recharge will be smaller than in the non-saline area owing to the operational difficulties that will be encountered in skimming a relatively shallow layer of fresh water from a deep layer of saline ground water.

In addition to pumping to recover recharge, the aquifer in the saline area would be mined. This would be done for two reasons: (1) to lower the water table so as to decrease the hydraulic gradient in the direction of the non-saline area, thereby reducing the hazard of movement of salt into this area; and (2) to provide additional water which can be diluted with canal water and used in agriculture (in the mathematical analysis this quantity is called z). In (1) it is assumed that the rate of lowering of the ground water would be 50 percent of that in the non-saline area. In (2) it is assumed that to provide an adequate amount of canal water for dilution of saline tubewell effluent, a somewhat larger proportion of the total available canal flow should be routed to the saline area than would be supplied on the basis of the relative areas of the two zones. In the mathematical analysis the optimal degree of salinity of the mixture of canal and pumped water is calculated. Water mined in accordance with purpose (1) and not used in purpose (2) would be exported, for example, to salt lagoons.

A portion of the water pumped in the non-saline zone must be exported to prevent an excessive accumulation of salt. It is predicated that at the end of the first level of development this export-flow would be 3.5 maf/yr. During the first decade of development a substantially smaller export flow (0.5 to 1.5 maf/yr) would be needed. The rate of salt accumulation and the effect on downstream regions of exported saline water is examined in subsequent sections of this chapter.

In accordance with the foregoing assumptions the following calculations are made:

1. The total recharge of 20 maf/yr in the entire aquifer of 30 million acres (ma) is divided into two parts as follows: in the non-saline area, 15.3 maf/yr [(23/30)20 = 15.3] and in the saline area, 4.7 maf/yr [(7/30)20 = 4.7]. (See Figures 7.4 and 7.5).

2. Water from the distribution system applied to crops [B1 (c) and C] in proportion to relative areas amounts to the following: in the non-saline area, 18.6 maf/yr [(18.4/24)24.3 = 18.6] and in the saline area, 5.7 maf/yr [(5.6/24) 24.3 = 5.7].

3. The tubewell pumpage from the non-saline portion of the aquifer has the following components: