WATER MANAGEMENT PLAN, REVISION 3

Robert S. Kerr Environmental Research Center, Ada, Oklahoma

OARM Office of Administration, Safety and Sustainability Division | September 2018

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) Ground Water and Ecosystem Restoration Division (GWERD) Robert S. Kerr Environmental Research Center (hereafter referred to as the ERC) located in Ada, Oklahoma. Under this Water Management Plan revision, the ERC 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) 13834, *Efficient Federal Operations,* Section 2(c) requires agencies to reduce potable and non-potable water consumption in federal facilities and comply with stormwater management requirements. In addition, 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.

To achieve greater facility and 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 the ERC June 25-26, 2018. Since 2002, the SSD's Sustainable and Transportation Solutions Branch (STSB) has conducted water assessments at EPA-owned and operated laboratories to improve water efficiency and comply with EISA 2007. The assessment team (Rafael Hernandez, STSB; Praveen KC, STSB; and Robert Pickering, Eastern Research Group, Inc. [ERG]) conducted the water assessment at the ERC to review existing conditions and update the facility's 2015 Water Management Plan.

Figure 1. View of the Robert S. Kerr Environmental Research Center main building and library conference center (LCC).

Table 1. Potential Water Conservation Opportunities at the ERC

Suggested Priority	Project Description	Number of Fixtures	Initial Project Cost	Potential Annual Water Savings (Gallons)	Potential Annual Energy Savings (Million Btu)	Potential Annual Utility Cost Savings[1]	Potential Payback (Years)	Notes
Low and No-Cost Maintenance								
1	Monitor water meters and submeters on a monthly basis and record meter readings.	N/A	N/A	Not Estimated	N/A	Not Estimated	N/A	Tracking water use regularly can help establish water use trends and identify potential leaks or mal-functions.
2	Replace faucet aerator in kitchenette handwashing sink with aerator rated at 1.5 gallons per minute (gpm).	1	$10	875	0.4	$14	0.7	None
3	Replace urinal flush valve inserts in 3rd Floor Men's Bathroom (both urinals) and Basement Men's Bathroom (urinals #3 and #5) of the Main Building with valve inserts rated at 0.125 gallons per flush (gpf). Each of these urinals appeared to flush at volumes higher than 0.125 gpf.	4	$200[2]	9,000	0	$60	3.3	None

[1] Estimated water cost savings are based on the City of Ada's water rate of $5.24 per Kgal and a sewer rate of $1.55 per Kgal. Estimated energy cost savings are based on electricity rate of $0.0713 per kilowatt hour (kWh), estimated based on the average electricity costs from the ERC's FY 2017 and FY 2018 electricity bills.

[2] Project cost assumes new urinal valve inserts are $50 each; however, once installed, valve replacement is part of regular maintenance and would not result in additional maintenance costs.

Suggested Priority	Project Description	Number of Fixtures	Initial Project Cost	Potential Annual Water Savings (Gallons)	Potential Annual Energy Savings (Million Btu)	Potential Annual Utility Cost Savings[1]	Potential Payback (Years)	Notes
4	Replace 1.0 gpf flush valve inserts for urinals in LCC men's restrooms with new valve inserts rated at 0.5 gpf.	4	$200[2]	5,000	0	$30	6.7	None
Capital Improvements								
5	Install 150 gpm side-stream filtration system, inclusive of a 50-micron filter, on the cooling tower water loop.	N/A	$8,000	86,000	Not quantified	$200[3]	40.0	This project is not recommend-ed unless other system improve-ments are planned for the cooling tower system.

Facility Information

The ERC is an EPA-owned, EPA-operated facility situated on a 16-acre tract 3 miles south of Ada, Oklahoma. Completed in 1966, the main laboratory building provides approximately 50,000 square feet of laboratory and office space in a four-story structure. An addition to the facility in 1993 provided another 20,000 square feet for the library, computer support services, and the library conference center (LCC). The 2008 addition of an East Wing to the main laboratory provides approximately 9,200 square feet of conditioned office space. The nearby 10,000-square-foot annex building contains a machine shop and storage facilities for field equipment and supplies. Separate, smaller buildings have been constructed for storing bulk chemicals, compressed gases and hazardous waste. In total, the research center contains 87,119 square feet of conditioned space.

The ERC is occupied by approximately 96 employees. The facility operates on a flex time schedule, one shift per day from 6:00 a.m. to 6:00 p.m., Monday through Friday.

Water Management

The ERC achieves its resource conservation goals by implementing the EPA ORD-wide environmental management system (EMS). The Water Management Environmental Management Program (EMP) within the ORD's EMS sets objectives and targets related to water use to reduce the impact on natural resources. It does

[3] Filter replacement costs will result in increased operation and maintenance expenses. Filters cost approximately $250 to replace. Based on discussion with SMC Technologies, the cooling tower water treatment vendor currently used by the ERC, filter replacement frequency is dependent on the quality of the system water. For purposes of this analysis, the filter is assumed to require replacement annually. The cost of a replacement filter is subtracted from the annual utility cost savings.

