



WATER MANAGEMENT PLAN, REVISION 2

National Exposure Research Laboratory, Environmental Sciences Division, Las Vegas, Nevada

OARM Sustainable and Transportation Solutions Branch (STSB)

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Overview

This report summarizes the findings and recommendations associated with a desk-based water use and conservation assessment conducted for the U.S. Environmental Protection Agency's (EPA's) National Exposure Research Laboratory (NERL) Environmental Sciences Division (ESD) Laboratory in Las Vegas, Nevada. Based on the findings of this assessment, and because EPA intends on vacating the ESD laboratory within the next two years, there are no recommended water conservation and efficiency projects. Under this Water Management Plan, the ESD Laboratory will continue to operate using water conservation best practices. This Water Management Plan describes the facility's water reduction goals, water use trends, end uses of water, completed water efficiency projects, and drought management plans.

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 through a WaterSense labeled program.¹

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 to measure and verify water savings.



Figure 1: View of NERL's ESD Laboratory in Las Vegas, Nevada.

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 for efficiency and performance. The growing list of 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 desk-based water assessment was conducted by the OARM's Office of Administration, Safety and Sustainability Division (SSD) for the ESD Laboratory on August 25, 2016. Since 2002, the SSD's Sustainable and Transportation Solutions Branch and its contractor, Eastern Research Group, Inc. (ERG), 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, ERG) conducted this desk-based water assessment for the ESD Laboratory to review existing conditions and update the previous 2012 Water Management Plan.

Facility Information

The ESD Laboratory, constructed in 1966, is a 72,000-square-foot facility that consists of five buildings, including the Chemistry Laboratory (CHL), Quality Analysis Laboratory (QAL), Environmental Annex (EA), Executive Center (EXC), and Monitoring Systems Laboratory (MSL). The buildings are owned by the University of Nevada at Las Vegas (UNLV) and are leased to the EPA by the U.S. General Services Administration (GSA).

The EPA has begun the process of vacating the facilities that make up the ESD Laboratory and turning them back over to UNLV. By November 2016, the EPA will demolish the EA and vacate the QAL. In addition, the EPA plans to vacate approximately one third of the EXC, instead allowing UNLV to occupy the space. The anticipated remaining space leased by the EPA is approximately 52,000 square feet. The remaining buildings are leased through September 30, 2020; however, the EPA intends on vacating these facilities and returning them to UNLV by September 2018.

The EPA is responsible for all water, sewer, and other utility bills. After September 30, 2016, the EPA will only be responsible for 77 percent of utilities, as was negotiated with UNLV under the new lease agreement.

The ESD Laboratory has approximately 74 occupants, including 33 EPA employees. The facility operates on a flex-time schedule and is typically occupied Monday through Friday between the hours of 6:00 a.m. and 6:00 p.m.

Water Management Goals

The ESD Laboratory 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 by reducing the consumption of water from facility and laboratory operations and by properly managing stormwater runoff. Targets established under this objective call for:

- Achieving the Agency ConservW targets (set annually by EPA's STSB) as a cumulative total of all seven locations.

Although not expressly stated, ORD's objectives and targets for water management imply a goal of achieving 36 percent potable water reduction by the end of 2025, compared to a 2007 baseline, and of achieving 30 percent ILA water reduction by the end of 2025, compared to a 2010 baseline, as set forth in EO 13693.

Water Supply, Measurement, and Historical Use

The ESD Laboratory's water use has significantly increased since the last water use and conservation assessment conducted in 2012. The increase is a direct result of environmental due diligence activities ongoing at the ESD Laboratory since July 2014. These activities are described further under End Uses of Water. The ESD Laboratory uses water for cooling tower make-up, sanitary needs, cooling tower filtration backwash, and other miscellaneous laboratory uses. The following sections provide additional details on the facility's water use.

Water Supply

The ESD Laboratory's potable water and sewer service is provided by UNLV, who in turn is served by the Las Vegas Valley Water District. The ESD Laboratory does not have any sources of nonpotable water (e.g., rainwater collection, air-handler condensate recovery), as the dry climate limits the availability of alternative water sources.

Meters and Submeters

Incoming city water is supplied through a single water meter. Two additional meters are located onsite to submeter landscape water use and the water used by the technology building, which is not occupied by EPA. Since neither of these end uses are controlled by ESD Laboratory staff, these uses are deducted from the facility's total water use.

The ESD Laboratory submeters the manual and automatic make-up water lines to the cooling tower, the cooling tower filtration backwash discharge, and the blowdown of the cooling tower system. In addition, the facility submeters two wastewater discharge systems collecting process water from QAL and CHL. Each of these submeters is read at least monthly.

