WATER MANAGEMENT PLAN, REVISION 2

Western Ecology Division Main Laboratory, Corvallis, Oregon

OARM Sustainable and Transportation Solutions Branch (STSB) **October 2016**

Overview

This report summarizes the findings and recommendations associated with a water use and conservation assessment conducted at the U.S. Environmental Protection Agency's (EPA's) Office of Research and Development (ORD) National Health and Environmental Effects Research Laboratory (NHEERL) Western Ecology Division Laboratory (hereafter referred to as Corvallis WED) located in Corvallis, Oregon. Under this Water Management Plan revision, Corvallis WED will consider implementing the potential water conservation opportunities identified during the water assessment, which are summarized in Table 1. The Water Management Plan also describes the facility's water reduction goals, water use trends, end uses of water, drought management plans, and stormwater management efforts.

Background

Executive Order (EO) 13693, Planning for Federal Sustainability in the Next Decade, signed in March 2015, requires agencies to reduce potable water consumption intensity, measured in gallons per gross square foot (gsf), by 36 percent by fiscal year (FY) 2025. Reductions are measured relative to the Agency's baseline water consumption in FY 2007, through reductions of 2 percent annually. In addition to the potable water use reduction requirements in EO 13693, the order requires that agencies reduce industrial, landscaping, and agricultural (ILA) water consumption by 2 percent annually or 30 percent by the end of FY 2025, relative to an FY 2010 baseline (including nonpotable sources). Agencies also should install water meters and utilize building and facility water balance data to improve water conservation and management.

The implementing instructions of EO 13693 require that, where applicable, agencies should purchase WaterSense® labeled products and choose irrigation contractors who are certified by a WaterSense labeled program.

The Energy Independence and Security Act (EISA) of 2007 directs agencies to complete comprehensive energy and water evaluations for 25 percent of covered facilities (i.e., those accounting for 75 percent of total agency energy use) each year, resulting in each covered facility being assessed once every four years. It also directs agencies to implement cost-effective measures identified through life-cycle analyses and measure and verify water savings.

Figure 1: View of the Western Ecology Division Laboratory main building in Corvallis, Oregon.

[1] WaterSense is a partnership program established by the EPA to promote water efficiency. Products and services that have earned the WaterSense label have been certified to be at least 20 percent more efficient and perform as well or better than standard models. Products that are eligible for the label include toilets, flushing urinals, showerheads, private lavatory faucets, pre-rinse spray valves, and irrigation controllers.

To achieve greater Agencywide water efficiency and to meet EISA requirements, a water assessment was conducted by the OARM's Office of Administration, Safety and Sustainability Division (SSD) at Corvallis WED May 17-18, 2016. Since 2002, the EPA's Sustainable and Transportation Solutions Branch (STSB) have conducted water assessments at EPA-owned and operated laboratories to improve water efficiency and comply with EO 13693 and EISA 2007. The assessment team (Angela F. Nunez Matos, STSB; Rafael Hernandez, STSB; and Robert Pickering, Eastern Research Group, Inc. [ERG]) conducted the water assessment at Corvallis WED to review existing conditions and update the previous 2011 Water Management Plan.

Table 1. Potential Water Conservation Opportunities at Corvallis WED

Suggested Priority	Project Description	Number of Fixtures	Project Cost	Potential Annual Water Savings (Gallons)	Potential Annual Energy Savings (Million Btu)	Potential Annual Utility Cost Savings[2]	Potential Payback (Years)	Notes
1	Install 0.5 gallon per minute (gpm) aerators on six faucets within the Corvallis modular complex and trailers.	6	$60	12,000	5	$180	0.3	None
2	Fix leaky water connections and water basins at Terrestrial Effects Research Facilities (TERF) evaporative coolers. Develop an effective preventative maintenance program to ensure TERF evaporative coolers continue to operate	N/A	$1,500[3]	259,000	0	$1,500	1.0	None
3	Replace two existing showerheads in the TERF with 1.75 gpm WaterSense	2	$60	3,000	0	$30	2.0	None
4	Install automatic conductivity controllers on all cooling towers to control blowdown frequency. Increase conductivity set point to between 1,200 and 1,500 uS/cm.	N/A	$4,000	29,000	Not quantified	$175	22.9	Facility should also work with its water treatment vendor to identify the maximum achievable cycles of concentration and set the conductivity controller accordingly to initiate blowdown once the conductivity threshold is exceeded.

[2] Estimated utility cost savings are based on Corvallis WED's water rate of $1.54 per Kgal and a sewer rate of $4.48 per Kgal.

[3] Project cost assumes repair cost of $250 per evaporative cooler, and that six of the nine evaporative coolers need immediate repair to prevent leaks.

