United States Department of Agriculture

CONSERVATION ENHANCEMENT ACTIVITY

E449D

CONSERVATION STEWARDSHIP PROGRAM

Advanced Automated IWM – Year 1, Equipment and 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

Installing and monitoring soil moisture or water leveling equipment for advanced automated irrigation water management

Criteria

- Equipment may include; weather station, sensors, flow meter, data loggers, cellular service, as needed to monitor soil moisture, determine and forecast crop water use and remotely control irrigation system.

- Subscription service provided by others may be used as an alternative.

- Data to be monitored includes 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, and a data logger to log continuous weather data including rainfall, temperature, solar radiation, humidity, wind

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speed and soil moisture/water level sensors data that can be downloaded to a personal computer and associated graphing software.

- Producer monitors the station during the growing season to determine timing and amounts of water to apply based on soil moisture/water level sensors, field checks and weather station data.

- Producer keeps records of collected data and resulting irrigation decisions. This enhancement only applies to year one of IWM. The appropriate labor-only IWM enhancements apply in subsequent contract years.

- If a weather station is installed, install within 1 mile of fields where practice is implemented. The weather station will record each of the following (at a minimum of four times per hour),
    o High and low temperature
    o Precipitation
    o Humidity
    o Wind speed and duration
    o Solar radiation

- Sensors, datalogger and required telemetry are installed on fields where practice is implemented as indicated in the Irrigation water management plan.

- Irrigation water management plan is followed and includes, as per NRCS Conservation Standard Practice Irrigation Water Management (Code 449):
    o An irrigation system layout map showing the main pipeline(s), irrigated area, soil moisture locations and depths (if used), and soils. If water level sensors are used, show locations and number of sensors used.

    o Methods used to measure or determine the flow rate or volume of the irrigation applications.

    o Measurement records showing the amount of water used to irrigate, as it comes onto the farm and goes to each field.

    o Documentation of the scientific method used for scheduling the timing and amount of irrigation applications.

    o The Irrigation water management plan explains;

- How irrigation system 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 insure uniform irrigation.

- Information on how to recognize irrigation induced erosion and how to mitigate it.

- Indicate how data from the sensor locations 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.

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

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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.

☐ Prior to implementation, acquire NRCS approval of selected weather station, sensors, data logger, etc. or subscription service.

☐ During implementation, ensure installation meets manufacturer recommendations.

☐ 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.

☐ After implementation, make the follow items available for review by NRCS to verify implementation of the enhancement:

 o Irrigation water management plan and records kept (i.e. , date, duration, and flow rate of all irrigation operations, rainfall, evapotranspiration, and soil moisture or water level data)

 o Changes made to address distribution uniformity deficiencies

 o Documentation of equipment installed (i.e. weather station, sensors, data logger, etc.) to NRCS

 o If a suscription service is used, provide location of equipment, date, duration, and flow rate of all irrigation operations, rainfall, evapotranspiration, and soil moisture or water level data.

NRCS will:

☐ Prior to implementation, provide and explain NRCS Conservation Practice Standard Irrigation Water Management (Code 449) as it relates to implementing this enhancement

☐ As needed, provide additional assistance to the participant as requested.

☐ Prior to implementation, review and approve producer's selected weather station, sensors, data logger, etc. or subscription service.

☐ As needed, provide additional technical assistance to the participant as requested.

☐ After implementation, verify installation of weather station, sensors, etc.

☐ After implementation, 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

North Dakota Sideboards::

1. ND NRCS will develop a site specific 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.

2. 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.

3. Sensors must include a data logger that records daily soil moisture levels, at multiple depths, and transmits information electronically to the operator in real time. Acceptable sensor types include Time Domain Transmissivity, Capacitance Sensors, Tensiometers, or Granular Matrix Sensors.

4. A weather station is required unless an active NDAWN station is located within 5 miles of the irrigated field.

5. At the completion of first 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. If a subscription service can provide comparable data (daily record of irrigation, rainfall, soil moisture), in an alternate format, that will be considered an acceptable substitute.

*All planning, review,and/or end of the season evaluations require 449 JAA