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.
- ***Chemigation***

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. ***Plans to utilize water resources may need to be approved or permitted by the appropriate Conservation District or state agency.***

Irrigation water management requires that the irrigator has the knowledge and capability to manage irrigation water resources in such a manner that the plant is able to make optimum use of the water. The irrigator shall apply the following steps in the irrigation of crops:

1. ***Determine when irrigation water should be applied, based on the available soil moisture holding capacity, soil moisture measurements, and the rate of water used by crops during all stages of plant growth and crop response.***
2. ***Measure or estimate the amount of water required for each irrigation, including leaching needs.***
3. ***Determine stream size or application rate and adjust irrigation time as needed to compensate for changes in such factors as intake rate or the amount of water to be applied.***

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact the Natural Resource Conservation Service.

***Note: Bold italics indicate information added or changes made in the National Conservation Practice Standard by WV*.**

NRCS, NHCP **NRCS, WV**

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4. ***Recognize erosion caused by bedding and irrigation and address as necessary.***
5. ***Estimate the amount of irrigation runoff from an area.***
6. ***Evaluate the uniformity of water application.***
7. ***Evaluate climatic data.***

The determination that irrigation water management is being practiced shall be determined by evaluating the irrigator's knowledge and use of the principles of irrigation water management as described above. Irrigation water management shall be documented in writing and as outlined in the attached worksheet.

Guidance for determining irrigation water requirements is contained in the 210-VI-National Engineering Handbook (NEH) 623.02 Irrigation Water Requirements and WV Guide for Sprinkler Irrigation.

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.

On soils that are susceptible to irrigation induced erosion, the irrigation system should be operated so that the application rate is less than the basic soil infiltration rate (found in the county Soil Survey).

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.

The potential for nutrient losses is high if excess irrigation water is applied. Nutrients should not be applied when rainfall is imminent.

The amount of nutrients to be applied must be determined according to the production level of the crop, the soil nutrient status, and the plant nutrient status. The scheduling of nutrient application should coincide with the irrigation cycle in a manner that will not leach nutrients below the root zone.

A nutrient management plan shall be followed in the timing and rate of nutrient application. Net irrigation application should not exceed the available water holding capacity of the soil within the root zone.

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.

The irrigation system must be capable of uniformly applying the required rate of water application based on the anticipated minimum temperature, maximum wind speed, maximum slope, maximum length, and relative humidity.

CONSIDERATIONS

Irrigation water management may affect the water budget, especially volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation and ground water recharge because of an increased amount of water stored in the root zone for plant use.

Irrigation can influence runoff and ground water percolation by raising the soil moisture and decreasing the available soil water storage capacity, thus increasing the amount of runoff or percolation, below the root zone from storm events.

Irrigation water use may affect downstream flows or aquifers and the amount of water available for other water uses.

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 waste waters.
- 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.

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.

The amount of water needed for each irrigation cycle shall be determined prior to application of irrigation water.

The timing or scheduling of irrigation shall meet the criteria for the purpose of the irrigation applications.

Water shall be applied at a rate and in such a manner that it will not cause excessive soil erosion or undesirable water loss.

The irrigation shall be performed in a manner that will attain the maximum field irrigation efficiency for the soil, slope crop and method of irrigation.