

***Technical Manual:
Best Management Practices for Securing a Drought Permit for
use on the Columbia River Mainstem***

What is the purpose of this manual?

This manual describes water use best management practices (BMPs) for water right holders who apply for a drought permit under Chapter 173-565 WAC and who elect to implement best management practices as a condition of receiving the permit.

Definitions

“On-site or on-farm application efficiency” means the ratio of the volume of water beneficially used to the volume of water applied, expressed as a percentage. This shall generally be calculated based on the water right season of use. Beneficial uses include water necessary for: plant evapotranspiration, crop heating and cooling, filling the root zone to field capacity in preparation for irrigation, germination and salt leaching. This definition applies both to farms and to lands irrigated for parks, golf courses, and playfields.

“Conveyance loss” means one minus the ratio of the volume of water supplied to the site to the volume of water diverted or withdrawn, expressed as a percentage.

Water Use Sectors

Best management practices will vary according to the acreage size and type of irrigation or other water use, as follows:

1. **Small Irrigation.** Water rights for the irrigation of no more than 25 contiguous acres.
2. **Medium Irrigation.** Water rights for the irrigation of 26 to 100 contiguous acres.
3. **Large Agricultural Irrigation.** Water rights for the irrigation of more than 100 contiguous acres of commercial cropland.
4. **Residential, Park and other Landscape Irrigation.** Water rights for the irrigation of one or more of the following: residential landscaping, parks, colleges, playfields, golf courses and other landscape irrigation served by a city or irrigation district.
5. **Other.** Water rights for any use not specifically addressed in the categories above.

The following practices apply to all sectors:

1. **Fish Screening.** Water diversion facilities are required to be equipped with a fish screen approved by the Washington Dept. of Fish and Wildlife (WDFW), pursuant to RCW 77.55.040 and 77.55.320, and WAC 220-110-190. Known facilities are routinely inspected by WDFW staff, and it is the responsibility of the diversion owner to adequately maintain their facility. Any noncompliance issues will be rectified within a compliance period approved by WDFW.
2. **Water Measurement and reporting.** Source water diversions are metered and data collected as described in the rule “Requirements for Measuring and Reporting Water Use,” Chapter 173-173 WAC. Water right holders shall also report monthly water use totals and monthly peak diversions to the department. Reporting shall be done using one of the available electronic reporting methods.

In addition, the following practices apply to small irrigation, medium irrigation and large agricultural irrigation sectors:

1. **Operation and Maintenance Plans (O & M).** When submitting an application for the adoption of irrigation sector BMPs, water right holders will include an operation and maintenance (O&M) plan describing the measures and implementation schedule for maintaining their water pumping and delivery systems. The O&M plan will specifically address component replacement and maintenance actions that will ensure optimal BMP performance during the operating life of the water pumping and delivery systems.
2. **Cover crops.** Cover crops shall be allowed for cooling enhancement and/or to reduce soil erosion.
3. **Frost protection and cooling water.** The application efficiencies listed in Table 1 do not apply to frost protection or cooling water.
4. **Voluntary water use improvements.** Water right holders are encouraged to try new or additional water management and efficiency practices, and continue use where effective and practical. Examples include but are not limited to:
 - a. Variable rate irrigation practices (acre-to-acre systems) and new forms of precision application and emitter controls.
 - b. Computer monitoring of irrigation systems for both efficiency and performance measures.
 - c. Underground drip application systems for broad commercial applications.
 - d. Soil conditioning products (“soil soap” or “wet soil” products).

Small Irrigation Sector BMPs

Water use associated with a drought water right and classified as small irrigation shall meet the following best management practices. These are in addition to the screening, measurement and operation & maintenance plan requirements above.

1. **Pumping and conveyance efficiencies.** All transmission/distribution systems between the source and the field are closed, pressurized systems, with conveyance losses of less than 5%.
2. **Irrigation scheduling.** Timed irrigation sets will be used to apply irrigation water based on turf/crop consumptive demand. Weather and evapo-transpiration data shall be checked monthly and scheduling updated if needed.
3. **On-site application efficiency.** On-site application efficiency shall not be less than the efficiencies shown in Table 1.