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 water reduction targets (set annually by EPA's STSB) as a cumulative total of all seven ORD locations.
- Identify a potential water conservation or stormwater management project that will be started by one of the six ORD locations in FY 2019.

Water Supply, Measurement and Historical Use

The ERC uses water for cooling tower make-up, miscellaneous laboratory and research purposes, sanitary needs, generation of laboratory grade water through reverse osmosis, landscape irrigation, operations of the ornamental landscape fountain, and ground-source heat pump (GSHP) well field make-up. A water softener equipment malfunction in 2017 also resulted in significant water use within the LCC. The following sections provide additional details on the facility's water use.

Water Supply

Ada City Utilities provides the ERC's potable water and sewer service. Each of the ERC's accounts has a base rate of $20.30 per month for potable water, which includes the first 200 hundred cubic feet (ccf). After the initial 200 ccf, potable water is billed at a rate of $3.92 per ccf ($5.24 per thousand gallons [Kgal]). For sewer, each of the ERC's accounts has a base rate of $20.20 per month, which includes the first 200 ccf (as measured at each potable water meter. After the initial 200 ccf, sewer use is billed at a rate of $1.16 per ccf ($1.55 per Kgal). The ERC does not pay for sewer service for water used at its cooling tower or in its irrigation system, both of which are separately metered by Ada City Utilities.

The ERC does not use any sources of non-potable fresh water.

Meters and Submeters

Incoming water is supplied through six meters under five different water accounts that serve the following areas:

- LCC
- Main laboratory
- Main laboratory bypass
- Cooling tower and hazardous material storage
- Irrigation system
- Annex building

Flow totalizing meters are also installed on many of the subsystem flows. Table 2 provides a summary of the meters and submeters installed at the ERC, the area or subsystem each meter serves, and the meter reading collected at the time of the assessment.

Table 2. List of Meters and Submeters at the ERC, June 2018

Meter Location	Area/System Served by Meter	Meter Number	Utility Account Number	Water Source	Meter Reading From Assessment
Below grade, exterior north face of the LCC	LCC	N/A	#60-0475-00	City potable water	6,558,087 cubic feet (cf)
Below grade, exterior north corner of main laboratory	Main laboratory	N/A	#60-0480-00	City potable water	Not able to obtain (confined space)
Below grade, exterior north corner of main laboratory	Main laboratory bypass	N/A	#60-0485-00	City potable water	Not able to obtain (confined space)

Meter Location	Area/System Served by Meter	Meter Number	Utility Account Number	Water Source	Meter Reading From Assessment
Below grade, east of main parking lot (black plastic meter box)	Cooling tower, hazardous material storage	N/A	#60-0490-00	City potable water	1,115,483.7 ccf
Below grade, near the east entrance along Kerr Research Drive	Irrigation sprinkler	Meter #1	#60-0495-00	City potable water	1,027,878.6 ccf
Below grade, east of main parking lot (meter box with iron cover)	Annex building	Meter #2	#60-0495-00	City potable water	22,013.27 ccf
Mechanical room	Cooling tower blowdown	N/A	N/A	Cooling tower blowdown	648,420 gallons
Mechanical room	Make-up to the closed ground loop for the ground source heat pump (well field)	N/A	N/A	City potable water	148,031 gallons
Mechanical room	Make-up to the internal, closed, chilled water loop (reheat)	N/A	N/A	City potable water	22,672 gallons
Maintenance storage area, integral to reverse osmosis (RO) system panel	RO system (total)	N/A	N/A	City potable water	252,679 gallons (116 gallons daily average)
Maintenance storage area	RO system (permeate)	N/A	N/A	RO product	1,771,250 gallons
Mechanical penthouse	Air-handler condensate recovery system	N/A	N/A	Recovered air-handler condensate	1,213,342 gallons
LCC basement custodial closet, integral to water softener system panel	LCC water softener (total)	N/A	N/A	City potable water	15,807 gallons (76 gallons daily average)
LCC basement custodial closet	LCC water softener (reject water)	N/A	N/A	Water softener reject water	23,939 gallons
LCC basement women's restroom	Ornamental landscape fountain make-up	N/A	N/A	City potable water	35,215 gallons

There is generally no flow through the submeters to the two closed-loops systems (GSHP loop, chilled water loop); however, since its FY 2015 water assessment, the ERC experienced two leaks in the closed ground loop of the GSHP, resulting in an average of 8,350 gallons of water needed annually to refill the loop.

