USDA-NRCS
Proficiency Areas and Performance Objectives for Irrigation Water Management
for
Certified Crop Advisers (CCAs)
Certified Professional Agronomists (CPAg)
Certified Professional Soil Scientist (CPSS)
Who Want To Be
Technical Service Providers (TSP)
for
USDA-NRCS

Note: You must show your certification card.
NRCS will verify your certification status

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INTRODUCTION

Providing clear guidance to Technical Service Providers (TSP's) for their role in protecting natural resources is one duty of the Natural Resources Conservation Service. The TSP's provide vital service to the producer, and must be competent in all phases of Irrigation Water Management. Because there are many components of Irrigation Water Management, it is imperative that the necessary knowledge and skills be clearly stated in an easily located and understood document.

Listed below are the Proficiency Areas that outline the subject matter areas of Irrigation Water Management. Within each Proficiency Area are specific, measurable objectives the TSP must perform in order to demonstrate proficiency.

Instructions:
CCA/CPAg/CPSS:

- You must read each area and check the box next to each Proficiency Area if you agree that you can satisfactory complete each objective listed under the proficiency area.
- At the end of the document you must sign your name and provide your certification number. Signing your name indicates that you are able to satisfactory complete each of the proficiencies.
- You will be required to perform one irrigation management plan for an existing grower that will be reviewed by NRCS personnel.
- If your plan meets the NRCS standards you will be certified as a technical service irrigation management planner for NRCS.
- If the plan does not meet NRCS standards, the necessary corrections or edits will be identified in writing and you will be requested to revise the plan and resubmit to NRCS. In addition you will also submit a second plan for a different farm that will be reviewed. If the second plan also meets the NRCS standards then you will be certified.
- If the second plan submitted does not meet the NRCS standard, the certification office will be notified and the applicant will be advised to register for and successfully complete the appropriate training.
- Please do not sign this document if you do not feel confident that you can complete all proficiencies. Signing and not performing to the standard may be a violation of the code of ethics. Seek training first if necessary.

Read each area and check the box only if you can perform the standards listed.

PROFICIENCY AREAS AND PERFORMANCE OBJECTIVES FOR IRRIGATION WATER MANAGEMENT

❒ PROFICIENCY AREA 1. Irrigation Water Management Planning

1. Define Irrigation Water Management (IWM)
2. Describe components of an IWM Plan

3. Describe best management practices for IWM
4. Develop an irrigation water management plan by completing each of the following planning steps:
    a. identify problems and determine objectives
    b. inventory resources
    c. analyze resource data
    d. develop the IWM plan
    e. formulate and evaluate alternatives
    f. recommend alternatives
    g. evaluate plan implementation
    h. adjust the IWM plan as needed
5. For a given irrigation plan, complete the following documents:
    a. inventory worksheet
    b. planning worksheet
    c. plan map
    d. water management plan
6. Explain national, state-specific, and local-specific rules, regulations, and USDA policies that impact irrigation water management

❒ PROFICIENCY AREA 2. Soil Characteristics Related to Irrigation Water Management

1. Define the following soil water related terms:
    a. available water capacity
    b. field capacity
    c. permanent wilting point
    d. management allowable depletion (MAD)
    e. soil texture
    f. soil bulk density
    g. soil pore space
    h. soil water tension
    i. soil intake
    j. permeability
    k. wetted diameter
2. Describe how the following soil physical properties affect irrigation water management:
    a. restricted layers
    b. topography
    c. soil erodibility
    d. slope
    e. depth to water table
3. Describe how the following soil chemical properties affect irrigation water management:
    a. cation exchange capacity

b. salinity
c. sodicity
d. pH
e. carbonates
f. bicarbonate
g. organic matter
h. nutrient levels

4. For a given soil, locate information on its physical and chemical characteristics
5. Interpret soil quality test results