Table 1. On-site or On-farm Application Efficiencies

Irrigation Technology	Application Efficiency
Solid Set (above canopy)	65%
Solid Set (below canopy or row crop)	70%
Pop-up sprinkler heads	65-70%
Wheel-Line or Hand-Line (impact sprinkler)	65-70%
Traveling Gun-Single Nozzle	65%
Center Pivot (over-head impacts, >25 psi)	75%
Center Pivot (drop tube <25 psi)	85%
Micro-Sprinkler	85%
Drip-Precision Irrigation	90-95%

Medium Irrigation Sector BMPs

Water use associated with a drought water right and classified as medium irrigation shall meet the following best management practices. These are in addition to the screening, measurement and operation & maintenance plan requirements above.

1. **Pumping and conveyance efficiencies.** All transmission/distribution systems between the source and the field are closed, pressurized systems, with conveyance losses of less than 5%.
2. **Irrigation scheduling.** Timed irrigation sets will be used to apply irrigation water based on turf/crop consumptive demand. Weather and evapotranspiration data shall be checked weekly and scheduling updated if needed.
3. **On-site application efficiency.** On-site application efficiency shall not be less than the efficiencies shown in Table 1.

Large Agricultural Irrigation BMPs.

Water use associated with a drought water right and classified as large agricultural irrigation shall meet the following best management practices. These are in addition to the screening, measurement and operation & maintenance plan requirements above.

(1) Pumping and conveyance efficiencies.

All transmission/distribution systems between the source and the field are closed, pressurized systems, with conveyance losses of less than 5%.

(2) Irrigation scheduling.

Soil moisture sensors and probes (and/or other remote sensing technologies) shall be employed by water users for monitoring water needs. These data shall be reviewed jointly with real-time weather forecast data to establish daily, and near-term, irrigation schedules. Any noncompliance issues will be rectified within three years of enrolling in the program.

(3) Irrigation water requirements.

All conventional standards for estimating irrigation water requirements are met or exceeded as follows:

- Irrigation water requirements shall be based on measurements or estimates of crop consumptive use (evapo-transpiration), less the effective growing season rainfall (2-year return period).
- Additional irrigation requirements for leaching, germination, frost protection, cooling, and longer return periods (e.g. 10-year or 20-year) shall be included by the department if applicable and based on site-specific technical guidance.
- Technical guidance for estimating irrigation water requirements include Washington State University (WSU) literature (e.g. Washington Irrigation Guide, WSU Cooperative Extension Bulletin EB1513, and periodic updates), WSU Public Agricultural Weather Systems (PAWS) data, or other sources the department determines are appropriate.

(4) On-farm application efficiency.

- a. On-farm application efficiencies shall not be less than the efficiencies shown in Table 1. By 2015, on-farm application efficiency must meet the appropriate value in Table 1 or 75%, whichever is greater.
- b. By 2015, drip irrigation and precision irrigation systems shall be introduced where crop types and technology allow.

Residential, Park and other Landscape Irrigation BMPs

Water use associated with a drought water right and classified as residential, park and other landscape irrigation shall meet the following best management practices. These are in addition to the screening and measurement requirements above.

1. Pumping, transmission, and distribution system efficiencies.

Leakage losses from the source diversion to the customer's connection shall not exceed 10% for closed-pipe systems OR water suppliers will annually conduct a leak detection survey on a minimum of 10 percent of their transmission and distribution system. Repairs will be completed within 120 days of detecting a leak.

All new mainline transmission and distribution systems shall be closed pipe systems, and have leakage losses of less than 10%.

For open channel systems, operational spills will be measured and shall not exceed 10% of the total diverted flow.

Existing transmission canals must be piped by December 31, 2015.

2. Water use inventory

The goals of this data collection are to provide data of sufficient accuracy for the water supplier to: 1) know how much water is being used in different areas of the system relative to turf/landscaping irrigation requirements; 2) manage the system efficiently, and 3) implement appropriate, targeted water use efficiency activities.

Source metering will be conducted as described above.