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Suggested Priority	Description	Number of Fixtures	Project Cost	Potential Annual Water Savings (Gallons)	Potential Annual Energy Savings (Million Btu)	Potential Annual Utility Cost Savings[2]	Potential Payback (Years)	Notes
5	Install and monitor make-up and blowdown flow meters on all cooling towers. Submeters are needed on the main building cooling tower system's make-up line and blowdown line and the TERF cooling tower blowdown line.	N/A	$1,500	Not quantified	Not quantified	Not quantified	Not quantified	Installing and monitoring submeters will help the facility better track the usage of cooling tower make-up water and ensure better management of the cooling tower in general.

Facility Information

Corvallis WED is located on 10 acres surrounded by the campus of Oregon State University. It includes a variety of laboratories, plant research facilities, a library, a computer center, and office space.

Within Corvallis WED are a number of greenhouse and field research modules known as Terrestrial Effects Research Facilities (TERF). These units provide the capability for research on: effects of gaseous air pollution; effects of heavy metals; effects of toxic substances; and plant propagation and growth assessments. Corvallis WED also houses a field exposure facility with 21 large, open-top exposure chambers, a nursery site, an automated irrigation system, an experimental rhizotron site, and a control center containing automated pollutant delivery control and data acquisition/ management systems.

To complement the plant exposure facilities described above, Corvallis WED constructed a highly sophisticated Terrestrial Ecophysiology Research Area (TERA) in 1994. The facility consists of a large polyhouse to shelter the data acquisition and control computers and a field of sunlit plant growth chambers.

Built in 1966, the main laboratory building at Corvallis WED has been occupied by EPA since 1970. The research complex has been developed over the years. In addition to the facilities described above, an annex, greenhouses, and office trailers were added in the 1970s. A chemical storage building was added in the 1980s and a plant ecology building (PEB) was constructed in 1990. The laboratory complex is owned and operated by EPA, and it comprises 104,506 square feet of conditioned space.

A new annex is being constructed at Corvallis WED that will provide approximately 4,700 square feet of new space. There are also plans to fully renovate the main laboratory building through a phased project. EPA WED's Willamette Research Station (WRS) in Corvallis, Oregon might be used as swing space during these renovations; however, a final decision has yet to be made. The Corvallis WRS facility is not included in this water management plan.

Corvallis WED has approximately 128 occupants, including 80 EPA employees and 48 contractors, post-doctorates, and student contractors. The facility operates on a flex time schedule and is typically occupied Monday through Friday between the hours of 7:30 a.m. and 4:30 p.m. EPA does not currently have any plans to vacate the facility.

Water Management Goals

Corvallis WED achieves its resource conservation goals by implementing the EPA ORD-wide Environmental Management System (EMS). The Water Management Environmental Management Program (EMP) within ORD's EMS sets objectives and targets related to water use to reduce the impact on natural resources. It does so by reducing the consumption of water from facility and laboratory operations and by properly managing stormwater runoff. Targets established under this objective call for ORD facilities to:

- Achieve the agency ConservW targets (set annually by EPA's STSB) as a cumulative total of all seven locations.
- Identify potential water conservation or stormwater management projects for their sites to be completed by FY 2017.

Although not expressly stated, ORD's objectives and targets for water management imply 36 percent potable water reduction goal by the end of FY 2025, compared to an FY 2007 baseline, and 30 percent ILA water reduction goal by the end of FY 2025, compared to an FY 2010 baseline, consistent with EO 13693.

Water Supply, Measurement, and Historical Use

Corvallis WED uses water for miscellaneous laboratory and research purposes, cooling tower make-up, irrigation for plant growth research, sanitary needs, and landscape irrigation. The following sections provide additional details on the facility's water use.

Water Supply

Corvallis WED's potable water and sewer service is provided by City of Corvallis. Potable water is billed at a rate of $1.15 per CCF ($1.54 per thousand gallons [Kgal]) and sewer is billed at $3.35 per CCF ($4.48 per Kgal).

Meters and Submeters

Incoming water is supplied through five separate metered lines that service the following areas:

- Main building and annex indoor use
- PEB
- TERA, Corvallis modular complex and trailers (COR-MOD), and chemical storage building
- TERA irrigation
- TERF

An irrigation line, stemmed from the main building's water line, has a sewer deduct submeter that captures all water used by the landscape irrigation system around the main building and annex. Sewer fees are not applied to this water use, nor are they applied to water use captured on the TERA irrigation meter.

A flow totalizing meter is also installed on the make-up water line to the TERF cooling tower; however, the blowdown line is not metered. Supply water to RO systems and permeate water from the RO systems in the main building and TERF are also submetered.