System submeters are regularly monitored to ensure leaks or other malfunctions can be quickly identified. However, meter readings are not regularly recorded. Under this Water Management Plan, facilities management and operations and maintenance (O&M) staff will begin to record meter readings at least monthly and report values to the facilities manager so that water use trends can be monitored on an ongoing basis. Any unexpected changes in water use will be investigated and resolved immediately.

Historical Water Use

In response to various executive orders and laws addressing federal sustainability, the ERC established a FY 2007 water use intensity baseline of 48.9 gallons per gsf based on 3,806,403 gallons of water used that fiscal year. In FY 2017, water use intensity was reduced to 15.8 gallons per gsf, or 1,377,270 gallons of water—a decrease of 68 percent compared to the FY 2007 baseline. The facility has further reduced its water use over most recent 12-month period for which water use data was available during the water assessment (June 2017 through May 2018) to 12.9 gallons per square foot—a 74 percent reduction over the facility's baseline. Malfunctioning of the ERC's LCC water softening system led to higher than normal water use from July 2017 through November 2017. The system has been replaced; therefore, water use in FY 2018 is expected see further reductions from the baseline. Figure 2 provides a graph of the ERC's water use from FY 2007 through FY 2017.

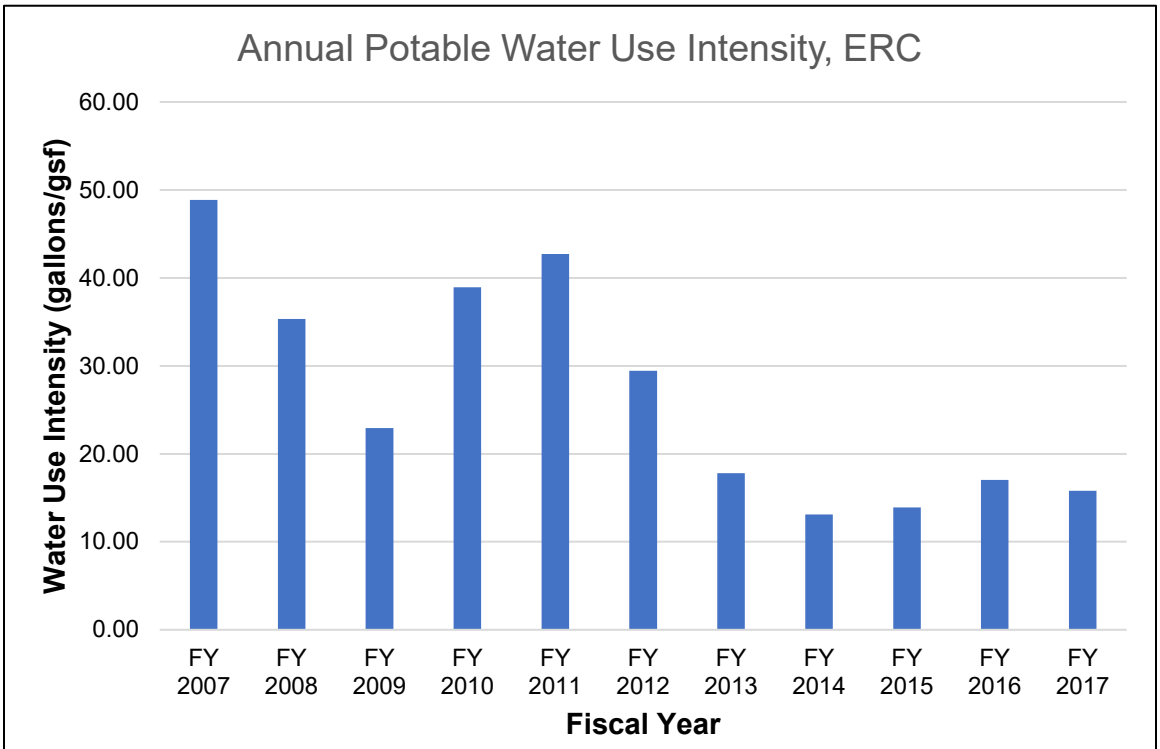

Figure 2: The ERC's Water Use Intensity, FY 2007 to FY 2017

End Uses of Water

Table 3 and Figure 3 identify the end uses of water at the ERC based on the facility's water use from June 2017 through May 2018. The uses are described in more detail below.

