

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 for reuse has been installed.

PURPOSES

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 and facilities that are served by a properly designed and installed irrigation system where recoverable irrigation 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, pits, 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.

Facilities needed for a tailwater recovery system shall be designed and constructed according to appropriate NRCS standards and specifications. 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 and 442-Sprinkler. 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 an irrigation pit 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 pits 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 pits 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.

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 pit 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

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. Changes in irrigation water management activities will be necessary to accommodate return flows.

Nutrient and pest management measures should be planned to limit chemical-laden tailwater as much as practical. Chemical-laden water can create a

potential hazard to wildlife, especially waterfowl that are drawn to ponded water.

Protection of system components from storm events and excessive sedimentation should be considered.

Downstream flows or aquifer recharge volumes dependent on runoff will be reduced. Existing wetland hydrology could be impacted by this practice.

This practice may adversely affect cultural resources and must comply with GM 420, Part 401 during planning, installation, and maintenance.

Cultural Resources Considerations

NRCS' objective is to avoid any effect to cultural resources and protect them in their original location. Determine if installation of this practice will have any effect on any cultural resources.

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

GM 420, Part 401, the California Environmental Handbook and the California Environmental Assessment Worksheet provide guidance on how the NRCS must account for cultural resources. The Field Office Technical Guide, Section II contains general information, with Web sites for additional information.

Endangered Species Considerations

Determine if 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' objective is to benefit these species and others of concern, or at least not have any adverse effect on a listed species. If the Environmental Evaluation indicates that the action may adversely affect a listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user 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 landowner selects one of the alternative conservation treatments for installation; or at the request of the landowners, NRCS may initiate consultation with the U.S. Fish and Wildlife Service, National Marine

Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Water Quantity

1. Effects on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, and deep percolation, and ground water recharge;
2. Effects on downstream flows or aquifers that would affect other water uses or users;
3. Effects on the volume of downstream flow that could cause undesirable environmental, social, or economic effects;
4. Potential use of irrigation water management.

Water Quality

1. Effects on the movement of sediment and soluble and sediment-attached substance on downstream water carried by runoff;
2. Effects of nutrients and pesticides on surface and ground water quality;
3. Effects on the movement of dissolved substances to ground water;
4. Effects on wetlands or water-related wildlife habitats;
5. Effects on the visual quality of water resources.

PLANS AND SPECIFICATIONS

Plans and specifications for irrigation tailwater recovery systems shall be prepared for specific field sites in accordance with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

An Operation and Maintenance plan specific to the facilities installed shall be prepared for use by the

landowner or operator responsible for operation and maintenance. The plan should provide specific instructions for operating and maintaining facilities to ensure they function properly. The plan shall include provisions to address the following, as a minimum:

- Periodic cleaning and re-grading of collection facilities to maintain proper flow lines and functionality;
- Periodic checks and removal of debris as necessary from trash racks and structures to assure proper operation;
- Periodic removal of sediment from traps and/or storage facilities to maintain design capacity and efficiency;
- Inspection or testing of all pipeline and pumping plant components and appurtenances, as applicable;
- Routine maintenance of all mechanical components in accordance with the manufacturer's recommendations.