

NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD

**IRRIGATION WATER MANAGEMENT**

(Acre)  
CODE 449

**DEFINITION**

Irrigation water management is the process of determining and controlling the volume, frequency, and application rate of irrigation water in a planned, efficient manner.

**PURPOSE**

Irrigation water management is applied as part of a conservation management system to support one or more of the following:

- Manage soil moisture to promote desired crop response
- Optimize use of available water supplies
- Minimize irrigation induced soil erosion
- Decrease non-point source pollution of surface and groundwater resources
- Manage salts in the crop root zone
- Manage air, soil, or plant micro-climate.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice is applicable to all irrigated lands.

An irrigation system adapted for site conditions (soil, slope, crop grown, climate, water quantity and quality, etc.) must be available and capable of applying water to meet the intended purpose(s).

**CRITERIA**

**General Criteria Applicable To All Purposes**

All work shall comply with Federal, State, and local laws and regulations. Water shall not be applied in excess of the needs to meet the intended purpose.

**Irrigator Skills and capabilities**

The irrigator and/or decision-maker shall have the knowledge and capability to manage and apply irrigation water in such a manner that the purposes can be reasonably achieved.

Proper irrigation scheduling, in both timing and amount, control of runoff, and the uniform application of water are of primary concern. The knowledge and capabilities required for efficient water management shall include:

**A. General**

1. How to determine when irrigation water should be applied, based on the rate of water used by crops and on the stages of plant growth and/or soil moisture monitoring.
2. How to measure or estimate the amount of water required for each irrigation, including the leaching needs.
3. How to recognize and control erosion caused by irrigation.
4. How to estimate the uniformity of water application.
5. The capability to measure the amount of water

applied.

6. How to perform system maintenance to assure efficient operation.
7. How to determine "where the water goes" after entering the soil surface considering surface and subsurface wetting patterns and soil available water holding capacity.
8. How to manage salinity and shallow water tables through water management.
9. The capability to control the irrigation delivery.

### **B. Surface Systems**

1. The relationship between advance rate, time of opportunity, intake rate, and other characteristics on distribution uniformity and the amount of water infiltrated.
2. How to estimate and control the amount of irrigation runoff.
3. How to adjust stream size, or irrigation time to compensate for seasonal changes in intake rate and the amount of water to be applied.

### **C. Pressurized Systems**

1. How to adjust the application rate and duration to apply the required amount of water.
2. How to recognize and remedy runoff problems.
3. How to identify and improve uniformity of water application.

### **System Performance**

The irrigation system must be capable of applying water uniformly and provide the irrigator with adequate control over water application. The uniformity shall be that which is economically achievable for a given irrigation method and area.

### **Additional Criteria to Manage Soil Moisture to Promote desired Crop Response**

The following principles shall be applied for various crop growth stages:

- The volume of water needed for each irrigation shall be based on plant available water holding capacity of the soil for the crop rooting depth, management allowed soil water depletion, irrigation efficiency, and water table contribution.
- The irrigation frequency shall be based on the volume of irrigation water needed and/or available, the rate of crop evapotranspiration, and effective precipitation.
- The application rate shall be based on the volume of water to be applied, the frequency of irrigation applications, soil infiltration and permeability characteristics, and the capacity of the irrigation system.

### **Additional Criteria To Optimize Use Of Water Supplies**

Limited irrigation water supplies shall be managed to meet critical crop growth stages.

### **Additional Criteria to Minimize Irrigation Induced Soil Erosion**

Application rates shall be consistent with local field conditions for long term productivity of the soil.

**Additional Criteria to Decrease Non-Point Source Pollution of Surface and Groundwater Resources**

Water application shall be at rates that minimize transport of sediment, nutrients, and chemicals to surface waters and that minimize transport of nutrients and chemicals to groundwater.

**Additional Criteria to Manage Salts in the Crop Root Zone**

The irrigation application volume shall be increased by the amount required to maintain an appropriate salt balance in the soil profile.

The requirement shall be based on the leaching procedure contained in the National Engineering Handbook (NEH) Part 623, Chapter 2.

**Additional Criteria to Manage Air, Soil, or Plant Micro-Climate**

The irrigation system shall have the capacity to apply the required rate of water for cold or heat protection as determined by the methodology contained in NEH Part 623, Chapter 2.

**CONSIDERATIONS**

The following items should be considered when planning irrigation water management:

- Consideration should be given to managing precipitation effectiveness, crop residues, and reducing system losses.
- Modify plant populations, crop and variety selection, and irrigated acres to match available or anticipated water supplies.
- Consider potential for spray drift and odors when applying agricultural and municipal wastewater.
- Equipment modifications and/or soil amendments such as polyacrylamides and mulches should be considered to decrease erosion.
- Consider the quality of water and the potential impact to crop quality and plant development.
- Quality of irrigation water should be considered relative to its potential effect on the soil's physical and chemical properties, such as soil crusting, pH, permeability, salinity, and structure.
- Avoid traffic on wet soils to minimize soil compaction.
- Consider the effects that irrigation water has on wetlands, water related wildlife habitats, riparian areas, cultural resources, and recreation opportunities.
- Management of nutrients and pesticides.
- Schedule salt leaching events to coincide with low residual soil nutrients and pesticides.
- Water should be managed in such a manner as to not drift or come in direct contact with surrounding electrical lines, supplies, devices, controls, or components that would cause shorts in the same or the creation of an electrical safety hazard to humans or animals.
- Consideration should be given to electrical load control/interruptible power schedules, repair and maintenance downtime, and harvest downtime.

- Consider improving the irrigation system to increase distribution uniformity of irrigation water application.

### **ENDANGERED SPECIES CONSIDERATIONS**

Determine if installation of this practice with any others proposed will have any effect on any federal or state listed Rare, Threatened or Endangered species or their habitat. NRCS's 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 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 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.

### **PLANS AND SPECIFICATIONS**

Application of this standard may include job sheets or similar documents that specify the applicable requirements, system operations, and components necessary for applying and maintaining the practice to achieve its intended purpose(s).

### **OPERATION AND MAINTENANCE**

There are no operation and maintenance (O&M) aspects applicable to this standard. Necessary O&M items are addressed in the physical component standards considered companions to this standard.