Historical Water Use

In response to EO 13693 and the executive orders that preceded it, the ESD Laboratory established a FY 2007 water use intensity baseline of 24.79 gallons per gsf. In FY 2015, water use intensity had increased to 41.35 gallons per gsf—an increase of 67 percent compared to the FY 2007 baseline. Figure 2 provides a graph of the ESD Laboratory's water use from FY 2007 through FY 2015.

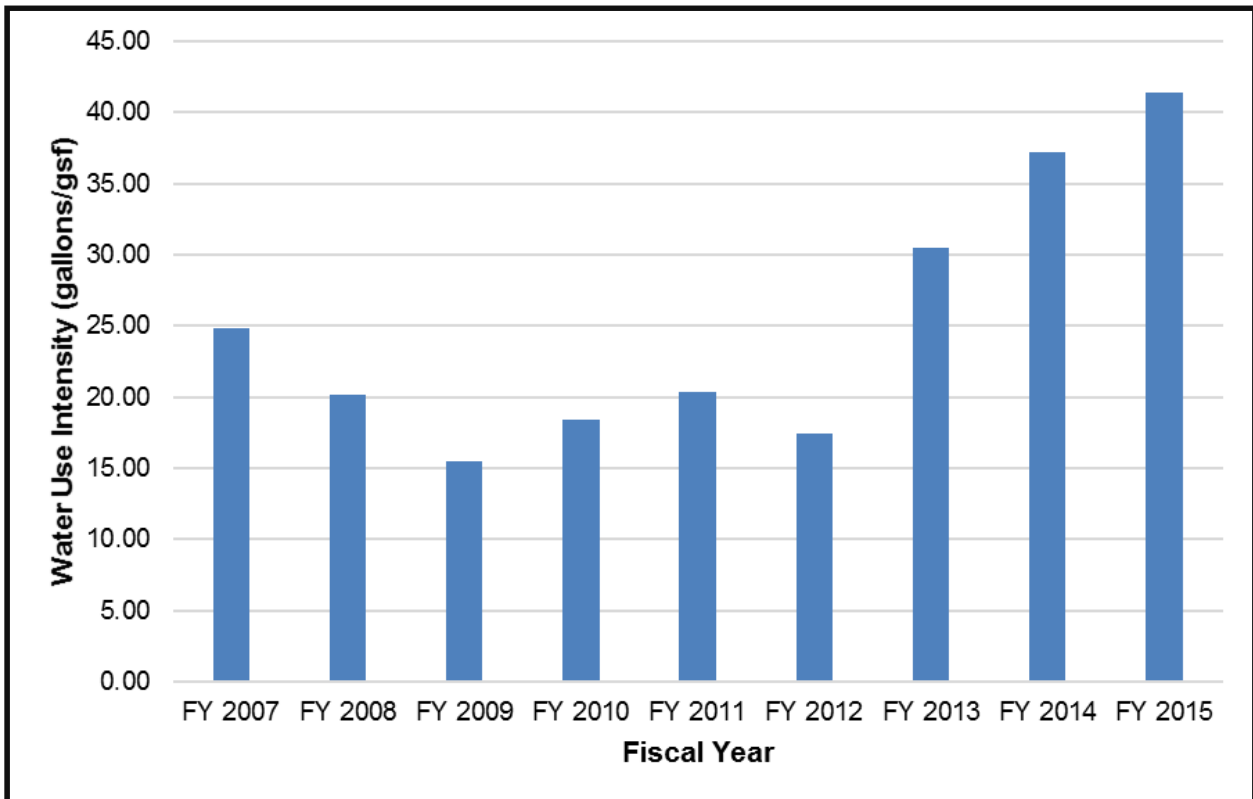


Figure 2: The ESD s Laboratory s Water Use Intensity, FY 2007 to FY 2015.

End Uses of Water

Table 1 and Figure 3 identify the end uses of water at the ESD Laboratory. The uses are described in more detail below.

Table 1. Major Potable Water Uses at the ESD Laboratory, FY 2015

Major Process	FY 2015 Annual Water Use (gallons)	Total Water Use (%)	Basis of Estimate
Cooling tower	2,403,603	62.7	From monthly meter readings collected by operations and maintenance (O&M) staff on manual fill and auto-make up submeters.
Miscellaneous laboratory use	1,270,897	33.1	Calculated by difference from the facility's metered total and the other known and estimated water uses.
Restroom and other sanitary fixtures	110,000	2.9	Engineering estimate based on fixtures installed, building occupancy, and usage rates.
Cooling tower filtration backwash	26,400	0.7	From monthly meter readings collected by O&M staff on the backwash submeter.
Cooling tower spray down and cleaning	22,500	0.6	Engineering estimate based on frequency and duration of cooling tower cleaning provided by O&M staff.
Total Water Use	3,833,400	100.0	FY 2015 total water use from metered sources

