

## SECTION 687 WATER SUPPLY FORECASTS AND WATER BUDGETS

### a. Section 687.3 Predictive yield of surface water where gaging records don't exist.

When it has been determined what amount of water is needed for irrigation, it is most important to determine if the water source will meet these needs. It is important that the yearly and daily needs both can be met.

Wells once dug can be pumped, and based on this flow a good long-term prediction of the yield can be made.

The most difficult forecasting of water supply is when it pertains to surface water. In Nebraska, dependable water supplies can be ranked in the following descending order:

- a. Runoff from sandhills streams that is stored
- b. Runoff from sandhills streams that is used directly from the stream
- c. Mountain snowmelt that is stored
- d. Mountain snowmelt that is used directly from a stream
- e. Hardland runoff that is stored
- f. Pumping directly from a stream that has a source of runoff that is hard land

When a storage facility is proposed as a water source, predictive criteria for water supply forecasting is contained in Engineering Standard 436 (Irrigation Storage Reservoir) and 552-A Irrigation Pit Reservoir.

The following is an example of the calculations that would be needed to determine the feasibility and size of an irrigation storage reservoir:

### Example Problem

A landowner in Furnas County wishes to build a dam across a dry stream and irrigate 80 acres. It has been determined from the irrigation guide that the owner will need 14" of net irrigation water. The efficiency of the field application is 70%, so 20" of water will have to be delivered to the field.

$$\frac{20''}{12} \times 80 \text{ Acres} = 133 \text{ Ac Ft} \quad \text{needs to be delivered to the field.}$$

The dam is to be built on a drainage of 3,000 acres with a complex number of 80.

An 80% chance yield is .25 in or 62.5 Ac Ft (From EFM, page NB 2-10.3). 50% chance yield is .65 in or 162.5 Ac Ft

There will be 3.0' of net evaporation from the pond (EFM NB 2-10.7).

The seepage will equal 2.0' per year - (experience). At the dam site, this will amount to 55 Ac Ft (from the storage table).

The net storage left from a 50% chance yield will be  $162.5 - 55 \text{ Ac Ft} = 107.5 \text{ Ac Ft}$  which isn't enough to satisfy the original needs.

Either a crop which takes less water or fewer acres can be irrigated are the two alternatives that must be considered if this dam site is to be used as a source of water.

If we are to depend on an annual allotment of 162.5 Ac Ft, 200% of this storage (from Engineering Standard 436) must be designed as permanent storage — 325 Ac Ft.