnel required to operate and maintain the tubewells represents the largest single group in our estimates for the staff of each project area. Present experience with tubewells in Project No. 1 indicates that one operator per well is required. With 1,200 wells in a million-acre district, 1,200 operators would be needed. It is probable that, with experience and development of better automatic controls, the number of wells per operator can be increased to perhaps five. However, for the initial years, the one-to-one correspondence should be held. In later years, if it is possible to increase the efficiency of the operation, personnel can be transferred to new areas.

A detailed record of the operation of each well will be required. Flow measurements, salinity measurements, time log of operation, records