Table 3. Major Potable Water Uses at the ERC, June 2017 Through May 2018

Major Process	Annual Water Use (gallons)	Total Water Use (%)	Basis of Estimate
Main Building and Annex			
Cooling tower make-up	641,365	57.0	Metered total[4]
Miscellaneous laboratory and other process water use	139,143	12.4	Calculated by subtracting all other estimated and known water uses from the ERC metered total water use
LCC water softener malfunction	130,000	11.6	Estimate based on comparison between LCC water bills before, during, and after water softener malfunction
Sanitary	128,000	11.4	Engineering estimate based on sanitary fixtures installed, occupancy and daily usage factors
RO system	42,340	3.8	Estimate based on RO system meter readings. System indicated average daily water use of 116 gallons. Estimate verified by looking at meter readings between FY 2015 and FY 2018 water assessments
Irrigation	25,845	2.3	Metered total
Ornamental landscape fountain	9,600	0.9	Engineering estimate based on annual pan evaporation amount and an estimate that the fountain is 8’ x 24’
GSHP well field make-up	8,350	0.7	Engineering estimate based on meter readings between FY 2015 and FY 2018 water assessments
Total Potable Water Use	**1,124,643**	**100**	Metered total
Onsite Alternative Water Use			
Cooling tower make-up (air handler condensate)	200,000		Engineering estimate based on meter readings between FY 2015 and FY 2018 water assessments.

[4] Meter also takes into account water use from the hazardous storage facility, but since the only water use is an outdoor spout that is rarely used (per facility staff), this water use is considered negligible.

