



**CONSERVATION ENHANCEMENT ACTIVITY**

**E449H**

**CONSERVATION STEWARDSHIP PROGRAM**

Intermediate IWM— Years 2 -5, using soil moisture or water level monitoring

**Conservation Practice 449: Irrigation Water Management**

**APPLICABLE LAND USE: Crop (Annual & Mixed); Crop (Perennial); Pasture**

**RESOURCE CONCERN: Water**

**ENHANCEMENT LIFE SPAN: 1 year**

**Enhancement Description**

Monitoring soil moisture or water levels within an irrigated field for implementing an intermediate irrigation water management plan using soil moisture data to facilitate management decisions.

**Criteria**

- Equipment previously installed (through preceding enhancement) must include soil moisture sensors with data collection systems; weather stations that collect solar radiation, wind speed and direction, rainfall, temperature; water level sensor with data collection system; and permanent flowmeter.
- Monitoring of the following items required:
  - Irrigation water applied
  - Crop water use
  - Status of heat and/or frost conditions to permit the producer to make informed irrigation decisions

E449H - Intermediate IWM – Year 2 - 5, Soil moisture or Water level monitoring	May 2020	Page   1
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## CONSERVATION STEWARDSHIP PROGRAM

- Perform regular maintenance and monitoring of equipment with data collection systems that continuously record data throughout the irrigation season.
- Follow an irrigation water management plan which includes, as per NRCS Conservation Standard Practice Irrigation Water Management (Code 449):
  - An irrigation system layout map showing the main pipeline(s), irrigated area, soil moisture sensor/water level sensor locations (if used), and soils.
  - Method used to measure or determine the flow rate or volume of the irrigation water applications.
  - Measurement records showing the amount of water used to irrigate as it comes on to the farm and goes into each field.
  - Documentation of the scientific method used to schedule the timing and amount of irrigation application.
  - Irrigation water management plan explaining:
    - How irrigation meets crop needs while maximizing irrigation water efficiency.
    - Seasonal or annual planned water application volumes by crop.
    - Management allowable depletion (MAD) and depth of the managed crop root zone or water level for each crop and stage of growth.
    - Evaluation of irrigation system distribution uniformity and necessary changes to ensure uniform irrigation.
    - Information on how to recognize irrigation induced erosion and how to mitigate it.
    - Indicate how data from the sensor location and depths will be considered to make field-wide irrigation decisions.



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- Water application scheduling based on soil moisture or water level monitoring and/or evapotranspiration monitoring from the weather station.
- Record keeping documents for the irrigator to use during the operation and management.

### Additional Criteria of Soil Moisture Devices

- Soil moisture sensors collect data at a minimum of 2 approved depths based on crop and soil characteristics of the region.
- Number of soil moisture data sets will be based on the irrigation water management plan designed per water source using the following criteria: field topography, crop rotation and the soils throughout the field.

### Additional Criteria of Flow Measurement Devices

- Permanent flow meters data collected at all wells/relifts that are included in the approved IWM plan.

### Additional Criteria of Water Level Devices

- Data from sensors installed in a basin field from data logger with the ability to capture an image of the movement of the gauge. Images are captured at a minimum of twice a day.

### Additional Criteria of Weather Stations

- Weather station data from a central location as defined by the irrigation water management plan
- Weather station record includes each of the following at a minimum of four times per hour:
  - High and low temperature
  - Precipitation



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- Humidity
- Wind speed and duration and direction
- Solar radiation.

## ND Sideboards

1. This enhancement may be used in either of the following circumstances: in conjunction with E449F, or as a follow up to an EQIP contract that included implementation of IWM, Advanced.
2. ND NRCS will develop a site specific Intermediate Irrigation Water Management Plan prior to implementation, utilizing the ND IWM Template, which includes guidance to the producer on sensor placement, weather station placement, and record keeping. Alternatively, the producer may provide an IWM Plan developed by a ND P.E., subject to a functional review and approval by NRCS.
3. Flow meters are required to be installed as necessary to accurately account for the quantity of water applied to each individual field. If meters are not tied into the pivot panel for automatic recording, the producer will be required to keep side records for each individual application.
4. Soil moisture readings are required, at depth intervals as outlined in the IWM plan. Acceptable sensor types include Time Domain Transmissivity, Capacitance Sensors, Tensiometers, or Graveac matrix sensors.
5. The producer will complete checkbook documentation through the irrigation season, utilizing one of the options listed in the Intermediate IWM Plan.
6. At the completion of each irrigation season prior to the end of the calendar year, NRCS and the producer will complete a technical evaluation of IWM utilizing the ND IWM Certification Tool.

*\*All end of the season consultations require 449 JAA*

E449H - Intermediate IWM – Year 2 - 5, Soil moisture or Water level monitoring	May 2020	Page   4
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## CONSERVATION STEWARDSHIP PROGRAM

### Documentation and Implementation Requirements

Participant will:

- Prior to implementation, acquire an irrigation water management plan meeting NRCS Conservation Practice Standard Irrigation Water Management (Code 449) requirements.
- During implementation, ensure each irrigation water management device functions as intended.
- During implementation, record irrigation data such as location, date, duration, and flow rate of all irrigation operations, rainfall, evapotranspiration, and soil moisture or water level data.
- During implementation, monitor the devices during the growing season to determine timing and amounts of water to apply based on soil moisture/water level sensor, field checks and weather data.
- After implementation, make the following documentation available for review by NRCS to verify implementation of the enhancement:
  - Irrigation water management plan and associated records.
  - Changes made to address distribution uniformity deficiencies.
  - Documentation demonstrating utilization of any sensor used throughout the growing season.

NRCS will:

- Prior to implementation, provide and explain NRCS Conservation Practice Standard Irrigation Water Management (Code 449) requirements as it relates to implementing this enhancement, including applicable state specific job sheets.
- Prior to implementation, assist with data interpretations needed for management decision making.
- Prior to implementation, provide additional assistance to the participant as requested.



- After implementation, verify implementation of the irrigation water management plan by reviewing records kept during enhancement implementation.

# CONSERVATION STEWARDSHIP PROGRAM

### NRCS Documentation Review:

I have reviewed all required participant documentation and have determined the participant has implemented the enhancement and met all criteria and requirements.

Participant Name \_\_\_\_\_ Contract Number \_\_\_\_\_

Total Amount Applied \_\_\_\_\_ Fiscal Year Completed \_\_\_\_\_

\_\_\_\_\_  
NRCS Technical Adequacy Signature

\_\_\_\_\_  
Date

