

The mainstream of the Missouri River has now become an integrated reservoir system due to construction by the U.S. Government through its agent, the Corps of Engineers. Included in this system are a series of dams which are operated as a unit for flood control, irrigation, power generation, and navigation purposes. The releases from these reservoirs are adjusted to meet downstream use and power demands. The carrying capacity of the river has very little direct effect on the method of operation.

The serious problems in this reach of the river are being caused by the operations of the Garrison Dam. This is due primarily to two causes. First, the water is released from the Garrison Dam in a silt-free condition. This means that the water has a silt-carrying capacity of at least 2.2 percent of the weight of the water itself. It is endeavoring to obtain this capacity and in doing so, this removes silt from the riverbanks eventually carrying it into the Oahe Reservoir. This is different than the type of erosion Mother Nature caused on the river, as the entire river was silt laden and the waters made a corresponding deposit for every amount of degradation which occurred. With the increased silt-carrying capacity of the water, there is no give and take, only take.

Second, the sharp fluctuations in the releases, particularly under the ice cover during the winter months, causes an increase in the flow velocities. Likewise, during the ice-free periods, fluctuations cause the banks to be saturated and dried many times during a month. This condition can best be illustrated through the use of a chart.

The chart being used covers the releases made from Garrison Dam during the calendar year 1965. The vertical graph represents the releases in cubic feet per second. The horizontal depicts the period of time. The upper red line indicates the instantaneous high releases. These releases correspond with the peak power demand. For instance, during the winter months, the load increases when people return from work to their residences. Cooking and reading light power demands become high. The gates, at the dam, are actuated to meet the demand and the flow of water through the turbines are increased. This type of operation constitutes the irregularity in the red line.

The blue line represents the instantaneous low flows. The low releases occur when the power demand falls off which is usually after midnight. The gates are then regulated to reduce the flow. This type of operation saves water, but it is most difficult on soil. From the chart, it is apparent that flows varying from 16,000 to 36,000 cubic feet per second occur with considerable frequency during the winter months and variations from 8,000 to 37,000 cubic feet per second are not uncommon in a matter of a day or two in the summer months. Several years ago, the Corps of Engineers believed it was impossible to make releases in excess of 16,000 cubic feet per second during the ice cover period. However, they are now making releases equal to those made during the ice-free period.

The fluctuating levels have a sluicing effect on the banks. The silt and colloidal material which act as a binder to the more porous soil are removed through this action. This causes the soil structure to become unstable and it readily crumbles into the stream under high velocity. The Corps of Engineers, when requested by the State water commission to operate Garrison Dam at a level no greater than 16,000