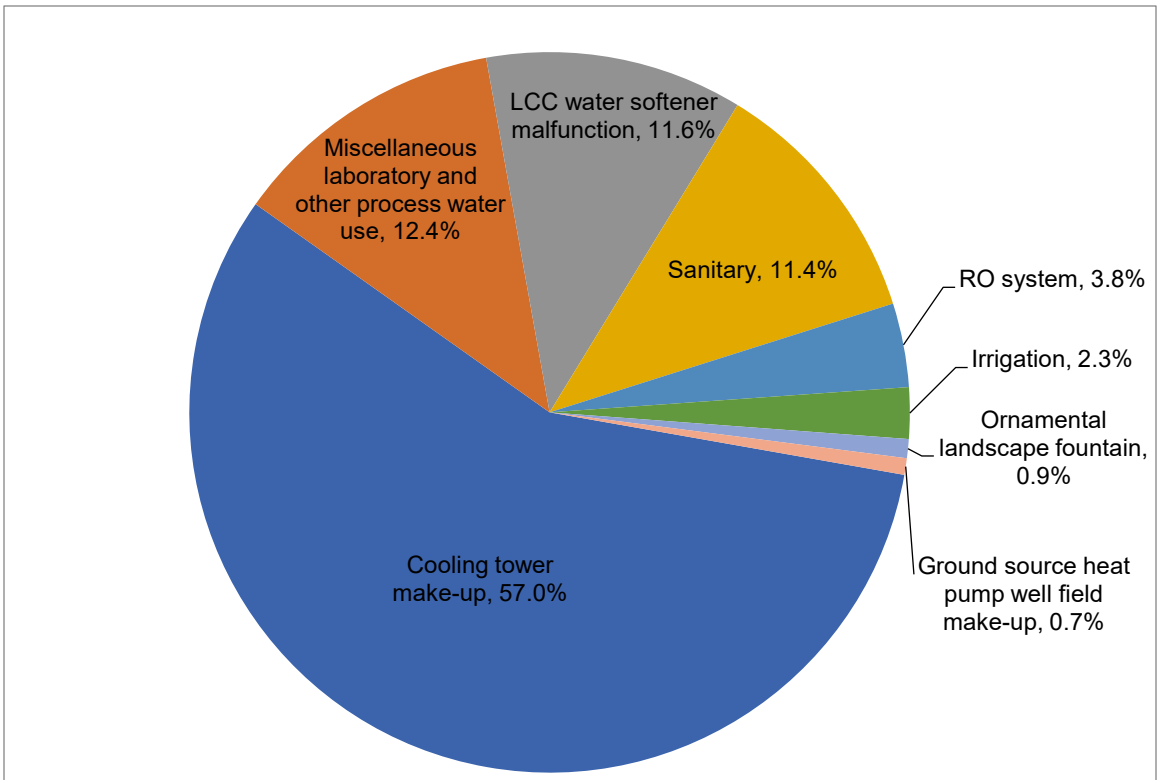

Figure 3: The ERC's Water End Uses, June 2017 Through May 2018

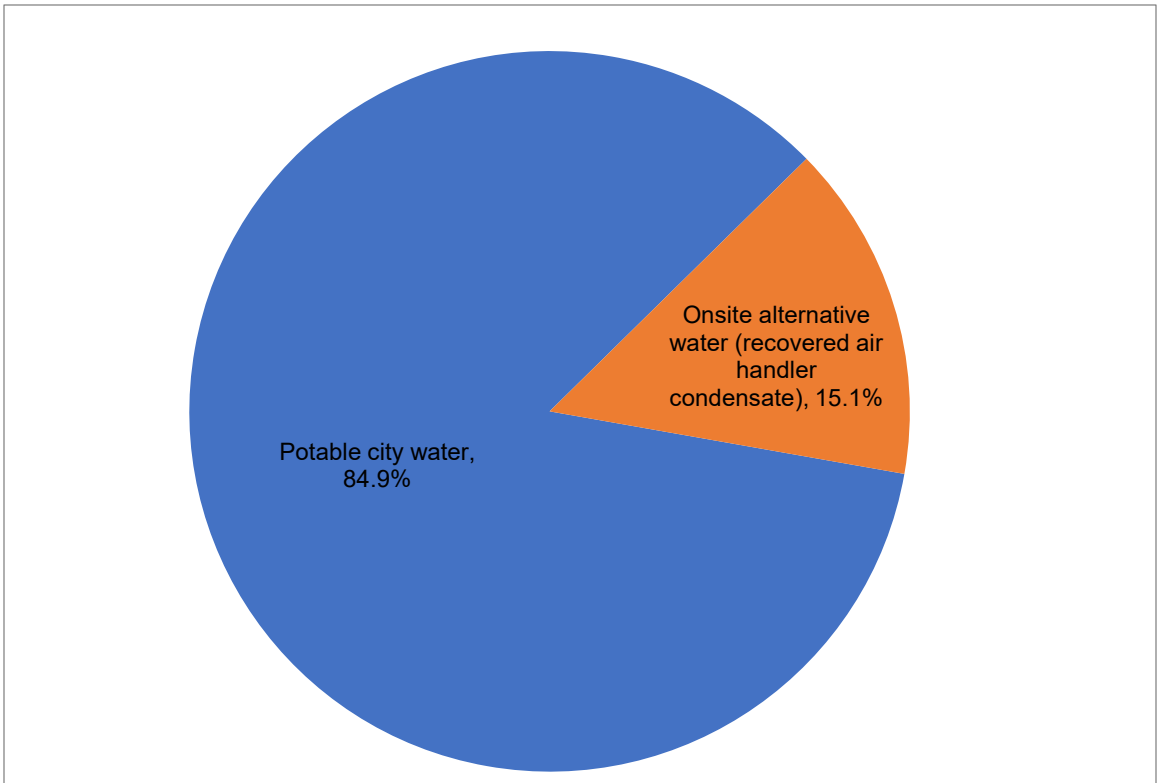

Figure 4: The ERC's Sources of Water, June 2017 Through May 2018

Cooling Towers

Figure 5: A 450-ton cooling tower provides space cooling for Ada's main laboratory and LCC.

The ERC's most significant water use is from operation of the cooling tower system, which accounts for approximately 57 percent of its annual potable water use. The ERC is equipped with a two-cell cooling tower, rated at 450 tons of total cooling capacity. The tower has a flow rate of up to 1,050 gpm and a system volume of approximately 8,040 gallons.

During the cooling season, a cooling tower maintenance contractor performs a monthly quality, performance and water chemistry review of cooling tower operation. Chemical treatment is provided to control scale and corrosion. A conductivity meter set at 1,800 microSiemens per centimeter (uS/cm) is used to control blowdown. Incoming make-up water has a conductivity between 600 and 700 uS/cm. Therefore, when maintained, the facility achieves approximately two and a half to three cycles of concentration in the cooling tower. Cooling tower make-up water quantity is metered separately and recorded monthly. The facility does not pay for sewer service on the meter that supplies the cooling tower. The cooling tower blowdown is also metered. Under this water management plan, meter readings should be recorded and reported to the facilities manager monthly.

The ERC collects air handler condensate from the air handling units on the roof and uses it for cooling tower make-up. The collected condensate is metered but not regularly recorded. Under this water management plan, meter readings should be recorded and reported to the facilities manager monthly. Collected air handler condensate makes up an estimated 24 percent of the cooling tower system's make-up water demand.

The ERC is considering implementing an energy and water conservation project that would install side-stream filtration on the cooling tower water loop. A 150 gpm filtration system could be installed on the cooling tower system, filtering approximately 15 percent of the overall system flow. Using side-stream filtration, it is estimated that the cooling tower would consume 11 to 16 percent less water.[5]

Side-stream filtration may also nominally improve energy efficiency;[6] however, energy savings are not quantified in this water management plan, as they are largely dependent on other operational procedures. Note that filter replacement costs would offset any realized water or energy cost savings. Because of the uncertainty of this project and the long payback period, this project is not recommended.

[5] Assumption based on increasing the cycles of concentration by one (either from 2.5 to 3.5 or from three to four), however water savings could be higher depending on improvements in water quality from side-stream filtration and chemical management. Water reduction percentage established from the EPA's *WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities*. Table 6-1. Percent of Make-Up Water Saved by Maximizing Cycles of Concentration. www.epa.gov/sites/production/files/2017-02/documents/watersense-at-work_final_508c3.pdf

[6] The Federal Energy Management Program (FEMP) estimates that side-stream filtration can reduce energy use by up to 10 percent. Source: FEMP. *Side Stream Filtration for Cooling Towers.* October 2012. www.energy.gov/sites/prod/files/2013/10/f3/ssf_cooling_towers.pdf

Miscellaneous Laboratory Uses

The ERC contains glassware washers in the laboratories. It is also equipped with two steam sterilizers with temperature-activated control valves that only allow tempering water to flow when they are operating. The Consolidated Stills & Sterilizers Model 4906-32 was installed in 2007. The Consolidated Stills & Sterilizers Model 4600-90 was installed in 1999. Each steam sterilizer is used a few times per month.

