

**Surface Irrigation System
 Detailed Evaluation Graded Border Worksheet**

Land user _____ Field office _____

Field name/number _____

Observer _____ Date _____ Checked by _____ Date _____

Field Data Inventory:

Field area _____ acres

Border number _____ as counted from the _____ side of field

Crop _____ Root zone depth _____ ft MAD _____ %

Stage of crop _____

Soil-water data for controlling soil:

Station _____ Moisture determination method _____

Soil series name _____

Depth	Texture	AWC (in)*	SWD (%)*	SWD (in)*
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Total		_____	_____	_____

MAD, in = $\frac{\text{MAD, \%} \times \text{total AWC, in}}{100}$ = _____ = _____ in

Comments about soils: _____

Typical irrigation duration _____ hr, irrigation frequency _____ days

Typical number of irrigation's per year _____

Annual net irrigation requirement, NIR (from irrigation guide) _____ in

Type of delivery system (gated pipe, turnouts, siphon tubes) _____

Delivery system size data (pipe size & gate spacing, tube size & length, turnout size) _____

Border spacing _____, Strip width _____, Wetted width _____, Length _____

Field Observations:

Evenness of water spread across border _____

Crop uniformity _____

Other observations _____

NOTE: MAD = Management allowed deficit AWC = Available water capacity SWD = Soil water deficit

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Average depth infiltrated low 1/4 (LQ):

Low 1/4 strip length = $\frac{\text{Actual strip length}}{4} = \frac{\text{Actual strip length}}{4} = \text{_____} \text{ ft}$

LQ = $\frac{(\text{Depth infiltrated at begin of L1/4 strip}) + (\text{Depth infiltrated at the end of L1/4 strip})}{2}$

= $\frac{\text{_____}}{2} = \text{_____} \text{ in}$

Areas under depth curve:

- 1. Whole curve _____ sq in
- 2. Runoff _____ sq in
- 3. Deep percolation _____ sq in
- 4. Low quarter infiltration _____ sq in

Actual border strip area:

= $\frac{(\text{Actual border length, ft}) \times (\text{Wetted width, ft})}{43,560} = \frac{\text{_____}}{43,560} = \text{_____} \text{ acres}$

Distribution uniformity low 1/4 (DU):

DU = $\frac{\text{Low quarter infiltration area} \times 100}{(\text{Whole curve area} - \text{runoff area})} = \text{_____} \%$

Runoff (RO):

RO, % = $\frac{\text{Runoff area} \times 100}{\text{Whole curve area}} = \text{_____} \%$

RO = $\frac{\text{Total irrigation volume, ac-in} \times \text{RO, \%}}{\text{Actual strip area, ac} \times 100} = \text{_____} \text{ in}$

Deep percolation, DP:

DP = $\text{Deep percolation area} \times 100 = \text{_____} \%$

DP = $\frac{\text{Total irrigation volume, ac-in} \times \text{DP, \%}}{\text{Actual strip area, ac} \times 100} = \text{_____} \text{ in}$

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Evaluation computations, cont:

Gross application, F_g :

$$F_g = \frac{\text{Total irrigation volume, ac-in}}{\text{Actual strip area, ac}} = \underline{\hspace{4cm}} = \underline{\hspace{2cm}} \text{ in}$$

Application efficiency, E_a :

(Average depth stored in root zone = Soil water deficit (SWD) if entire root zone depth will be filled to field capacity by this irrigation, otherwise use F_g , in - RO, in)

$$E_a = \frac{\text{Average depth stored in root zone} \times 100}{\text{Gross application, in}} = \underline{\hspace{4cm}} = \underline{\hspace{2cm}} \%$$

Application efficiency low 1/4, E_q :

$$E_q = \frac{DU \times E_a, \%}{100} = \underline{\hspace{4cm}} = \underline{\hspace{2cm}} \%$$

Average net application, F_n

$$F_n = \frac{\text{Total irrigated volume, ac-in} \times E_a, \%}{\text{Actual strip area, ac} \times 100} = \underline{\hspace{4cm}} = \underline{\hspace{2cm}} \%$$

Time factors:

Required opportunity time to infiltrate soil water deficit of _____ in

$$T_o = \underline{\hspace{2cm}} \text{ min (} \underline{\hspace{2cm}} \text{ hr - } \underline{\hspace{2cm}} \text{ min)}$$

Estimated required irrigation inflow time from adv.-recession curves;

$$T_{in} = \underline{\hspace{2cm}} \text{ min (} \underline{\hspace{2cm}} \text{ hr - } \underline{\hspace{2cm}} \text{ min)}$$

At inflow rate of:

$$Q = \underline{\hspace{2cm}} \text{ ft}^3/\text{s per border strip}$$

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Present management:

Estimated present average net application per irrigation _____ inches

Present gross applied per year = $\frac{\text{Net applied per irrigation} \times \text{number of irrigations} \times 100}{\text{Application efficiency (E}_a\text{)}^{1/}}$

= _____ = _____ in

^{1/} Use the best estimate of what the application efficiency of a typical irrigation during the season may be. The application efficiency from irrigation to irrigation can vary depending on the SWD, set times, etc. If the irrigator measures flow during the season, use that information.

Potential management:

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

Potential application efficiency (E_{pa}) _____ percent (from irrigation guide, NEH or other source)

Potential annual gross applied = $\frac{\text{Annual net irrigation requirement} \times 100}{\text{Potential application efficiency (E}_{pa}\text{)}}$

= _____ = _____ in

Total annual water conserved

= $\frac{(\text{Present gross applied} - \text{potential gross applied}) \times \text{area irrigation (ac)}}{12}$

= _____ = _____ acre feet

Annual cost savings:

Pumping plant efficiency _____ Kind of fuel _____

Cost per unit of fuel _____ Fuel cost per acre foot \$ _____

Cost savings = Fuel cost per acre foot x acre feet conserved per year

= _____ = \$ _____