❒ PROFICIENCY AREA 3. Crop Characteristics and Water Use

1. Describe how the following affect crop water use:
   a. crop water use efficiency
   b. crop canopy characteristics
   c. plant population/spacing
   d. crop growth stages
   e. effective rooting depth and moisture extraction patterns
   f. climatic factors
   g. soil moisture levels
2. Evaluate impact of crop selection, partitioning, and rotation on seasonal gross and individual application water requirements
3. Describe how the following practices affect irrigation water management:
   a. deep tillage
   b. crop residue management
   c. cover crops
   d. surface storage enhancement
   e. nutrient management
   f. pest management
   g. drainage water management
   h. use of polyacrylamide (PAM)
   i. land leveling
4. Use the following methods to estimate seasonal or daily evapotranspiration:
   a. real-time and historic weather station data
   b. atmometer data
   c. Penman-Monteith evapotranspiration software
   d. irrigation scheduling software
5. Compare and contrast direct and estimated methods of measuring crop evapotranspiration
6. Use water quality and quantity information to recommend adapted crops and crop hybrids/varieties to the producer

❒ PROFICIENCY AREA 4. Irrigation Methods and System Design

1. List advantages and limitations of surface, sprinkler, microirrigation, and subirrigation methods
2. List attainable field irrigation efficiencies for surface, sprinkler, microirrigation, and subirrigation methods
3. Describe how soil intake and application rates differ among surface, sprinkler and microirrigation systems

SURFACE IRRIGATION

4. List factors to consider in designing and maintaining surface irrigation systems
5. Describe physical and operating characteristics of the following surface irrigation systems:
    a. basin
    b. furrow
    c. border
6. Describe advantages, disadvantages, and sites adapted to surge irrigation

SPRINKLER IRRIGATION

7. List factors to consider in designing and maintaining sprinkler irrigation systems
8. Describe physical and operating characteristics of the following sprinkler systems
    a. periodic move
    b. fixed solid set
    c. continuous self move (center pivot or lateral move)
    d. traveling gun
    e. traveling boom
9. Describe potential sources of sprinkler irrigation water losses and IWM methods that minimize these losses
10. Complete an NRCS or equivalent sprinkler irrigation system planning/design worksheet

MICROIRRIGATION

11. List factors to consider in designing and maintaining microirrigation systems
12. Describe physical and operating characteristics of the following microirrigation systems
    a. drip/trickle/bubbler
    b. line source emitter
    c. point source emitter
    d. basin bubbler
    e. microspray/minisprinkler
    f. subsurface drip
13. Describe how water source and water quality affect water filtration requirements for microirrigation systems listed above
14. Explain design application and operation of pressure compensated vs. non-pressure compensated emitters

15. Explain and document how to operate and backflush microirrigation filtration systems

SUBIRRIGATION WATER TABLE MANAGEMENT

16. List factors to consider in designing and maintaining subirrigation systems
17. Explain how to use subirrigation for water table management

❒ PROFICIENCY AREA 5. Specialized Uses of Irrigation

1. Develop an IWM plan for the following specialized uses of irrigation:
    a. fertigation
    b. chemigation
    c. biosolids application
    d. frost protection and crop cooling
    e. particulate control
    f. leaching for salinity

❒ PROFICIENCY AREA 6. Irrigation Scheduling

1. Use the following to develop a crop soil water budget and irrigation schedule:
    a. type of crop
    b. type of soil
    c. effective rooting depth
    d. available water holding capacity
    e. management allowable depletion (MAD)
    f. net irrigation water requirement
    g. evapotranspiration, rainfall, and irrigation application data
2. Use management allowable depletion (MAD) and available water capacity to determine maximum allowable irrigation interval and application amount
3. Use field application efficiencies to determine gross irrigation requirements
4. Use system application rate to determine irrigation set or application time
5. Use data from the following soil moisture monitoring methods to schedule irrigation:
    a. soil feel and appearance
    b. volumetric soil moisture devices
    c. soil moisture potential
6. Select a soil moisture monitoring method adapted to a given soil type and crop
7. Use evapotranspiration values to predict soil moisture depletion
8. Use soil moisture depletion estimates, available water capacity and MAD level to determine when to start irrigation and amount of water to apply
9. Explain how to collect rainfall amount and estimate effective precipitation
10. Explain how to use the checkbook method to keep water use records for a field
11. Describe how the following affect irrigation scheduling:
    a. crop cooling