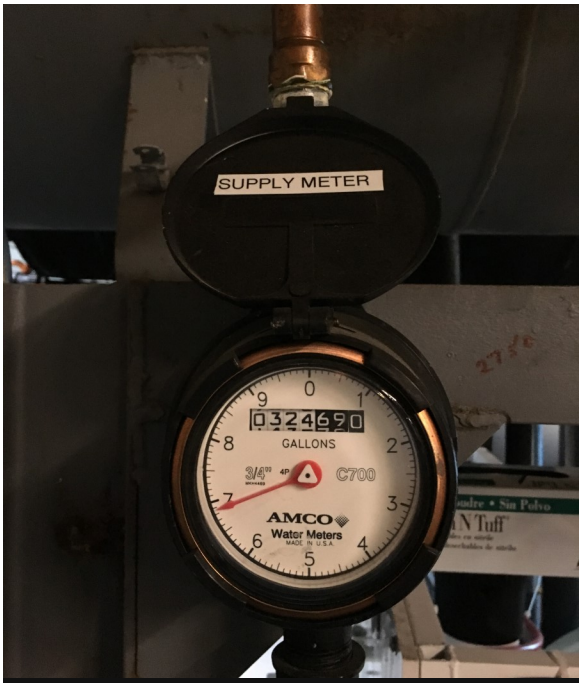

Figure 2: A flow totalizing submeter is installed on the supply line of the main building's RO system.

To provide more precise water use and efficiency information related to the main building and TERF cooling towers, Corvallis WED will consider installing submeters on the make-up line to the main building's cooling tower system and blowdown lines to both the main building's and TERF's cooling tower. In addition, under this plan, Corvallis WED should monitor these meters and record water use monthly. Water use trends will be evaluated by the facility manager, and unanticipated usage trends will be investigated and resolved.

Table 2 provides a summary of the meters and submeters installed at Corvallis WED, the area each meter serves, and the meter reading collected at the time of the assessment.

Table 2. Corvallis WED Meters and Submeters, May 2016

Meter Location	Area/System Served by Meter	Meter Number	Utility Account Number	Water Source	Meter Reading From Assessment
Grassy area north of PEB and east of TERA, on north property line	TERA, COR-MOD, and chemical storage (2" line)	#870493	#159275-128720	City potable water	625,530 cubic feet
Adjacent to east side of chemical storage building	TERA irrigation	#900510	#455-380	City potable water	166,390 cubic feet
Southeast corner of TERF building	TERF (2" line)	#61026860	#159325-128770	City potable water	1,404,664.7 cubic feet
Southeast corner of main building on walkway	Main building irrigation deduct meter	#74931505	#159245-128690	City potable water	56,520.7 cubic feet
RO system in main building mechanical penthouse	Main building RO system supply line	N/A	N/A	City potable water	324,690 gallons
RO system in main building mechanical penthouse	Main building RO system permeate	#20008151	N/A	RO product	67,599 gallons
TERF mechanical room	TERF cooling tower make-up	N/A	N/A	City potable water	6,103,100 gallons
TERF RO system	TERF RO system supply line	N/A	N/A	City potable water	760,500 gallons
TERF RO system	TERF RO system permeate	#200078548	N/A	RO product	141,889 gallons

Historical Water Use

In response to EO 13693 and the executive orders that preceded it, Corvallis WED established a FY 2007 water use intensity baseline of 63.94 gallons per gsf based on 6,178,910 gallons of water used that fiscal year. In FY 2015, water use intensity was reduced to 23.91 gallons per gsf, or 2,499,242 gallons of water—a decrease of 63 percent compared to the FY 2007 baseline. Figure 3 provides a graph of Corvallis WED's water use from FY 2007 through FY 2015.