The ERC has two water softeners, which each regenerate automatically. From July through November 2017, the water softener that serves the LCC began to malfunction, resulting in water regularly discharging from the softener to the sanitary sewer. The system was placed in November 2017, which resolved the issue and returned water use at the LCC back to normal. Approximately 130,000 gallons of water were wasted from the system, based on a comparison of monthly water use at the LCC before, during and after the malfunction. The new water softening system in the LCC is equipped with two meters, one integral to the operating system that measures the feed water to the water softener, and one on the reject water line running to the floor drain. In addition to monitoring LCC water bills, both meters associated with the water softener should be monitored regularly to ensure no irregularities in water use persist.

Figure 6: Two steam sterilizers at the ERC have on-board steam generation and only apply tempering water when in operation.

The ERC has a Scotsman Model #F0522A-1A air-cooled ice machine located in the lunch room.

In October 2016, the ERC replaced two air compressors that used single-pass water cooling with air-cooled models. Therefore, the ERC no longer utilizes any single-pass cooling.

Cooling is supplied by electric GSHP. The heat pumps operate using external and internal closed cooling water loops, which consume virtually no water. However, Facility Management staff indicated that multiple leaks had occurred since the last assessment, resulting in water being released from the closed loop system that runs to the well field. Each of the water loops is metered and monitored, so leaks were identified and fixed. Since the FY 2015 assessment, approximately 30,600 gallons of water have leaked from the system.

Figure 7. Ada installed a new water softener system for the LCC in November 2017 to replace an inefficient and malfunctioning unit.

Restroom and Other Sanitary Fixtures

With the exception of one original toilet installed in the laboratory director's office, all toilets installed at the ERC are dual-flush models (1.6 gpf for full flush/1.1 gpf for reduced flush). The toilet in the laboratory director's office flushes at 3.5 gpf. A total of 75 percent of urinals are WaterSense labeled high-efficiency urinals flushing at 0.125 gpf. The remaining four urinals, located in the two men's restrooms of the LCC, are Energy Policy Act of 1992 (EPAct 1992)-compliant urinals flushing at 1.0 gpf. During the assessment, four of the 12 WaterSense labeled urinals appeared to be flushing at greater than 0.125 gpf. The urinal flush valve inserts for these urinals should be replaced with valve inserts rated at 0.125 gpf to return these urinals to their intended flush volume.

Twenty-eight of the ERC's 29 lavatory faucets have been equipped with aerators that limit the flow to 0.5 gpm. The 0.5 gpm flow rate is lower than the EPAct 1992 requirement for faucets and is compliant with the American

Society of Mechanical Engineers/Canadian Standards Association (ASME/CSA) standard for lavatory faucets in public use. This flow rate is sufficient for hand washing and is considered a best practice for lavatory faucets in public settings. One faucet, located in the restroom of the Annex, is not controlled with a flow-restricting aerator. However, due to its location within the Annex where maintenance staff may need a higher flow rate to wash heavily soiled hands, installation of an aerator is not recommended. There is an additional hand-washing sink located in the kitchenette that with a flow rate of 2.2 gpm. To reduce sanitary water use, the ERC should consider installing a WaterSense labeled faucet aerator with a flow rate of 1.5 gpm or less, which is suitable for handwashing, lunch preparation and dish rinsing.

WaterSense labeled showerheads have been installed throughout the ERC. Six of the eight showerheads flow at 1.5 gpm, while two showerheads located in the handicap-accessible shower stalls have flow rates of 2.0 gpm.

Janitorial staff and employees are trained to report leaks or other maintenance problems. Identified leaks or other maintenance problems are immediately corrected.

Domestic hot water is provided through electric hot water heaters. Table 4 provides an inventory of sanitary fixtures.

Table 4. Restroom Fixtures Inventory, the ERC

Fixture Type	Flow Rate	Total Number
Toilets	Dual-flush (1.6 gpf/1.1 gpf)	28
	3.5 gpf	1
Urinals	1.0 gpf	4
	0.125 gpf	12
Lavatory faucets	0.5 gpm	28
	Uncontrolled	1
Kitchenette hand-washing faucet	2.2 gpm	1
Showerheads	2.0 gpm	2
	1.5 gpm	6

Full urinal replacement of the four remaining urinals that flush at 1.0 gpf with WaterSense labeled models flushing at 0.125 gpf is not life-cycle cost effective. Instead, replacing existing flush valve inserts with inserts rated at 0.5 gpf could be a cost-effective approach to reduce water use. If the ERC decides to replace the flush valve inserts, it should consider conducting a pilot with one urinal to verify adequate performance and user satisfaction with the lower flush volume. The ERC should also consider replacing the urinals if future restroom renovations within the LCC are planned.

