

TAILWATER REUSE SYSTEMS

This page is an excerpt from the NRCS, National Engineering Handbook, Section 15, Chapter 5, Furrow Irrigation (2nd Edition).

Tailwater recovery or recirculating facilities collect irrigation runoff and return it to the same or adjacent field for irrigation use. Such systems can be classified according to the method of handling runoff or tailwater. If the water is returned to a field lying at a higher elevation, it is usually referred to as a return-flow system; if the water is applied to a lower lying field, this is termed sequence use. The components consist of tailwater ditches to collect the runoff, drainageways or waterways to convey water to a central collection area, a sump or reservoir for water storage, a pump, a power unit, and a pipeline or ditch to convey water for redistribution. Under certain conditions where gravity flow can be used, neither pump nor pipeline may be necessary.

A return-flow system provides for the temporary storage of a given amount of water and includes the pumping equipment and pipeline needed to deliver the water back into the application system. The sequence system generally has a pump and only enough pipe to convey the water to the head ditch of the next field. The farm often can be planned so that there is enough elevation difference between fields to apply the runoff water to a lower field in sequence by gravity. Recovery systems can also be classified according to whether they accumulate and store runoff water. Systems storing collected runoff water are referred to as reservoir systems. Systems that immediately return the runoff water require little storage capacity. They have

automatically cycled pumping systems and are called cycling-sump systems. One or more types of systems may be applicable to a given farm. A sump is used where land value is high, water cannot be retained in a reservoir, or water ponding is undesirable. Dugouts or reservoirs are more common and are easily adapted to storage and planned recovery of irrigation tailwater.

A reservoir system collects enough water to be used as an independent supply or as a supplement to the original supply. The reservoir size depends on whether collected water is

handled as an independent supply and, if not, on the rate water is pumped for reuse. A smaller reservoir is required if the system is used for cutback irrigation. Reservoirs should be at least 8.0 and preferably 10 feet deep to discourage growth of aquatic weeds. Side slopes should be 2 or 2.5 feet horizontal for each 1 foot vertical to prevent sloughing of the banks. Where dugouts may be a safety hazard, one end slope should be 5 to 1 or less to provide a way of escape in case of accidents. The reservoir should provide for an unused storage depth of at least 1.0 foot.

The cycling-sump system consists of a sump and a pump large enough to handle the expected rate of runoff that enters the sump. The sump is generally a vertical concrete or steel tube with a concrete bottom. The tube is approximately 48 inches in diameter and installed to a depth of approximately 10 feet. Pump operation is controlled automatically by a float-operated or electrode-operated switch. Some storage can be provided in the collecting ditch.

The size, capacity, location, and selection of equipment for these systems are functions of the main irrigation system, the topographic layout of the field or fields, and the farmer's

irrigation practice and desires (see figure below).

If a sump is used, the pump should be capable of pumping 40 percent of the initial water supply. This system has the disadvantage that water is applied intermittently, making efficient application rather difficult.

When a dugout is used, it should have the capacity to store the tailwater from a complete irrigation set. The pump capacity depends on the method or schedule of reuse planned. The pump can be designed to empty the storage in approximately one-fourth to one-third the desired application time and, in this way, provide a cutback operation, or it can be designed for continuous operation after the first set is completed with additional furrows watered after the first set.

Plan for a Return-Flow System Used in Conjunction With an Underground Pipeline Distribution

