Micro-Irrigation Design Data Worksheet

Project Owner's Name & Address:

Project Location			
Field No:	*Legal Description:* _____, Section _____, T_____ , R_____ ; _____ County, WA		
Project Designer			
Design Prepared By:		*Representing: (name of agency, company, etc.)*	*Date:*

Attach Construction Drawings or other documentation that identify and locate:
(check all that apply)

- ❑ **Site Specific Contour or Grid Elevation Map**
  Include map scale, legend, north arrow & critical elevations
- ❑ **Irrigation well(s) or Other Water Source**
  Indicate design capacity (gpm) and operating pressure (psi)
- ❑ **Delivery Pipeline** (from source to system controller)
  Indicate sizes, lengths, locations, material type, pressure ratings
- ❑ **Control Station & Filter Station(s)**
- ❑ **Main Distribution Line & Sub-main Lines**
  Indicate sizes, lengths, locations, material type, pressure ratings
- ❑ **Manifolds, Headers, and Flush Lines**
  Indicate sizes, lengths, locations, material type, pressure ratings
- ❑ **Valves**
  Indicate type, make, model, & size
- ❑ **Zones or Blocks**
  Identify zones & provide drip tape layout, number of tapes, and material type

Attach Supporting Documentation that includes:

- ❑ **Construction Specifications**
- ❑ **Material List and Itemized Cost Estimate**
- ❑ **Recent (< 1 year old) Pump Test Data**
- ❑ **Filter Selection & Design Computations**
- ❑ **Hydraulic Design Computations**

Micro-Irrigation Design Data Worksheet, cont.

Project Owner's Name:

CROP & SOILS DATA SUMMARY

Basic Crop Data						
Crop to be Irrigated	Rooting Depth (feet)	Plant Spacing (feet)	Row Spacing (inches)	Threshold Salinity[1] (mmhos/cm)	Net Water Requirement (inches/yr)	Peak Daily ET_c (inches /day)

[1] Threshold salinity, $EC_{e(ct)}$, is the maximum mean root zone soil salinity at which yield reductions will not occur.

Computed Q_{max} = $23 \times ET_{max} = 23 \times$ _____ in/day = _____ gpm/acre

where: Q_{max} = max. water requirement, gpm/day , and ET_{max} = highest peak daily ET_c, inches/day, from above. (assumes a maximum operating period of 22 hours/day and a design efficiency of 90%)

Basic Soil Data					
Soil Type/Name	Dominant Texture	Design Soil Intake Rate (Inches/hour)	Available Water Holding Capacity (inches/foot)	MAD[1] (%)	$EC_{e(ave)}$[2] (mmhos/cm)

[1] MAD is Management Allowed Deficit [2] $EC_{e(ave)}$ is Average Soil Extract Electrical Conductivity

Irrigation Water Electrical Conductivity, EC_w _____ mmhos/cm. Compute Leaching Fraction, LF, where:

$$LF = \frac{0.1794}{\left(EC_{e(ct)} / EC_w\right)^{3.0417}} = \frac{0.1794}{\left(\_\_\_\_ / \_\_\_\_\right)^{3.0417}} = \_\_\_\_\_ \therefore Use\ LF = \_\_\_\_\_$$

Attach Supporting Documentation that includes:
(check all that apply)

- ❑ **Method for determining net annual water requirement and peak daily ET_c**
- ❑ **Rationale for selected Management Allowed Deficit (MAD)**
- ❑ **Rationale for selected leaching fraction**
- ❑ **Laboratory analysis of irrigation water with suitability assessment for drip irrigation including analysis to determine filtration requirements**
- ❑ **Proposed chemical treatments of irrigation water**

Micro-Irrigation Design Data Worksheet, cont.

Project Owner's Name:

BASIC SYSTEM DATA

(Refer to NRCS Standard 441- Irrigation System, Micro Irrigation, for design requirements)

Total area irrigated ……..…….... [ ] (acres)

Available water supply flow rate ……... [ ] (gpm) Available flow per acre: [ ] (gpm/acre)

System design flow rate ……..... [ ] (gpm) @ operating pressure of [ ] (psi)

Zones Planned ……..... [ ] Area irrigated by each zone: [ ] (acres)

Zones irrigated concurrently……..... [ ] Application rate per zone: [ ] (inches/hr)

Lateral line material: _____ Inside diameter: [ ] (inches)

Drip tape/line material: _____ Inside diameter: [ ] (inches)

Drip tape/line spacing: …….. [ ] (inches); Drip tape/line depth: [ ] (inches)

Flushing velocity: …… [ ] (ft/s); Flushing end pressure: [ ] (psi)

Flushing flow rate: [ ] (gpm)

Describe Emitter *(make, model, etc.)*: _____

Type (circle one): laminar laminar/turbulent turbulent Emitter spacing: [ ] (inches)

Emitter path width:……..... [ ] (inches); Emitter path height: [ ] (inches)

Describe Filter system *(type, model, capacity in gpm)*: _____

Pressure loss across filter: ……. [ ] (psi); Head required at filter: [ ] psi

Time required for backwash: ……. [ ] (hours); Backwash flow rate: [ ] gpm

Describe Sand Separator *(type, model, capacity in gpm)*: _____

Describe Chemigation Valve *(type, model, location)*: _____

Describe Check Valve *(type, model, location)*: _____

Micro-Irrigation Design Data Worksheet, cont.