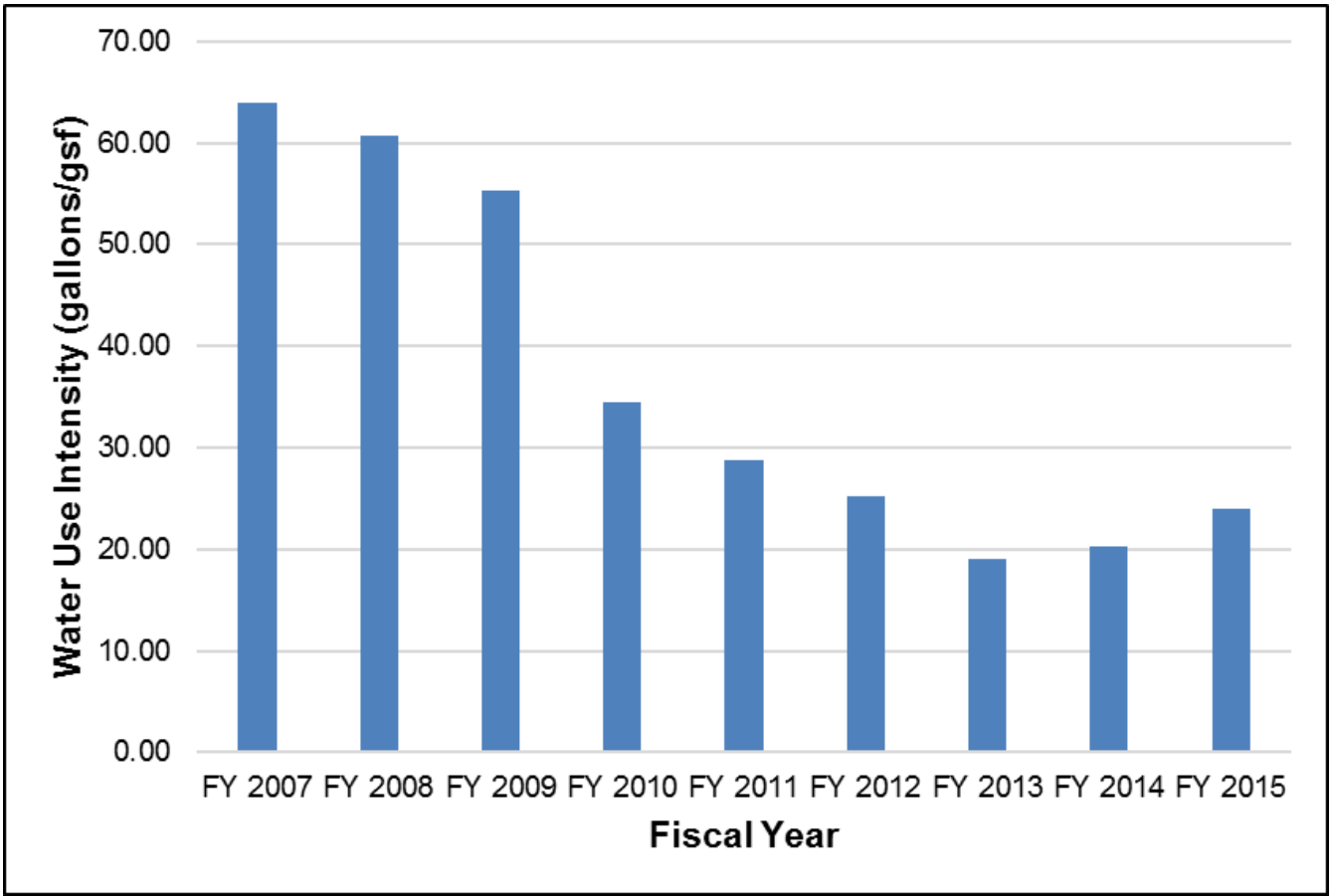

Figure 3: Corvallis WED's Water Use Intensity, FY 2007 to FY 2015.

End Uses of Water

Table 2 and Figure 4 identifies the end uses of water at Corvallis WED based on the facility's water use in FY 2015. Where individual buildings located at Corvallis WED are metered separately, end uses of water are associated with a specific building. The uses are described in more detail below.

Table 2. Major Potable Water Uses at Corvallis WED, Fiscal Year 2015

Major Process	FY 2015 Annual Water Use (gallons)	Total Water Use (%)	Basis of Estimate
Main Building and Annex			
Cooling tower make-up	760,000	30.4	Engineering estimate based on seasonal difference in facility water usage. Cooling tower water use mainly occurs in summer months
Irrigation for pollinator program	380,758	15.2	Metered total from irrigation deduct meter on account #159245-128690
Miscellaneous laboratory and other process water use	245,057	9.8	Calculated by subtracting all other estimated and known water uses from the metered total from account #159245-128690
Sanitary	110,000	4.4	Engineering estimate based on sanitary fixtures installed, occupancy, and daily usage factors

Table 2. Major Potable Water Uses at Corvallis WED, Fiscal Year 2015

Major Process	FY 2015 Annual Water Use (gallons)	Total Water Use (%)	Basis of Estimate
Main Building and Annex			
Main building RO system reject	23,427	0.9	Difference between daily readings collected from main building RO system supply and permeate meters
Main building RO system permeate	12,020	0.5	Daily readings collected on main building RO system permeate meter
TERF			
Cooling tower and evaporative coolers	427,000	17.1	Engineering estimate based on increased usage in summer months
Leaks from evaporative coolers	259,000	10.4	Engineering estimate based on TERF meter readings and observed leakage
Miscellaneous (steam sterilizer, sanitary, etc.)	55,564	2.2	Calculated by subtracting all other estimated and known water uses from the metered total from account #159325-128770
TERF RO system reject	23,551	0.9	Difference between daily readings collected from TERF RO system supply and permeate meters
TERF RO system permeate	18,095	0.7	Daily readings collected on TERF RO system permeate meter
TERA, COR-MOD, and chemical storage building			
Irrigation for research	106,233	4.3	Metered total from account #455-380
Other miscellaneous water use	15,301	0.6	Calculated by subtracting all other estimated and known water uses from the metered total from account #159275-128720
Sanitary	61,000	2.4	Engineering estimate based on sanitary fixtures installed, occupancy, and daily usage factors
PEB			
Sanitary and process water	2,244	0.1	Metered total from account #159265-128710
Total Potable Water Use	**2,499,242**	**100.0**	**FY 2015 total water use from metered total**