Reverse Osmosis System

Purified water for laboratory use is generated through a multi-step process consisting of deionization and RO. The RO system was replaced in December 2013 with a more efficient and appropriately sized model for the ERC's laboratory requirements. As RO permeate is generated, it fills a 500-gallon tank, and a float switch controls when more RO water is produced. The RO system's control panel has an integral water meter that provides total and average daily water use. RO system permeate is also metered as it runs to the laboratories. Neither meter is currently recorded; however, under this water management plan, meter readings should be recorded and reported to the facilities manager monthly.

Figure 8. The ERC replaced its RO system with a more efficient model in December 2013.

Irrigation

The ERC has significantly decreased irrigation water use since the FY 2015 water assessment. Irrigation currently only accounts for 2.4 percent of the ERC's annual potable water use (down from 38.1 percent in FY 2014). The irrigation system is composed of 19 different irrigation zones capable of irrigating two of the facility's 16 acres. This irrigated landscape is primarily covered with Bermuda grass, which is not irrigated and allowed to go dormant during drier summer months.

In the front of the main facility, within approximately 10 feet of the building exterior, the ERC has a mulched area with shrubs and other plantings and an ornamental landscape fountain.

Based on discussions with the facilities manager, the irrigation system is only activated to prevent loss of plantings during dry periods. Zones that require watering during the summer months include the planters in the medians located in the parking lot and at the main entrance of the laboratory (Zones 10, 11, 12, 14, 15, 16 and 17), and the shrubs at the front of the building near the ornamental fountain (Zone 9). The ERC will continue to pursue opportunities for reducing supplemental landscape irrigation when possible.

Irrigation water use is metered separately by the ERC and Ada City Utilities. The facility does not pay for sewer service on the meter that supplies the irrigation system.

Ornamental Landscape Fountain

The ERC has an ornamental landscape fountain located at the main entrance. The fountain recirculates water and is filled using an automatic valve to make up for evaporation or other losses. The make-up line is submetered. Under this water management plan, meter readings should be recorded and reported to the facilities manager monthly.

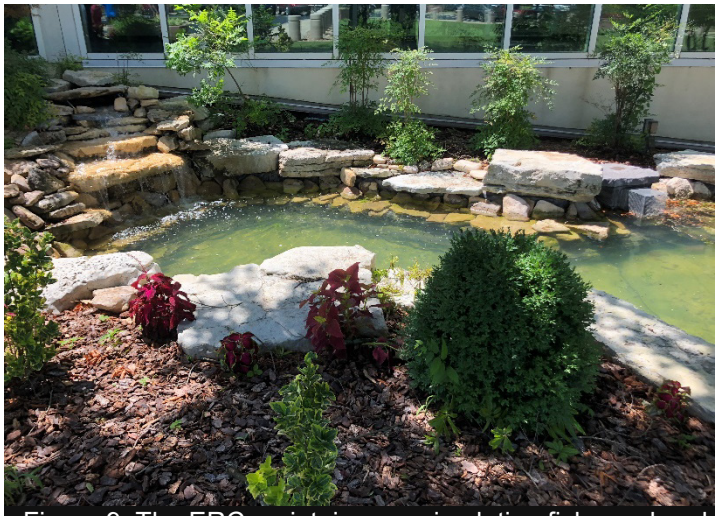

Figure 9. The ERC maintains a recirculating fish pond and ornamental fountain within the landscape of its front entrance.

Completed Water Efficiency Projects

As described in Table 5, the ERC has completed 14 projects to improve water efficiency and water management since FY 2007.

