



# IRRIGATION WATER MANAGEMENT

Client: \_\_\_\_\_

Date: \_\_\_\_\_



## Definition

Irrigation Water Management (IWM) is the process of determining and controlling the volume, frequency, and application rate of irrigation water in a planned, efficient manner.

## Purpose

IWM is applied as part of a conservation management system to support one or more of the following:

- Manage soil moisture to promote desired crop response
- Optimize use of available water supplies
- Minimize irrigation induced soil erosion
- Decrease non-point source pollution of surface and groundwater resources
- Manage salts in the crop root zone
- Manage air, soil, or plant micro-climate.

## Where Used

This practice is applicable to all irrigated lands.

An irrigation system adapted for site conditions (soil, slope, crop grown, climate, water quantity and quality, etc.) must be available and capable of applying irrigation water to meet the intended purpose(s).

## Conservation Management Systems

IWM is generally one of several components of a resource management system used to manage water supplied to a crop through an irrigation system that is

part of an overall resource management plan for the irrigated cropland.

## Irrigation Water Management Planning

IWM components of the conservation plan will contain the following information:

- Field map(s) and soil survey information
- Crop rotation or sequence
- Recommended irrigation water application rates, timing, and method of application
- Locations of designated sensitive areas
- Guidelines for irrigation system operation and maintenance

IWM is most effective when used in conjunction with other conservation practices such as irrigation system design, cover crop, residue management, conservation buffers, nutrient management, pest management, and conservation crop rotation.

IWM requires knowledge, skills, and desire to determine when irrigation water should be applied. The main factors influencing IWM are:

- **Irrigation interval** (time between irrigations),
- **Irrigation set time** (time water is applied), and
- **Application rate** (rate at which water is applied).

These parameters define the timing and duration of irrigation and the amount of water applied. System design and maintenance are also important factors influencing IWM.

**IRRIGATION WATER MANAGEMENT****Water Rights**

Under Oregon law all water is publicly owned and anyone planning to store or divert surface or groundwater for the purpose of irrigation must obtain a permit or water right from the Oregon Water Resources Department. These permits or water rights must be obtained prior to the use of the water. It is the responsibility of the landowner to file for the necessary permits or water rights. The landowner should complete a *Producer Self-Certification of Irrigation History* (OREGON BULLETIN NO. OR210-2007-2).

**Operation and maintenance**

The operation and maintenance (O&M) aspects applicable to this standard consist of evaluating available field soil moisture, crop evapotranspiration rates and changes in soil intake rates and adjusting the volume, application rate, and/or frequency of water application to achieve the intended purpose(s). A review of the effectiveness of the IWM Plan is useful in evaluating the effectiveness of the Plan and its implementation.

Other necessary O&M items are addressed in the physical component standards considered companions to this standard such as Irrigation System and Irrigation Water Conveyance.

**IWM Plan Specifications**

An IWM Plan shall be developed to assist the irrigator or decision-maker in the proper management and application of irrigation water. Factors to be included in the IWM Plan include the following:

- Statement of objective(s) for the IWM Plan
- Description of the irrigation system and its components including water supply, water conveyance and application systems, and any water measurement devices.
- Soils information including available water capacity, depth, and limiting conditions related to irrigation water management.
- Crop information including crops grown, irrigation water requirements, and physical characteristics including rooting depth.
- Description of irrigation scheduling and system management including methods for measuring and/or estimating crop water use and soil moisture levels.
- IWM record keeping requirements of appropriate detail for the IWM objectives. The detail of IWM may be specified as ***Detailed or By Irrigation Cycle*** with the associated level of record keeping as appropriate for the level of detail.
- IWM review requirements regarding the effectiveness of the IWM Plan and its implementation.

**Worksheets**

IWM Worksheets and Record Sheets for developing an IWM Plan and associated reporting are contained in the Oregon Supplements to Part 652, *Irrigation Guide*, Chapters 2, 9, and 10.

The Job Sheet and Worksheets are available as MS Word .doc files suitable for electronic fill-in. The files are found in the NRCS Oregon Engineering web site in the section **Oregon Supplements to NEH Part 652, Irrigation Guide**.