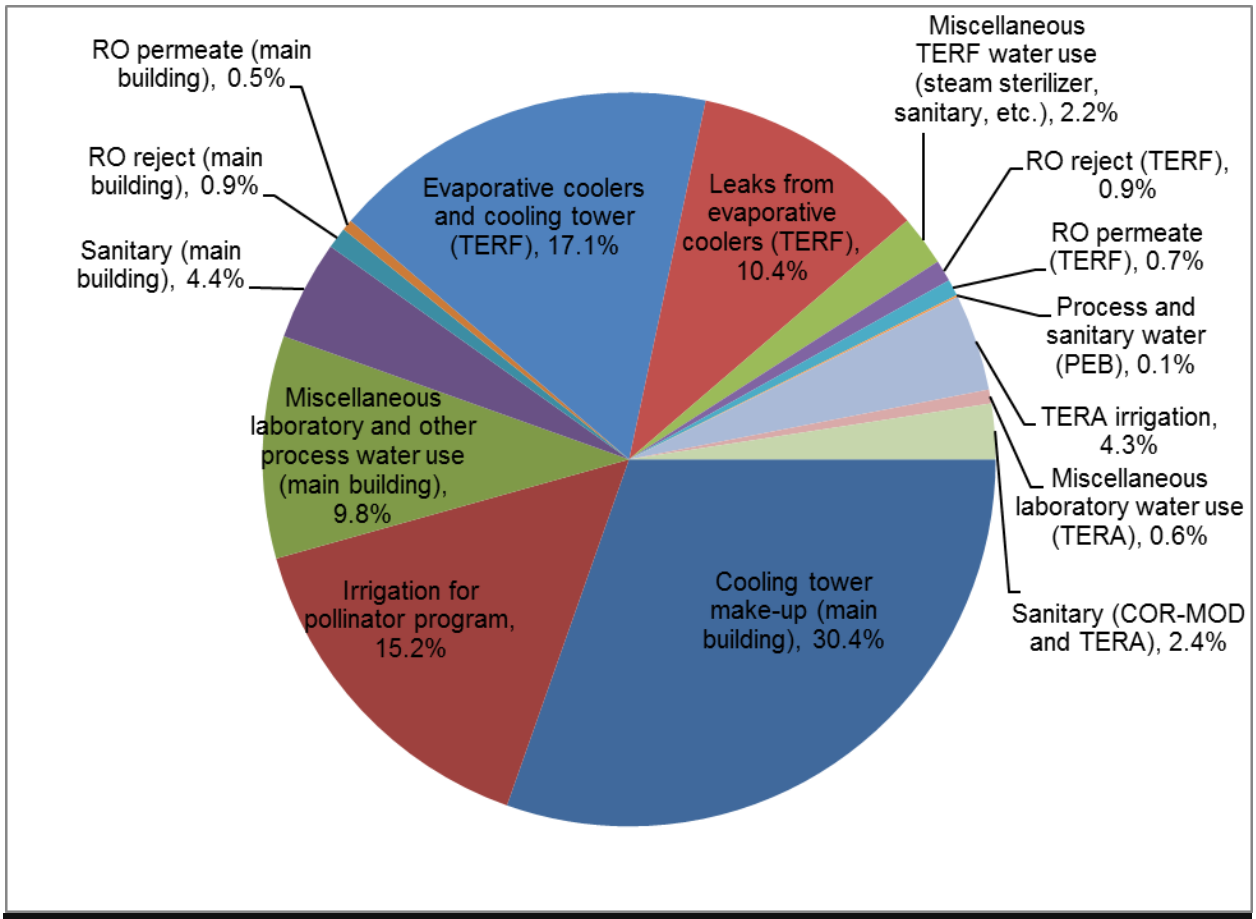

Figure 4: Corvallis WEB's Water End Uses for FY 2015.

Cooling Towers

The laboratory is equipped with three cooling towers, each of which was replaced with new models in 2015. A 125-ton unit is installed at TERF and is used for process and comfort cooling. The main laboratory building is equipped with two 150-ton cooling tower units, which provide building cooling. These units are operated in sequence, one each during alternate cooling seasons. If the cooling demand is high enough, Corvallis WED can utilize both cooling towers.

Figure 5. Two 150-ton cooling towers are operated in sequence to provide building cooling in the main building.

Cooling tower blowdown from each tower is controlled manually, with blowdown initiated based on the water treatment vendor's recommendation. Cooling tower water chemistry is tested monthly for alkalinity, chlorides, hardness, pH, total dissolved solids, biological growth, and phosphonate to control scale and corrosion. A dry chemical system is used to control for scale, corrosion, and biological growth.

Because the cooling tower water chemistry at TERF and the main building are manually controlled only once per month, the conductivity of the circulating water varies significantly, from approximately 400 to approximately 900 uS/cm. City make-up water has a relatively low dissolved solids content, with a resultant conductivity typically between 100 and 150 uS/cm. Therefore, the cooling tower systems achieve variable cycles of concentration, typically ranging between 4 and 8.

