

# **Irrigation Training Toolbox Irrigation System Evaluation**

## **Lesson Plan Gathering Data for Evaluating a Sprinkler Irrigation**

National Employee Development Center  
Natural Resources Conservation Service  
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# **Irrigation Training Toolbox**

## **Irrigation Systems Evaluation**

**COURSE:** Irrigation Systems Evaluation

**LESSON TITLE:** Gathering Data for Evaluating a Sprinkler Irrigation

**OBJECTIVES:** Give each participant field experience in the mechanical procedures of gathering and recording field data for use in evaluating furrow or corrugation irrigation.

**REFERENCE:** Agricultural Handbook No. 82

**METHOD:** Group Activity

**TRAINING AIDS:** Projector and slides

**LOCATION:** Field

**DEVELOPED BY:** West National Technical Center

# **IRRIGATION SYSTEMS EVALUATION**

## **GATHERING DATA FOR EVALUATING A SPRINKLER IRRIGATION**

### **INTRODUCTION**

### **BODY**

#### **A. Gathering data and recording**

1. Obtain and record data on sprinkler-system design and operation (EXHIBIT - IWM - 9.)
2. Make Field Layout.
  - a. Choose site.
  - b. Set up sprinkler lateral ready to operate.
  - c. Set out spray cans in symmetrical pattern across the lateral between two sprinklers.
3. Determine moisture content of the soil profile before irrigation.
  - a. Estimating.
    - 1) Obtain soil sample from each significant layer of the root zone by use of an auger.
    - 2) Use the procedure of the feel chart and estimate the moisture content of each sample.
    - 3) Record information on (EXHIBIT - IWM - 4)
  - b. Measuring.
    - a. Obtain soil sample from each significant layer of the root zone by use of the Eley Volumeter.
    - b. Determine moisture content of the sample by use of the Speedy Moisture Tester.
    - c. Record information on EXHIBIT - M - 1.
4. Determine the moisture content of the soil profile at field capacity.
  - a. Estimate - obtain from chart (based on soil texture) EXHIBIT - IWM -20. Record on EXHIBIT - IWM - 4.
  - b. Measuring - Make Speedy Moisture Tester measurements, Record on EXHIBIT - IWM -1,
5. Start sprinkler and record time. (Note: Do not allow water from nozzle to fall in cans until pressure in system has built up.)

6. Run sprinkler until 1/2" or more water has entered most cans, and then stop irrigation on an even hour from the start. (Note: Stop the sprinklers so no water falls into the spray can.) Measure catch. Record data on sprinkler data sheet.
7. Measure flow from sprinkler operating at operating pressure at the first, last and gaged area sprinkler.
8. Measure operating pressure at pump, at mainline, on each side of the spray-gaging area, and the first and last sprinkler on the lateral.
9. Observe the rate at which water enters soil. If possible locate an area where water enters soil just as sprinkler passes and set a measuring can. This is maximum intake rate for this soil.
10. Note wind direction, velocities, temperature, and humidity.
11. Record all observations.

## **SUMMARY**

SPRINKLER IRRIGATION DATA & EVALUATION SHEET

Farm \_\_\_\_\_ Field \_\_\_\_\_ Crop \_\_\_\_\_ Last.-Irrig.(Date) \_\_\_\_\_

Soil \_\_\_\_\_ Tech. \_\_\_\_\_ Date \_\_\_\_\_

**1. AREA SPRINKLED:****A. Lateral:**

Dia. of pipe \_\_\_\_\_ in. Type of lateral \_\_\_\_\_

Sprinkler spacing on lateral \_\_\_\_\_ ft. No. of heads \_\_\_\_\_

Length of lateral \_\_\_\_\_ ft. (Include area at ends of lateral).

**B. Main Line:**

Dia. of pipe \_\_\_\_\_ in. Type of main \_\_\_\_\_

Lateral spacing on main line \_\_\_\_\_ ft. Spacing of hydrants \_\_\_\_\_

Number of laterals \_\_\_\_\_

**C. Field or Set Size:**

Field Dimensions: Length \_\_\_\_\_ ft. Width \_\_\_\_\_ ft.