Table 5. Completed Water Efficiency Projects at the ERC Since FY 2007

Project	Estimated Annual Water Savings (Gallons)	Completion Year	Additional Notes
Submeter installation	Not estimated	FY 2017	The ERC installed submeters on the ornamental landscape fountain make-up and LCC water softener drain lines to improve water management.
Irrigation minimization	400,000	FY 2016	The ERC revised irrigation practices so that only priority landscape areas are watered during summer months. Turf-grass is no longer irrigated.
Water-cooled air compressor replacement	80,000	FY 2016	The ERC replaced two water-cooled air compressors in the penthouse with air-cooled models.
Faucet aerators	6,000	FY 2016	The ERC installed faucet aerators on two additional lavatory faucets. All lavatory faucets now flow at 0.5 gpm.
RO system replacement	105,000	FY 2014	The ERC replaced the RO system with a more efficient and more appropriately sized system in FY 2014.
Minimize single-pass cooling	80,000	FY 2014	The ERC minimized the flow rate of the single-pass cooling on the air compressors such that cooling water is only used when necessary.
Cooling tower blowdown meter	Not estimated	FY 2014	The ERC installed a blowdown meter on the cooling tower in April 2014.
Install air handler condensate recovery system	200,000	FY 2013	The ERC installed a system to recover air handler condensate and route it to the cooling towers in FY 2013. In FY 2014, the system provided 188,400 gallons of make-up water to the cooling tower system.
Toilets	171,000	FY 2013	The ERC has replaced or retrofitted all 28 of its toilets with dual-flush toilets with a rated flush volume of 1.6 gpf for full flush and 1.1 gpf for reduced flush.
Urinals	90,000	FY 2013	The ERC replaced 12 of 16 urinals with WaterSense labeled models flushing at 0.125 gpf.
Faucet aerators	35,000	FY 2013	The ERC retrofitted 26 lavatory faucets with faucet aerators that flow at 0.5 gpm.
Showerheads	14,000	FY 2013	The ERC replaced six of eight showerheads with WaterSense labeled models flowing at 1.5 gpm. Two showerheads already flowed at 2.0 gpm.

Project	Estimated Annual Water Savings (Gallons)	Completion Year	Additional Notes
Fix leak in cooling tower	515,000	FY 2012	The ERC fixed a leak in the cooling tower resulting from a stuck valve.
Irrigation	400,000	FY 2010	Based on recommendations from a 2008 irrigation audit, the ERC has optimized irrigation water use by only irrigating certain zones and only when necessary.

Drought Contingency Plan

Drought Risk

The ERC is located in an area that periodically experiences drought and, at times, can experience extreme drought. Water is supplied by Ada City Utilities, which obtains water from the Arbuckle-Simpson Aquifer, an underground reservoir located approximately 11 miles south of Ada. The aquifer occupies more than 500 square miles of underground terrain. The water flows by gravity from the aquifer approximately 11 miles north into the city's water treatment plant.

Information on drought and water resource monitoring in Oklahoma is maintained by the Oklahoma Water Resources Board (OWRB). It can be reviewed at: http://www.owrb.ok.gov/drought/.

The Oklahoma Department of Environmental Quality maintains information on local water systems experiencing problems or implementing water use restrictions/rationing at: http://www.deq.state.ok.us/conservation/index.html.

Recent Contributions to Drought Contingency

The ERC has reduced its water use intensity baseline of 48.9 gallons per gsf, set in FY 2007, to 12.9 gallons per gsf over the most recent 12-month period for which water use information was available at the time of the assessment (June 2017 through May 2018)—a 74 percent reduction. The ERC plans to pursue projects to continue to reduce facility water use. The ERC staff will monitor water meters and submeters so that leaks or other malfunctions resulting in increased water use can be identified and resolved quickly.

Potential Capital Improvement Projects to Reduce Water Use

Potential capital improvement projects are identified in Table 1. These projects represent the ERC's plans to further reduce facility water use, particularly if the facility is faced with water supply limitations or undergoes a major renovation. 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 9 percent.

Opportunities for Short-Term Response to Local Drought

In the event of a drought or other water supply shortage, the ERC will follow any water use recommendations and restrictions from Ada City Utilities and the Oklahoma Department of Environmental Quality.

Because the majority of the laboratory's water usage is for sanitary, research, and laboratory functions that are critical to the ERC's mission, there is not much opportunity for short-term response to local drought. However, the ERC could further curtail outdoor water use, ultimately eliminating it entirely in cases of severe drought. In addition to reducing and/or eliminating outdoor water use for irrigation, the ERC could also cease operation of the ornamental landscaping fountain in the event of a drought. While the fountain is recirculating and is not a heavy water user, nearly 10,000 gallons of water is lost annually through evaporation and must be made up via an automatic valve throughout the year.

Considerations for New Construction

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

1) Install restroom fixtures with the maximum flush volume/flow rate and performance requirements provided in Table 6.

Table 6. Requirements for Restroom Fixtures in New Construction/Major Renovation

Fixture Type	Maximum Flush Volume/Flow Rate	Performance Requirement
Toilets	1.28 gpf	WaterSense labeled
Urinals	0.125 gpf	WaterSense labeled
Lavatory faucets	0.5 gpm	None
Kitchen faucets	1.8 gpm	None
Showerheads	1.75 gpm	WaterSense labeled

2) Incorporate air handler condensate collection and/or rainwater collection into the initial design to use for cooling tower make-up, toilet and urinal flushing, or other non-potable water end uses.

Stormwater Management

The ERC operates under a Municipal Separate Storm Sewer System (MS4) permit with the City of Ada. Stormwater mostly collects in storm drains on site; however, some stormwater runs off to the east and west of the parking lot into nearby woods and landscape.

Onsite Green Infrastructure

The ERC does not currently have any onsite green infrastructure.

Contact us

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