To better maintain the cooling towers and control blowdown, Corvallis WED should consider installing an automatic conductivity and blowdown control system. Corvallis WED should also work with its cooling tower vendor to determine if the towers can continue to operate properly if the conductivity limit was increased to 1,200 to 1,500 uS/cm. This would allow the cooling towers to consistently achieve cycles of concentration of between 10 and 15, reducing the amount of make-up water required in the system.

Corvallis WED experienced an anomalous increase in summertime water use in FY 2015 compared to previous fiscal years. Cooling tower water use at the main laboratory building is estimated to be between 200,000 gallons and 350,000 gallons annually depending on cooling needs, with the majority being consumed during warmer summer months. In FY 2015, water use during the summer had an uncharacteristic increase to approximately 750,000 gallons total. While the specific reason for this occurrence is not known, it is suspected that it may be related to an anomaly in cooling tower operation, such as a stuck fill valve or blowdown valve. As discussed in the Meters and Submeters section, Corvallis WED will consider installing submeters on the make-up line to the main building's cooling tower system and blowdown lines to both the main building's and TERF's cooling tower. Regularly monitoring these submeters could help the facility identify possible leaks or anomalous activity and resolve them before significant water waste occurs.

Corvallis WED has considered capturing and reusing air handler condensate as cooling tower make-up water. Because the air handling units are not in close proximity to the cooling tower basins or chilled water loop, the facility does not intend on pursuing this project.

TERF Evaporative Coolers

Greenhouses 1 and 2 at TERF are divided into four total bays, with a central hallway connecting the bays. Each bay is equipped with two evaporative coolers, to cool and humidify greenhouse air during hot weather. The central connecting hallway is also equipped with an evaporative cooler. Noticeable moisture and puddling were identified at and around several of these evaporative coolers. Some leaky connections between water feed lines and the evaporative cooler basins were also noted. The cumulative leakage rate for the nine evaporative coolers at Greenhouses 1 and 2 is estimated to be between 1.0 gpm and 1.5 gpm, based on meter readings at TERF during the two-day assessment.

Greenhouse 8 is also equipped with an evaporative cooler. During the assessment, it was noted that the shut-off valve on the make-up water line was not operating correctly, causing water to overflow from the evaporative cooler basin directly to a floor drain. The leak was measured to be approximately 1.0 gpm. The issue was raised with the facility O&M staff, and the shut off valve was fixed, eliminating the water overflow during the assessment.

Corvallis WED should consider developing a more comprehensive preventative maintenance (PM) program for the evaporative coolers to ensure they are functioning properly and not leaking. Once water basins and connections are fixed to prevent leaks, evaporative coolers should be visited regularly during facility rounds to ensure moisture or puddling is not present, as these are clear indications of ongoing leaks.

Figure 6. Leaks in the TERF evaporative coolers causes nearby puddling, wasting up to 250,000 gallons of water annually.

Laboratory and Miscellaneous Water Uses

Purified water for laboratory use is generated in two systems of the same model, both of which were installed in October 2010 to replace less efficient systems. One is located in the main building and the other in TERF. In each case, purified water is generated through a multi-step process consisting of cartridge filtration, carbon adsorption, and RO. The RO system in the main building rejects approximately 1.9 gallons of water for each gallon of RO permeate produced. The RO system in TERF rejects approximately 1.3 gallons of water for every gallon of RO permeate produced. Each system is equipped with submeters on the system water supply line and the permeate line. There is also an RO system installed in the PEB in case its use becomes necessary; however, it is not currently operational.

Figure 7. Centralized RO systems produce deionized water for research purposes in the main building and TERF.

The main building has a wash room (Room 200) that contains a glassware washer and two steam sterilizers. The glassware washer was purchased and installed two years ago and is a water-efficient model. The steam sterilizers only apply tempering water when the sterilizers are operational. Each of these sterilizers also generates its own steam, which resulted in Corvallis WED being able to eliminate a steam boiler from the facility. A pre-rinse spray valve is also located in Room 200 and is used to pre-wash some glassware and field equipment. The measured flow rate of this device was 0.65 gallons per minute.

Room 202 previously included a steam sterilizer, but the equipment was removed due to lack of use and was not replaced. An Ice-O-Matic air-cooled ice machine is installed in Room 202 and is used for sample preparation and field work.

One steam sterilizer is in operation at TERF with onboard steam generation and tempering water flowing only when needed.

Figure 8: Three efficient steam sterilizers at Corvallis WED have on-board steam generation and only apply tempering water when in operation.

Two 2,000,000 Btu hot water boilers are used for building heat. Hot water is recirculated throughout the building in a closed loop. Corvallis WED has plans to install a third hot water boiler for redundancy and to improve operating efficiency of the hot water system. A single closed loop provides building heating in the winter months and is then switched over to chilled water for building cooling in the summer months.