b. frost protection
c. chemigation

❒ PROFICIENCY AREA 7. Water Quantity

1. Describe methods used to measure available water quantity and system flow rate
2. Determine minimum water supply capacity required to meet crop irrigation water requirements
3. Explain the importance of the following on water supply:
    a. on-farm water supply development
    b. irrigation storage structures
    c. rainfall harvesting
    d. tailwater recovery systems
4. Evaluate impact of the following on gross water requirements and application timing:
    a. annual and seasonal rainfall distribution
    b. soil water storage capacity
    c. surface and subsurface drainage
    d. water conservation and management practices

❒ PROFICIENCY AREA 8. Water Quality

1. Interpret water quality test results
2. Describe how water quality affects the following:
    a. irrigation system selection and design
    b. soil infiltration and permeability
    c. crop productivity potential
3. Describe how the following water quality factors affect crops and soils:
    a. salinity
    b. sodium, chloride, and boron toxicity
    c. sediment deposits
    d. physical, chemical and biological characteristics of water
    e. agricultural, industrial and municipal waste application through the irrigation system
4. Use water quality test results to recommend modifications to an existing IWM Plan and/or develop water treatment recommendations

❒ PROFICIENCY AREA 9. System and Economic Evaluation

1. Conduct flow measurements, pressure checks, and uniformity measurements of irrigation systems in the field
2. Determine irrigation system performance based on type of system, management, and equipment used
3. Use the following to make recommendations for system improvement:
    a. CU (Coefficient of Uniformity)
    b. DU (Distribution Uniformity)
    c. EU (Emission Uniformity)
    d. AE (Application Efficiency)
4. Estimate potential water and energy savings when adopting or modifying an irrigation water management plan
5. Develop system alternatives if water supply is limited
6. Evaluate alternative energy sources for powering irrigation systems
7. Compare capital, operating, and maintenance costs of irrigation systems

❒ PROFICIENCY AREA 10. Environmental Concerns

1. Develop IWM alternatives that minimize the following environmental impacts:
    a. off-site contamination related to surface runoff
    b. leaching to groundwater
    c. atmospheric contamination
    d. irrigation-induced erosion
2. Develop IWM alternatives that allow safe use of chemigation
3. Match chemical and biosolid application techniques to crop requirements and field limitations
4. Recommend a backflow prevention device that prevents groundwater contamination
5. Estimate water savings from water harvesting, tailwater recovery, and alternative water sources
6. Describe environmental impacts of subirrigation
7. Recommend subirrigation alternatives that maximize economic and environmental benefits
8. Explain how irrigation practices can impact wetlands, wildlife habitats, and fisheries

I, the undersigned CCA/CPAg/CPSS, have read and fully understand each of the proficiency areas listed in this document. I can perform the proficiencies and their objectives necessary to meet NRCS procedures and assist the producer in meeting the criteria in the conservation practice standard. I will develop and deliver to NRCS staff for review one irrigation management plan for an existing grower. I also understand that if I do not perform to the stated standard, my certification request will be referred to the certification office and I will be required to successfully complete the appropriate training.

Print Name

Sign Name

Certification Number

Date

Note: Please do not sign this document if you can not perform the proficiencies and their objectives. Instead, seek the appropriate training prior to completing this form. NRCS TSP NMP training will be listed on the CCA Web site: www.certifiedcropadviser.org, CPAg Web site: www.agronomy.org/certification, and the CPSS Web site: www.soils.org/certification.