

**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 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 on sub-irrigated sites.
- The 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.

When water supplies are estimated to be insufficient to meet the critical crop growth stage, modify plant populations, crop and variety selection, and/or irrigated acres to match available or anticipated 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. Application rates of irrigation water should meet the general criteria as specified in the National Engineering Handbook, Part 652, Irrigation Guide for the given application method.

If these rates are exceeded equipment and irrigation system modifications, and/or soil amendments such as polyacrylamides and mulches shall be used to decrease irrigation induced erosion.

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

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 will meet the producers' goal and yield expectations shall be selected. Decisions shall be based on the average existing root zone salinity expected to occur during the growing season and water quality variations throughout 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 for salinity control 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 waste waters.
- 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.
- Minimize traffic on wet soils to decrease the possible adverse effects from soil compaction.
- Consider the effects that irrigation water has on wetlands, water related wildlife habitats, riparian areas, cultural resources, recreation opportunities and downstream water users.
- Consider implementing other practices such as nutrient and pest management.
- Consider applying nutrients with irrigation water closer to crop uptake to improve nutrient management (e.g. chemigation).
- Consider scheduling 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.

PLANS AND SPECIFICATIONS

Application of this standard may include job sheets or similar documents that specify the applicable requirements, system operations, irrigation scheduling, monitoring, record keeping and other components necessary for implementing 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.

REFERENCES

The following references may provide useful guidance and information in the development and application of irrigation water management principles:

National Engineer Handbook, Part 652, Irrigation Guide

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

National Engineering Handbooks, Part 634, Section 15, Chapter 8, 11.

Water Measurement Manual - U.S. Department of the Interior, Bureau of Reclamation.