Water use and flow in the system will be measured. Flow meters installed at strategic points (i.e. zone metering) within the distribution system, representative metering (i.e. metering of a small number of each customer class) and/or service metering of all connections may be used in conjunction with source meters to inventory flow. If zone metering is used, there shall be one meter for every 10 to 15% of the total flow diverted or for those portions of systems where inter-ties or looped distribution pipe create two way flow in pipes, meters will be installed where there are single points of entry and flow is in one direction. A guideline for the zone size intended is 100 to 500 residences. If representative metering is used, service meters shall be installed on at least 5 percent of meters from each customer class that the representative metering is being used to estimate. Measurement and devices will be consistent with the metering requirements under WAC 173-173-090 through 120. Meters shall be read and data recorded on a monthly basis during the season of use.

Service meters for parks, colleges, playfields, golf courses and other open spaces greater than 5 acres and connections using greater than 5% of the total volume of the water right

shall be installed. Measurement and devices will be consistent with the metering requirements under WAC 173-090 through 120. Meters shall be read and data recorded on a monthly basis during the season of use.

3. Use of water inventory data

Water use data for areas not under city or utility ownership or management (e.g. residential areas) shall be used for one or more of the following options.

Option 1: Benchmarking and selection of water efficiency measures

The utility will estimate the area under irrigation for each inventory meter. Average lot size for the area or other readily available data from the assessor's office may be used. An estimate of the areas not irrigated shall be subtracted from the total area (e.g. footprint of buildings, driveways, streets and sidewalks). For each of these areas, the utility will compare actual water use to the crop irrigation requirements (plus distribution/ transmission leakage and the application efficiency listed in Table 1) for each month of irrigation. Irrigation requirements published each year by Washington State University or National Resource Conservation Service may be used. The comparison may be done each month or once per year. The estimate shall be no more than plus or minus 20% of the true value.

Water inventory data and the estimate of water use relative to the crop irrigation requirements will be used to: recommend irrigation scheduling to users, select other water efficiency measures the utility believes are appropriate (e.g. public education, audits, pressure management, pipeline materials management and enforcement) and track effectiveness of conservation activities.

The area for each inventory meter and the volume of water used for each area shall be retained and made available to Ecology if requested.

OR

Option 2: Conservation pricing

Billing based on metered usage and an allocation based rate structure or other conservation pricing that encourages users to water efficiently (i.e. use of the appropriate amount of water to keep plants healthy).

4. Irrigation scheduling

For parks, colleges, playfields, golf courses and other open spaces greater than 5 acres and under city or utility ownership or management; irrigation scheduling using soil moisture probes, weather data and appropriate irrigation water requirements shall be used. Scheduling shall be updated on a weekly basis.

5. Public Outreach

Customers shall be notified at the start of the irrigation season of:

- the importance of efficient use of water,
- availability of weekly forecast advice pertaining to watering,
- advice on why customer owned pipelines break or leak,
- enforcement actions that may take place if abuse of watering is discovered and
- any other water wise advice the utility deems appropriate.

The local agency and/or utility will provide a weekly forecast on appropriate residential watering amounts in a location the local agency and/or utility believes will best communicate to customers. The forecast shall be in inches, timer percent and/or whatever measures will be easiest for water users to understand and implement.

6. Excessive Use of Water

Local agencies and/or utilities that use a drought water permit for irrigation will put in place ordinances, policies or rules controlling the excessive use of said water. Excessive use of water from a drought water permit; such as standing water on turf, wet impervious surfaces will be addressed in a progressive manner. The user or customer will be notified of the excess use and requested to correct the usage. If not corrected, the manner of excessive use of water will be quantified by metering, pictures, and/or moisture testing. Based on that information, the customer will again be notified and requested to modify the usage. If the excessive use is not corrected by the customer within the time frame set forth in the ordinance, the case will be sent to the appropriate department or board and a significant fine will be assessed of the customer until the excessive use has ceased.

Other Water Use

If an application for a drought permit is received by Ecology where the water use is not appropriately covered by the BMPs listed above, e.g. water right holders with the purpose of use listed as industrial, Ecology shall establish requirements on a case-by-case basis.

Variations

A water right holder may request in writing a variance from individual elements of these BMPs. The request will include the rationale for change or modification. No variance request shall be considered granted until Ecology has approved it in writing.

Ecology has the discretion to approve or disapprove the request based on the criteria below:

- the system infrastructure is not compatible with the BMP, OR
- the BMP would be unduly burdensome for the water right holder,

AND,

- the water right holder has proposed a suitable substitute for the element.