Area: \_\_\_\_\_ Sq. ft. \_\_\_\_\_ acres

**2. DEPTH OF WATER APPLIED**

a. Sprinkler number	First	Last	Area Gaged
b. Pressure (psi)			
c. Nozzle Type (Ffg-Model)			
d. Nozzle Size			
e. Discharge gpm-tab. value			
f. Discharge gpm-bucket meas			
g. *Depth Water Appl.			
h. Duration of test (hrs.)			
i. Total depth applied for set			

Average depth appl. at lateral (ins./hour):

First - (3/4) (First-last) = (\_\_\_\_\_) - (3/4) (\_\_\_\_\_) ins./hr. = \_\_\_\_\_ ins./hr.

**3. SOILS:**

Refer to IWM-4. 'Estimate of Moisture to be replaced' or Form IWM-1, "Determination of Soil Moisture". Total Depth of Moisture Needed \_\_\_\_\_ ins.

**4. MOISTURE DISTRIBUTION:**

Record 'catch-can' moisture distribution information on a sprinkler data sheet.

5. MINIMUM FREQUENCY (Interval in days between irrigations):

$$\text{Frequency} = \frac{\text{(not irrigation or moisture deficiency)}}{\text{peak daily use (cu)}} = \frac{\text{ins.}}{\text{ins. / day}} = \text{_____ days}$$

6. PATTERN EFFICIENCY (attach Catch data)

No. Cans \_\_\_\_\_; Total Catch \_\_\_\_\_ cc.; Ave. Catch/can \_\_\_\_\_ ins.;

Ave. Catch (ins./hr.) = Ave. Catch (ins.)/ Time = \_\_\_\_\_ ins./hr.;

No. cans in low 1/4 catch \_\_\_\_\_; Total Low Catch \_\_\_\_\_ cc.;

Ave. Low Catch \_\_\_\_\_ cc. = \_\_\_\_\_ ins.; Low catch \_\_\_\_\_ in./hr.;

Pattern Efficiency = (ave. low/ave. all x 100) = \_\_\_\_\_ %

7. WATER LOSSES (gaged area):

$$\text{Water Losses} = (\text{Ave. Depth Applied}) - (\text{Ave. Catch}) = \text{_____} \text{ Ins./Hr.}$$

$$\text{Percent Loss} = \frac{(\text{H}_2\text{O Losses})}{\text{Ave Dept Applied}} \times (100) = \text{_____} \text{ Ins./Hr.}$$

Explain losses:

8. APPLICATION EFFICIENCY OF GAGED AREA:

$$\text{Applic. Eff.} = \frac{(\text{Ave low catch}) \times (100)}{(\text{Ave depth applied at gaged area})} = \text{_____}$$

9. APPLICATION EFFICIENCY OF THE LATERAL:

$$\text{Applic. Eff.} = \frac{(\text{Ave low catch})}{(\text{Ave depth applied at lateral})} \times (100) = \text{_____} \%$$

10. SYSTEM EFFICIENCY:

If lateral pressures can be regulated, this will be the same as the application efficiency for the lateral.

11. TIME REQUIRED FOR EACH LATERAL SETTING:

$$\text{Time} = \frac{\text{Net depth of moisture needed}}{\text{Ave low catch}} = \text{_____} \text{ hrs.}$$

12. NUMBER OF LATERAL MOVES PER DAY:

$$\text{No. Moves} = \frac{24 \text{ hrs/day}}{\text{(item 11)}} = \frac{24 \text{ hrs/day}}{\text{( hrs)}} = \underline{\hspace{2cm}} \text{ moves/day.}$$

13. NUMBER OF DAYS TO COVER FIELD:

$$\frac{\text{(Total lateral settings for field)}}{\text{(Lateral sets per day) x (No. of laterals)}} = \underline{\hspace{2cm}} \text{ Days}$$

14. SPRINKLER SYSTEM CAPACITY:

Equals sum of all lateral capacities.

$$\text{Lat Cap} = \text{(Number of heads) x (aver discharge/head)} = \underline{\hspace{2cm}} \text{ GPM}$$

15. PRESSURE REQUIREMENTS OF PUMP:

Should be adequate to maintain lateral pressures on all laterals when they are located in most critical positions.

16. FIELD APPLICATION EFFICIENCY

$$\text{F. A. Eff.} = \frac{\text{(Amount needed)}}{\text{(Amount applied)}} \times 100 = \underline{\hspace{2cm}} \%$$

17. Recommendations:

$$* D = \frac{\text{GPM (T) (96.3)}}{L \times W} = \frac{Q \text{ (T) (96.3)}}{A}$$