Irrigation to Support Pollinator Program

During a review of Corvallis WED's water bill, it was noted that there was a spike in water usage between May 2015 and August 2015 compared to the same months the previous year. The higher than normal water usage was partially a result of irrigation that occurred to establish wildflowers and other plantings to support pollinator habitat. This project was initiated by EPA as a result of a Presidential Memorandum to promote the health of honey bees and other pollinators. Based on meter readings for Corvallis WED's irrigation meter, these activities accounted for more than 380,000 gallons of water use. Irrigation water use will be discontinued in FY 2016, as these plantings are now established.

The facility has implemented xeriscaping and native plantings to eliminate the need for supplemental water from irrigation.

Restroom and Other Sanitary Fixtures

Corvallis WED's toilets and urinals are compliant with 1992 Energy Policy Act (EPAct 1992) water efficiency requirements (1.6 gpf for toilets; 1.0 gpf for urinals). Toilets at Corvallis WED are either single-flush models that flush at 1.6 gpf, or dual-flush models with full flush of 1.6 gpf and a reduced flush of 1.1 gpf. Five of the facilities seven urinals are non-water models. For the non-water urinals, O&M personnel conduct preventative maintenance to clean drainlines and eliminate potential for odors.

The majority of lavatory faucets installed throughout Corvallis WED have a flow rate of 0.5 gpm; however, there remains a total of seven faucets in the PEB, COR-MOD, and Trailer 3 that have flow rates that exceed 0.5 gpm. The American Society of Mechanical Engineers (ASME) has established 0.5 gpm as the standard maximum flow rate for public use (e.g., all non-residential applications) lavatory faucets. This flow rate is sufficient for hand washing and is considered a best practice for lavatory sinks in public settings. To reduce facility water consumption, Corvallis WED will consider installing 0.5 gpm aerators on the seven remaining lavatory faucets.

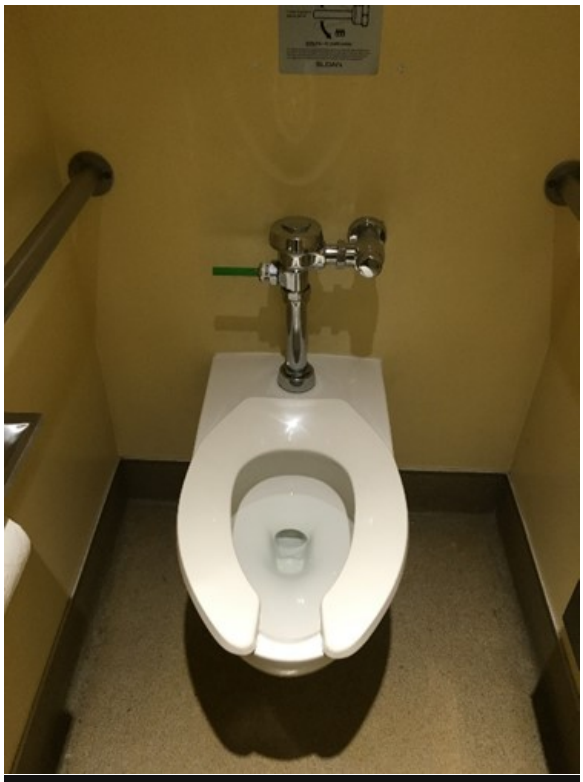

Figure 9. Corvallis WED has installed non-water urinals and five dual-flush toilets in certain restrooms to ensure efficient use of water.

Corvallis WED also has four showerheads installed, two in the Annex and two in the TERF. Three of the four showerheads have flow rates of 2.5 gpm, which meets the EPAct 1992 requirements; however, this flow rate exceeds the maximum flow rate labeling criteria established by WaterSense and adopted by EPA as best practice. The fourth showerhead has a flow rate of 2.0 gpm. The TERF contains Corvallis WED's fitness equipment, so those two showerheads are the ones that are primarily used by employees. Corvallis WED will consider installing WaterSense labeled showerheads flowing at 1.75 gpm or less in the TERF showers as a water efficiency project.

Domestic hot water is provided through electric hot water heaters. Table 3 provides an inventory of sanitary fixtures.

Table 3. Corvallis WED Sanitary Fixtures Inventory

Fixture Type	Flow Rate	Total Number
Toilets	1.6 gpf	25
	1.6 gpf full/1.1 gpf reduced (Dual Flush)	5
Urinals	1.0 gpf	1
	0.5 gpf	1
	Non-Water	5
Lavatory faucets	2.2 gpm	1
	2.0 gpm	2
	1.5 gpm	4
	0.5 gpm	20
Showerheads	2.5 gpm	6
	2.0 gpm	1

Research Irrigation

At the TERA and within its plant growth chambers, irrigation is required to maintain plant life for continuing research. This water is metered separately and reported on city water bills.

Completed Water Efficiency Projects

As described in Table 4, Corvallis WED has completed five water efficiency projects since FY 2007.

