

**Surface Irrigation System
 Detailed Evaluation Graded Furrow Worksheet 1**

Land user _____ Field office _____
 Field name/number _____
 Observer _____ Date _____ Checked by _____ Date _____

Field Data Inventory:

Show location on evaluation furrows on sketch or photo of field.

Crop _____ Actual root zone depth _____ MAD [†]/ _____ % MAD _____ in
 Stage of crop _____ Planting date (or age of planting) _____
 Field acres _____

Soil-water data:

(Show location of sample on soil map or sketch of field)

Soil moisture determination method _____
 Soil mapping unit _____ Surface texture _____

Depth	Texture	AWC (in) ^{1/}	SWD (%) ^{1/}	SWD (in) ^{1/}
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
		Total	_____	_____

Comments about soils: _____

Typical irrigation duration _____ hours, Irrigation frequency _____ days
 Typical number of irrigations per year _____
 Crop rotation _____

Field uniformity condition (smoothed, leveled, laser leveled, etc., and when) _____

1/ MAD = Management allowable depletion AWC = Available water capacity SWD = Soil water deficit

**Surface Irrigation System
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Cultivation no.	Date	Crop stage	Irrigate?
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____
5	_____	_____	_____

Delivery system size (pipe diameters, gate spacing, siphon tube size, etc.) _____

Field observations

Evenness of advance across field _____

Crop uniformity _____

Soil condition _____

Soil compaction (surface, layers, etc.) _____

Furrow condition _____

Erosion and/or sedimentation: in furrows _____
 head or end of field _____

Other observations (OM, cloddiness, residue, plant row spacing, problems noted, etc.) _____

Furrow spacing _____ inches

Furrow length _____ feet

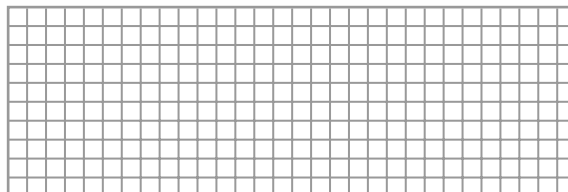
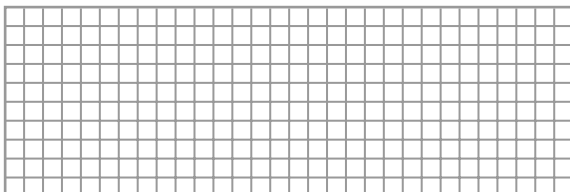
Irrigations since last cultivation _____

Furrow profile (rod readings or elevations at each 100 foot. station):

Furrow cross section:

Station: _____

Station: _____

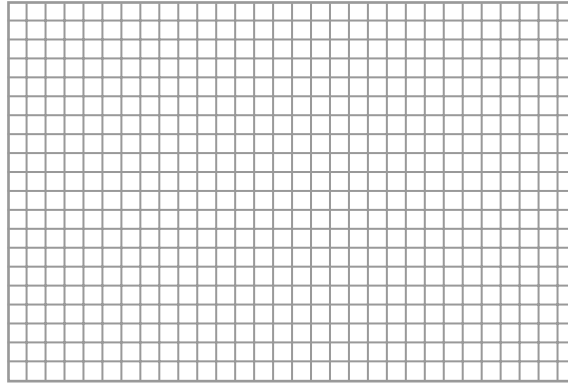


**Example - Surface Irrigation System Detailed Evaluation
 Graded Furrow Worksheet 3**

Furrow data summary:

Evaluation length _____ Slope _____ Average _____

Section through plant root zone:



Evaluation computations

Furrow area, A = $\frac{\text{(furrow evaluation length, L, ft)} \times \text{(furrow spacing, W, ft)}}{43,560 \text{ ft}^2/\text{acre}}$

A = _____ = _____ acre

43,560

Present gross depth applied, $F_g = \frac{\text{Total inflow volume, gal.} \times .0000368}{\text{Furrow area, A, in acres}}$ (Total inflow from worksheet 7)

$F_g =$ _____ = _____ inches

Minimum opportunity time, $T_{ox} =$ _____ min at station _____ (from field worksheet 10)

Minimum depth infiltrated, $F_{min} =$ _____ inches (from worksheet 10)

Average depth infiltrated, $F_{(0-1)} =$ _____ (from calculations on worksheet 10)

Distribution uniformity, $DU = \frac{\text{Minimum depth infiltrated, inches}}{\text{Average depth infiltrated, inches}} \times 100 = \frac{F_{min} \times 100}{F_{ave}}$

= _____ = _____ %

Example - Surface Irrigation System Detailed Evaluation Graded Furrow Worksheet 4

$$\text{Runoff, RO\%} = \frac{\text{Total outflow volume, gal}}{\text{Total inflow volume, gal}} \times 100 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \% \text{ (Total outflow, worksheet 8)} \\ \text{(Total inflow, worksheet 7)}$$

$$\text{RO, in} = \frac{\text{Total outflow volume, gal} \times .0000368}{\text{Evaluation furrow area, A, in acres}} = \underline{\hspace{2cm}} \times 0.0000368 = \underline{\hspace{2cm}} \text{ in (Furrow area, worksheet 3)}$$

Deep percolation, DP, in = Average depth infiltrated - Soil moisture deficit, SMD (Ave. depth worksheet 10 and SMD worksheet 1)

$$\text{DP} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ in}$$

$$\text{Deep percolation, DP, \%} = \frac{\text{Deep percolation, DP, in} \times 100}{\text{Gross depth applied, } F_g, \text{ inches}} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \%$$

Application efficiency, E_a

$$E_a = \frac{\text{Ave depth stored in root zone}^* \times 100}{\text{Gross application, } F_g, \text{ inches}} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \%$$

*Average depth of water stored in root zone = SWD if entire root zone depth is filled to field capacity by this irrigation. If irrigation efficiency is to be used in place of application efficiency, use average depth of water beneficially used (i.e., all infiltrated depths less than or equal to SWD) plus any other beneficial uses.

Example - Surface Irrigation System Detailed Evaluation Graded Furrow Worksheet 5

Potential water and cost savings

Present management

Estimated present gross net application, F_g per irrigation = _____ inches (F_g from worksheet 3)

Present gross applied per year = Gross applied per irrigation, F_g x number of irrigations

= _____ = _____ inches

Potential management

Annual net irrigation requirement _____ inches, for _____ (crop)

Potential application efficiency, E_{pa} = _____%

Potential annual gross applied = $\frac{\text{Annual net irrigation req.} \times 100}{\text{Potential application efficiency, } E_{pa}}$

= _____ = _____ inches

Total annual water conserved = $\frac{(\text{present gross applied} - \text{potential gross applied}) \times \text{area irrigated, ac}}{12}$

= _____ = _____ acre feet

**Surface Irrigation System
 Detailed Evaluation Furrow Worksheet 7-8**

Data: Furrow number _____ Inflow _____ Outflow _____

Type of measuring device _____

Clock ^{1/} time	Elapsed time (min)	Δ T (min)	Gage H (ft)	Flow rate (gpm)	Average flow rate (gpm)	Volume ^{2/} (gal)	Cum. volume (gal)
Turn on							
Total volume							

1/ Use a 24-hour clock reading; i.e., 1:30 p.m. is recorded as 1330 hours.
 2/ Volume = Δ T x average flow rate

Average flow rate = $\frac{\text{Total irrigation volume, gallon}}{\text{Elapsed time, minute}}$ = _____ = _____ gpm