# IRRIGATION WATER MANAGEMENT

## Irrigation Water Flows, Volumes, and Relationships

$$Q \times T = D \times A$$

where:

- Q = flow rate (acre-in/hr or cfs)
- T = time (hr)
- D = gross depth applied (in)
- A = area (acres)

$$Q = \frac{453 \times A \times D}{F \times H}$$

where:

- Q = flow rate (gpm)
- A = area (acres)
- D = gross application depth (in)
- F = irrigation period (days)
- H = hours of operation per day

### Water Flow Rates:

- 1 cubic foot per second (cfs) = 448.8 gallons per minute
- 1 cfs for 1 hour = 0.99 acre-inch
- 1 cfs for 24 hr = 1.98 acre-ft
- 1,000 gpm = 2.23 cfs
- 1,000 gpm for 24 hr = 4.42 ac-ft
- 1 gpm/acre = 0.053 ac-in/ac/day
- 1 cfs = 40 miner's inches in OR, No CA
- 1 cfs = 50 miner's inches in ID, WA
- 1 miner's inch = 11.22 gpm in OR
- 1 miner's inch = 9 gpm in ID, WA
- 1 cfs = 28.32 liters/sec
- 1 cubic meter/sec = 35.3 cfs
- 1 liter/sec = 15.85 gpm

$Q \times T = D \times A$  where  $Q = cfs$

$T = hr; D = inches\ depth; A = acres$

### Gpm for 5 ft/s velocity in PVC pipe

6"	8"	10"	12"	14"
480	800	1250	1750	2150



### Water Volumes & Weights:

- 1 cubic foot = 7.48 gallons = 62.4 lb = 28.3 liters
- 1 acre-foot = 43,560 cubic feet (1 acre covered 1 ft deep)
- 12 acre-in = 1 acre-ft = 325,829 gal
- 1 million gallons = 3.07 acre-ft
- 1 acre-ft = 1,234 cubic meters
- 1 cu meter = 1,000 liters = 35.3 cu ft

### Pressure and Pressure Head:

- 1 psi = 2.31 ft of pressure head
- 1 atmosphere (sea level) = 14.7 psi = 33.9 ft of head

### Lengths and Areas:

- 1 mile = 5,280 ft = 1.61 km
- 1 meter = 3.28 ft = 39.37 inches
- 1 acre = 43,560 square ft
- 1 hectare = 2.47 acres

### Pump Power Requirement

Horsepower =

$$= \frac{\text{Pump Head in ft} \times \text{gpm}}{39.6 \times \% \text{ Pump Efficiency}}$$

# IRRIGATION WATER MANAGEMENT

Landowner/Operator: \_\_\_\_\_

Job Location: \_\_\_\_\_

County: \_\_\_\_\_ SWCD: \_\_\_\_\_ Farm/Tract: \_\_\_\_\_

Referral No.: \_\_\_\_\_ Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

**PLAN APPROVAL AND ACCEPTANCE:**

Practice Code No.	PRACTICE	LEAD DISCIPLINE	CONTROLLING FACTOR	UNITS	JOB CLASS				
					I	II	III	IV	V
449	Irrigation Water Management	CED-WME & BCSD-Agron	Area	Acres	40	320	640	2000	All

Number of Acres: \_\_\_\_\_ Job Class: \_\_\_\_\_

Plan Prepared by: /s/ \_\_\_\_\_ Date: \_\_\_\_\_

Job title: \_\_\_\_\_

Plan acceptance by landowner/operator by: /s/ \_\_\_\_\_ Date: \_\_\_\_\_

**PRACTICE CERTIFICATION:**

Year <span style="font-size: 2em;">→</span>				
Suitability of IWM Plan:*				
Irrigation records including*				
Individual irrigation application amounts:				
Application timing:				
Total seasonal amount applied:				
Review of IWM Plan and Implementation:				
Practice meets specification:*				
Contract item number:				
Approved by: /s/				
Date:				

\* Note **A** for **Acceptable** or **U** for **Unacceptable**