Table 4. Completed Water Efficiency Projects at Corvallis WED Since FY 2007

Project	Estimated Annual Water Savings (Gallons)	Completion Year	Additional Notes
Discontinued use of the irrigation system	250,000	FY 2011	Aside from irrigation water used in FY 2015 to establish plants as part of EPA's pollinator protection initiative, landscape irrigation at
Steam sterilizer	237,000	FY 2011	A new steam sterilizer without continuously flowing tempering water was installed to replace an existing steam sterilizer.
Faucet aerators	35,000	FY 2011	0.5 gpm faucet aerators were installed throughout the restrooms at Corvallis WED.
Irrigation audit	N/A	FY 2008	An irrigation professional certified by a WaterSense labeled program audited the Corvallis WED in-ground irrigation system and provided recommendations for improved efficiency.

Drought Contingency Plan

Drought Risk

Corvallis WED is located in an area that frequently experiences drought conditions. In 2015, the governor of Oregon declared drought in 19 of Oregon's 36 counties; however, Benton County, where Corvallis WED is located, was not in the affected area. Corvallis WED's water is supplied by the City of Corvallis, which obtains water from the Willamette River and the Rock Creek Watershed. The City of Corvallis also maintains nine reservoirs that store treated water. Except in emergency situations, these reservoirs must be maintained at minimum levels to provide water for fire suppression.

The City of Corvallis has a Water Supply Emergency Curtailment Plan, last updated in April 2010.[5] The curtailment plan has only been put into effect once, in 1994. In addition to the City's curtailment plan, the Oregon Water Resources Department (WRD) coordinates with municipalities to implement water conservation and curtailment plans when drought emergencies are declared.

Recent Contributions to Drought Contingency

Corvallis WED has reduced its water use intensity baseline of 63.94 gallons per gsf, set in FY 2007, to 23.91 gallons per gsf in FY 2015—a 63 percent reduction. Corvallis WED plans to pursue projects to continue to reduce facility water use. Corvallis WED staff will monitor water meters and submeters so that leaks or other malfunctions resulting in increased water use can be identified and resolved quickly.

[5] The City of Corvallis Water Supply Emergency Curtailment Plan is available at http://www.corvallisoregon.gov/index.aspx?page=1000

Potential Capital Improvement Projects to Reduce Water Use

Potential capital improvement projects are identified in Table 1. These projects represent Corvallis WED's plans to further reduce facility water use, particularly if the facility is faced with water supply limitations. If necessary, all of the projects could be implemented relatively quickly, although some do not have short-term payback periods. If fully implemented, these projects are estimated to reduce facility water use by nearly 11 percent.

Opportunities for Short-Term Response to Local Drought

In the event of a drought or other water supply shortage, Corvallis WED will follow any water use recommendations and restrictions from the City of Corvallis and the Oregon WRD. Defined response levels are communicated by the City of Corvallis based on the declared severity stage of water shortages, as described in its Water Supply Emergency Curtailment Plan.

Because the majority of the laboratory's water usage is for sanitary, research, and laboratory functions that are critical to Corvallis WED's mission, there is not much opportunity for short-term response to local drought. However, the facility O&M staff will closely monitor water meters and submeters to ensure leaks or other inefficiencies are identified and fixed to minimize water waste. Any ongoing irrigation that may be occurring for landscape plant establishment would be eliminated based on the recommendations and water restrictions established by the City of Corvallis.

Considerations for New Construction

Corvallis WED's current facility includes many aspects that are considered water efficiency best practices. However, if EPA decides to pursue further expansion of Corvallis WED through new construction or major renovations, the design choices listed below could be considered to further reduce water use:

1) Install restroom fixtures with maximum flow rate and performance requirements provided in Table 5.

Table 5. Requirements for Restroom Fixtures in New Laboratory Construction

Fixture Type	Maximum Flow Rate	Performance Requirement
Toilets	1.28 gpf	WaterSense labeled
Urinals	0.125 gpf	WaterSense labeled
Lavatory faucets	0.5 gpm	None
Showerheads	1.75 gpm	WaterSense labeled

2) Incorporate air handler condensate collection or rainwater collection into the initial design to use for cooling tower make-up or toilet and urinal flushing.

3) Investigate feasibility of incorporating rainwater collection into future designs.

Stormwater Management

Corvallis WED operates under a Municipal Separate Storm Sewer System (MS4) permit with the City of Corvallis. Stormwater collects in storm drains, which flows to Oak Creek.

Due to the level of the water table below Corvallis WED and the slight gradient on which the facility is located, some stormwater accumulates on the lawns surrounding the facility during heavy rains. This occurs largely because infiltration is limited by the high water table. Stormwater is typically able to infiltrate once the rain event ceases. Corvallis WED has never experienced flooding within the buildings.

Onsite Green Infrastructure

Corvallis WED does not currently have any onsite green infrastructure. However, there are plans to install two new bioswales as part of the construction of the new annex and changes to an adjacent parking areas.

Contact us

For more information about our services:

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