United States Department of Agriculture

CONSERVATION ENHANCEMENT ACTIVITY

E449F

CONSERVATION STEWARDSHIP PROGRAM

Intermediate IWM— Year 1, Equipment with Soil moisture or Water Level monitoring

Conservation Practice 449: Irrigation Water Management

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

RESOURCE CONCERN ADDRESSED: Insufficient Water

ENHANCEMENT LIFE SPAN: 1 year

Enhancement Description

This activity involves monitoring soil moisture or water levels within a surface irrigated field for intermediate irrigation water management by utilizing technological equipment to gather field specific data concerning weather, soil moisture or water levels throughout the irrigation season. The equipment is installed and utilized to log data and retrieve the data periodically throughout the season, so irrigation decisions can be made based on scientific data. Maximum time between data retrievals is weekly.

Monitoring will be for the entire irrigation season and data gathered will be used to make sound decisions on irrigation water use.

Criteria

General

- Equipment may include: soil moisture sensor with data collection systems; weather stations that collect solar radiation, wind speed and direction, rainfall,

temperature; water level sensor with data collection system; permanent flowmeter

- Data to be monitored includes: irrigation water applied, crop water use, status of heat and/or frost conditions to permit the producer to make informed irrigation decisions.
- The installation includes the purchase and installation of equipment with data collection systems that can continuously record data throughout the irrigation season.
- Irrigation water management plan is followed and 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
        - Water application scheduling based on soil moisture or water level monitoring and/or evapotranspiration monitoring from the weather station

- Recordkeeping documents for the irrigator to use during the operation and management

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Additional Criteria of soil moisture devices

- Installation of each soil moisture set will include the ability to collect data at a minimum of 2 approved depths based on crop and soil characteristics of the region
- Number of soil moisture sets will be installed 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 will be installed at all wells/relifts that are included in the approved IWM plan

Additional Criteria of water level devices

- Sensor is installed in a basin field with a 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

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- Weather station is installed in a central location as defined by the irrigation water management plan, but no more than 2 miles separation

- Weather stations will record each of the following at a minimum of four times per hour:
  - High and low temperature
  - Precipitation
  - 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 E449H, 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 roducer 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

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Documentation and Implementation Requirements

Participant will:

Prior to implementation

- Acquire an irrigation water management plan meeting NRCS Conservation Practice Irrigation Water Management (Code 449) requirements
- Acquire NRCS approval of all irrigation water management devices that will be utilized for the plan implementation

During installation or implementation

- Ensure each irrigation water management device is installed to manufacturer recommendations
- Record irrigation data such as location, date, duration, and flow rate of all irrigation operations, rainfall, evapotranspiration, and soil moisture or water level data
- 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 items available for review by NRCS to verify implementation of the enhancement:
    - Irrigation water management plan is followed, and records kept
    - Changes made to address distribution uniformity deficiencies
    - Utilization documentation of any sensor used throughout the growing season as well as certification of their proper installation

NRCS will:

Prior to implementation

- Provide and explain NRCS Conservation Practice Standard Irrigation Water Management (Code 449) as it relates to implementing this enhancement

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- Provide additional assistance to the participant as requested
- Review and approve producer's selected equipment After Implementation
- Verify installation of all irrigation water management equipment
- Verify implementation of the irrigation water management plan by:
    - Reviewing records kept during enhancement implementation

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