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.

PURPOSES

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

- 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 ground water 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 water quality, etc.) must be available and capable of applying water to meet the intended purposes.

CRITERIA

General Criteria Applicable to All Purposes

This practice shall conform to all federal, state, and local laws, rules, and regulations. Laws, rules, and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

Chapter 9 of National Engineering Handbook (NEH) Part 652, Irrigation Guide, should be used as a basis for irrigation water management. System evaluations should likewise be governed by the principles set forth in the guide.

The criteria computed and recorded on the irrigation development plan should be used as a guide in determining how the irrigation system should be operated (assuming some small adjustments) so as to attain a high level of irrigation water management.

Additional Criteria

Managing 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.

Optimizing 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.

Minimizing 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 Chapter 6 of NEH 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.

Decreasing non-point source pollution of surface and ground water 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 ground water.

Managing 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 producer’s 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 Chapter 13 of NEH Part 652, Irrigation Guide.

Managing air, soil, or plant microclimate. 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 Chapter 2 of NEH Part 623, Irrigation.

CONSIDERATIONS

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 potential for overspray from end guns onto public roads.

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 (for example 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 purposes.

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.