Project Owner's Name:

ZONE/BLOCK DATA

Refer to NRCS Standard 441- Irrigation System, Micro Irrigation, for design requirements. If all zones/blocks are identical in all design considerations, including topography, submit only one set of data and indicate "ALL" for zone number. Otherwise, submit a complete data set for each zone/block. Use the following equations to calculate system characteristics for each zone:

$$\text{Flow Variation, \%, } = \frac{q_{max} - q_{min}}{q_{ave}} \times 100 \text{;}$$ where:

q_{max} = the maximum emitter discharge in the zone;
q_{min} = the lowest emitter discharge in the zone; and
q_{ave} = the average emitter discharge in the zone.

$$\text{Emission Uniformity, (EU), \%, } = 100\left[1.0 - \frac{1.27 C_v}{\sqrt{n}}\right]\frac{q_{min}}{q_{ave}} \text{;}$$ where:

C_v = the manufacturer's coefficient of variation for the emitters;

n - for point source emitters = the number of emitters per plant; or

n - for line source emitters = the lateral plant rooting diameter divided by length of line used to calculate C_v, or 1, which ever is greater.

q_{min} = the lowest emitter discharge in a lateral; and

q_{ave} = the average emitter discharge in a lateral.

Zone Number: [ ] Type of drip tape/line: _____

Emitter data (model, type, etc.) _____ Spacing: [ ] (inches)

Design manifold inlet pressure downstream of zone control valve: [ ] (psi)

Emitter discharge = $q = K_d H^x$ (gal/hr) K_d = [ ] x = [ ]

Manufacturer's Coefficient of Variation, (C_v): [ ]

Average emitter design discharge, q_{ave}: [ ] (gal/hr) @ line pressure of [ ] (psi)

Maximum emitter discharge, q_{max}: [ ] (gal/hr) @ line pressure of [ ] (psi)

Location of maximum discharge emitter: _____

Minimum emitter discharge, q_{min}: [ ] (gal/hr) @ line pressure of [ ] (psi)

Location of minimum discharge emitter: _____

Flow Variation = _____ % Emission Uniformity, (EU), = _____ %

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Project Owner's Name:

(make additional copies of this page as needed)

Zone Number: ____ Type of drip tape/line: _____

Emitter data (model, type, etc.) _____ Spacing: ____ (inches)

Design manifold inlet pressure downstream of zone control valve: ____ (psi)

Emitter discharge = $q = K_d H^x$ (gal/hr) K_d = ____ x = ____

Manufacturer's Coefficient of Variation, (C_v): ____

Average emitter design discharge, q_{ave}: ____ (gal/hr) @ line pressure of ____ (psi)

Maximum emitter discharge, q_{max}: ____ (gal/hr) @ line pressure of ____ (psi)

Location of maximum discharge emitter: _____

Minimum emitter discharge, q_{min}: ____ (gal/hr) @ line pressure of ____ (psi)

Location of minimum discharge emitter: _____

Flow Variation = _____ % Emission Uniformity, (EU), = _____ %

Zone Number: ____ Type of drip tape/line: _____

Emitter data (model, type, etc.) _____ Spacing: ____ (inches)

Design manifold inlet pressure downstream of zone control valve: ____ (psi)

Emitter discharge = $q = K_d H^x$ (gal/hr) K_d = ____ x = ____

Manufacturer's Coefficient of Variation, (C_v): ____

Average emitter design discharge, q_{ave}: ____ (gal/hr) @ line pressure of ____ (psi)

Maximum emitter discharge, q_{max}: ____ (gal/hr) @ line pressure of ____ (psi)

Location of maximum discharge emitter: _____

Minimum emitter discharge, q_{min}: ____ (gal/hr) @ line pressure of ____ (psi)

Location of minimum discharge emitter: _____

Flow Variation = _____ % Emission Uniformity, (EU), = _____ %

- ❑ **Attach justification/explanation pertaining to deficit irrigation**
  (When available irrigation flow rate is less than peak water requirement)
- ❑ **Attach documentation describing supplemental irrigation requirements**
  (If supplemental irrigation is necessary for germination, crop protection, or other purposes)
- ❑ **Attach Operation & Management Plan**