then the ultimate concentration will be 2000 milligrams per litre. If $Q_d/n \pi r_0^2 = 0.25$, $S = 0.25$ and $C_g = 750$ mg/l the salinity of the groundwater and the tubewell water at various times is given in Table VII for tubewell depths of 100 and 250 feet.

"Horizontal" versus "Vertical" Drainage

Any drainage system in an irrigated area must serve two purposes: *i)* removal of excess water and control of the elevation of the watertable; *ii)* removal of saline water to prevent accumulation of salt in the soil. These objectives can be accomplished in one of two ways: *i)* by pumping water from underground and carrying part of the pumped water away from the region in conveyance channels; or, *ii)* by allowing part of the irrigation water to percolate into a series of small ditches or porous tile pipes, which lead into larger "collector" and "main" drains. Such a "horizontal" system can be used to remove saline waters only if the watertable is sufficiently close to the surface to prevent a major part of the irrigation return flows from seeping out of the drains. The system is not effective for salinity control in a region where both ground and surface waters are being used for irrigation and the watertable is pumped down significantly below the bottom level of the drainage channels during part of the time. Wherever large numbers of tubewells, either public or private, are employed to supply part of the irrigation water, it will often be undesirable to keep the watertable high. Horizontal drainage structures will then have a limited usefulness, primarily to carry off flood waters. In regions of highly saline underground water, tubewells will not be employed to provide irrigation supplies, and either a horizontal system or a system of tubewells plus conveyance channels can be employed for drainage. Several factors should enter into the choice between these alternatives.

Horizontal drainage may be economical in certain regions of West Pakistan, particularly in parts of the Southern Zone, where conditions for vertical drainage are not satisfactory. In the Panel Report, however, we concluded that vertical drainage would be desirable in most areas of the Indus Plain.

The principal disadvantage of horizontal drainage is that it must operate with a relatively high watertable, and hence is incompatible with the use of tubewells to increase and stabilize the irrigation water supply. But other disadvantages must also be kept in mind.

1) A system of main drains and tile or open field drains is essentially a passive system. It is dependent upon gravity flow and once it is constructed it cannot easily be modified or revamped. The amount of water discharged through such a system depends upon the amount of water applied to the land it subtends, and the salt removed in drainage depends largely upon the salinity of the upper