

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**IRRIGATION SYSTEM, TAILWATER RECOVERY**

(No.)

**CODE 447**

**DEFINITION**

A planned irrigation system in which all facilities utilized for the collection, storage, and transportation of irrigation tailwater and/or rainfall runoff for reuse have been installed.

**PURPOSE**

This practice may be applied as part of a conservation management system to support one or more of the following:

- Conserve irrigation water supplies
- Improve offsite water quality

**CONDITIONS WHERE PRACTICE APPLIES**

Tailwater recovery systems are suitable for use on lands that are served by a properly designed and installed irrigation system where recoverable irrigation runoff and/or rainfall runoff flows can be anticipated under current or expected management practices.

This standard applies to the planning and functional design of irrigation tailwater recovery systems including, but not limited to, pickup ditches, sumps, collecting basins, pumping plants and pipelines. It does not apply to detailed design criteria or construction specifications for individual structures or components of the recovery system.

**CRITERIA**

**General Criteria Applicable To All Purposes**

The installation and operation of a tailwater recovery system shall comply with all federal, state and local laws, rules and regulations.

Appropriate NRCS standards and specifications shall be used in the design and construction of facilities needed for a tailwater recovery system. The criteria for the design of components not addressed in a NRCS practice standard shall be consistent with sound engineering principles.

**Collection Facilities.** Facilities for the collection of irrigation tailwater can be an integral part of irrigation systems covered by NRCS Conservation Practice Standards (443)- Surface and Subsurface Irrigation Systems and (442)- Sprinkler Irrigation Systems. These facilities may include, but are not limited to, ditches, culverts, pipelines, water control and/or grade stabilization structures or other erosion control measures, as needed.

**Storage Facilities.** Facilities are needed to store the collected water until it is redistributed in the irrigation system. Runoff volume and rate, as well as the required level of water control at the point where the tailwater is returned to the irrigation system, should be considered in determining the size of the storage facility.

For systems where tailwater is discharged into a collecting basin or regulating reservoir or into a pipeline having facilities for regulating fluctuating flows (i.e. a float valve), small sumps with frequently cycling pumping plants may be used. For systems unable to regulate flows, tailwater sumps or collection basins shall be made large enough to provide the regulation needed to permit efficient use of the water.

When energy sources for tailwater pump back systems are subject to interruption, safe emergency bypass areas cannot be provided, or tailwater discharges violate local or state regulations, tailwater storage requirements

shall, as a minimum, include a volume adequate to store the complete runoff from a single irrigation set.

Sumps and collecting basins shall be equipped with inlets designed to protect the side slopes and the collection facilities from erosion. A dike, ditch, or water control structure shall be provided, if required by state law, to limit the entrance of rainfall runoff into the designed inlet. Sediment traps shall be installed as needed or the design storage volume increased to accommodate expected sediment load between cleanouts.

Above ground earthen embankments on ponds planned to retain uncontrolled storm runoff shall be designed following appropriate criteria in 378 Ponds.

**Conveyance Facilities.** All tailwater recovery systems require facilities to convey water from the storage facility to a point of entry back into the irrigation system. These facilities may consist of a pumping plant and pipeline to return the water to the upper end of the field, or a gravity outlet having a ditch or pipeline to convey the water to a lower elevation in the irrigation system. Other components or combinations of components may be necessary as determined on a site-specific basis.

The capacity of conveyance facilities shall be determined by an analysis of the expected runoff rate, the planned irrigation collecting basin or regulating reservoir storage capacity, and the anticipated irrigation application. If the return flow is used as an independent irrigation supply rather than as a supplement to the primary irrigation water supply, the rate and volume of flow must be adequate for the method(s) of water application employed.

#### **Additional Criteria Applicable To Improving Water Quality**

**Storage Facilities.** Where additional storage is required to provide adequate retention time for the breakdown of chemicals in the runoff waters, storage facilities shall be sized accordingly. Allowable retention times shall be site specific to the particular chemical used.

Seepage from a storage facility shall be controlled to the extent possible when the

storage facility is expected to receive chemical-laden waters. Control may be in the form of natural soil liners, soil additives, commercial liners, or other approved methods.

Where additional storage is required to provide for sediment deposition, storage facilities shall be sized accordingly. Allowable retention times shall be site specific to the particular soil type(s).

### **CONSIDERATIONS**

#### **Water Quantity**

- Irrigation systems should be designed to limit tailwater volumes to that needed for effective operation. This reduces the need or minimizes the size and capacity of collection, storage, and transportation facilities.

Where tailwater recovery systems are used to collect rainfall runoff for storage and use as an irrigation water source, the size and capacity of collection and storage facilities will be sized according to expected runoff volumes and rates as well as the expected crop water needs.

- Changes in irrigation water management activities may be necessary to optimize the use of return flows.
- Downstream flows or aquifer recharge volumes dependent on runoff will be reduced and could cause undesirable environmental, social, or economic effects.

#### **Water Quality**

- Effects on surface and groundwater quality by the movement of sediment and soluble and sediment-attached substances should be considered. Chemical-laden water can create a potential hazard to wildlife, especially waterfowl that are drawn to ponded water.
- Nutrient and pest management measures should be planned to limit chemical-laden tailwater as much as practical.
- Protection of system components from storm events and excessive sedimentation should be considered.

### **Cultural Resources**

NRCS policy is to avoid any effect to cultural resources and protect them in their original location. Determine if installation of this practice or associated practices in the plan could have an effect on cultural resources. The National Historic Preservation Act may require consultation with the California State Historic Preservation Officer.

<http://www.nrcs.usda.gov/technical/cultural.html> is the primary website for cultural resources information. The California Environmental Handbook and the California Environmental Assessment Worksheet also provide guidance on how the NRCS must account for cultural resources. The e-Field Office Technical Guide, Section II contains general information, with Web sites for additional information.

Document any specific considerations for cultural resources in the design docket and the Practice Requirements worksheet.

### **Endangered Species**

If during the Environmental Assessment NRCS determines that installation of this practice, along with any others proposed, will have an effect on any federal or state listed Rare, Threatened or Endangered species or their habitat, NRCS will advise the client of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the client selects one of the alternative conservation treatments for installation; or with concurrence of the client, NRCS initiates consultations concerning the listed species with the U.S. Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game.

### **PLANS AND SPECIFICATIONS**

Plans and specifications for installing this practice shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

### **OPERATION AND MAINTENANCE**

An operation and maintenance (O&M) plan shall be developed for irrigation ditch and canal linings. The plan should document needed actions to ensure that practices perform adequately throughout their expected life.

O&M requirements shall be determined as part of the design. Any requirements should be documented as brief statements in the plans, the specifications, or the conservation plan narrative, or as a separate O&M plan. Typical O&M may include sediment/debris removal, patching of cracked concrete, and replacement of deteriorated linings.