

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**IRRIGATION WATER MANAGEMENT**

(ac.)  
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 microclimate.

**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**

**Laws and regulations.** This practice must conform to all federal, state, and local laws and regulations. Laws and regulations of particular concern include those involving environmental protection, wetlands, Waters of the US, land use, pollution control, property easements, preservation of cultural resources, and endangered species.

Polluted liquids may not be discharged to Waters of the US at any time during start-up, operation, and shut down.

**General.** Water shall not be applied in excess of the amounts needed to meet the intended purpose.

**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 to be applied 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.

Irrigation frequency shall be based on the volume of irrigation water to be applied and/or available, crop evapotranspiration, and effective precipitation.

The application rate shall be based on the volume of water to be applied, the frequency of scheduled irrigation applications, soil infiltration and permeability characteristics, and the capacity of the irrigation system.

Appropriate field adjustments shall be made for seasonal variation and field variability.

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

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

If water supplies are insufficient to meet critical crop growth stage needs, modify plant populations, crop and variety selection, and/or irrigated acres to match available water supplies.

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

Application rates shall be consistent with field slopes, length of run, soil textures, and residue management for long term soil productivity. Irrigation induced soil erosion shall be addressed by equipment modifications and/or management changes such as reduced application rates, or use of mulches or polyacrylamides.

Conservation practice standards are reviewed periodically and updated if needed. The current version of this standard is posted on our web site at [www.sd.nrcs.usda.gov](http://www.sd.nrcs.usda.gov) or may be obtained at your local Natural Resources Conservation Service.

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

Irrigation water shall be applied at rates that minimize detachment of soil particles and 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**

Adequate leaching or drainage is required to accomplish this purpose.

The concentration and distribution of soil salinity within the crop root zone shall be evaluated.

Crops with threshold salinity values that meet the producer's goal and yield expectations shall be selected. Decisions shall be based on the average root zone salinity and water quality variations expected during the growing season.

Increase the irrigation application volume by the amount required to maintain an appropriate salt balance in the soil profile (leaching requirement).

The leaching requirement shall be determined using 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 amount of water at the desired rate for frost protection or crop and soil cooling 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.

Consider potential for spray drift and odors when applying agricultural and municipal wastewaters.

Consider the effect of the irrigation water quality on the soil's physical and chemical properties, such as soil crusting, pH, permeability, salinity, and structure.

Minimize traffic on wet soils.

Consider the quality of water and the potential impact to crop quality and plant development.

Consider the effects on wetlands, wildlife habitats, riparian areas, cultural resources, recreation, and downstream water users.

Consider nutrient and pest management.

Consider scheduling leaching events to coincide with low soil nutrients and pesticides.

Consider improving nutrient management by use of irrigation water to apply nutrients closer to crop uptake (e.g. chemigation).

Water should not drift or come in direct contact with surrounding electrical lines, supplies, devices, controls, or components where an electrical short or other hazard could be created. Irrigation systems must not create 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 water distribution uniformity.

## **PLANS AND SPECIFICATIONS**

Provide documents that specify system operations, irrigation scheduling, monitoring, record keeping, and other components necessary for application and maintenance of this practice to achieve its intended purpose(s).

## **OPERATION AND MAINTENANCE (O&M)**

Necessary O&M items are addressed in the physical component standards of this standard.

## **REFERENCES**

National Engineering Handbook, Part 652, Irrigation Guide

National Engineering Handbooks, Part 623, Section 15, Chapter 1-7 and 12

National Engineering Handbooks, Part 634, Section 15, Chapters 8 and 11

Water Measurement Manual - US Department of the Interior, Bureau of Reclamation