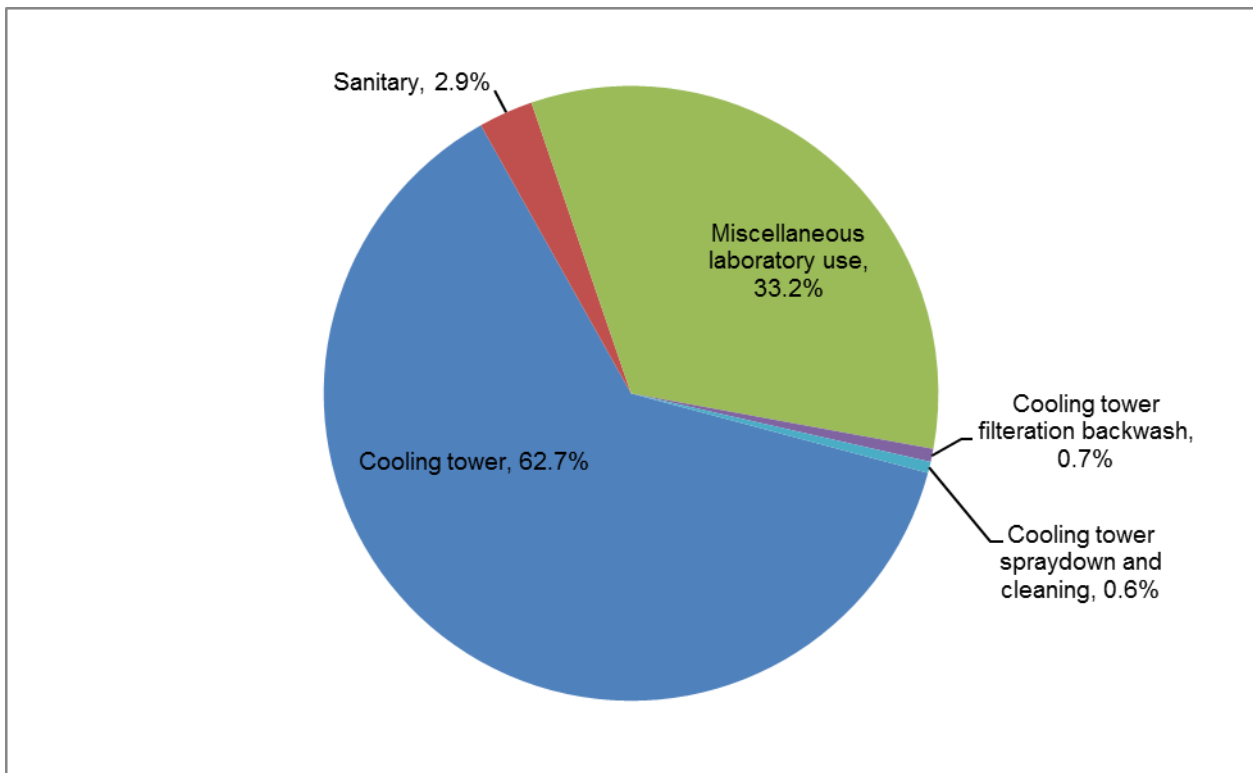


Figure 3: ESD Laboratory's Water End Uses for FY 2015.

Cooling Tower

The cooling tower system is the largest end use of water at the ESD Laboratory. The 200-ton cooling system is monitored and maintained regularly by the building engineer. A conductivity meter automatically controls cooling tower blowdown. The blowdown controller is set to achieve approximately 2.7 cycles of concentration within the cooling tower, maintaining a set point between 2,750 and 2,850 microsiemens per centimeter ($\mu\text{S}/\text{cm}$), while the make-up water supply is approximately 1,000 $\mu\text{S}/\text{cm}$. The water is chemically treated to control scale and corrosion.

Water in the cooling tower system is sent through a filter to remove debris and other particulates. The sand filter is backwashed manually every 1 to 3 days.

To further reduce the potential for scale and to remove dust and sand build-up on the cooling tower, the O&M contractor sprays down the cooling tower every other day for approximately 30 minutes using a hose with a spray nozzle.

Meters are installed on the manual and automatic make-up water lines, the backwash discharge, and the blowdown. Meters are monitored and recorded monthly.

The ESD Laboratory's potable water and sewer service is provided by UNLV, who in turn is served by the Las Vegas Valley Water District. The ESD Laboratory does not have any sources of nonpotable water (e.g., rainwater collection, air-handler condensate recovery), as the dry climate limits the availability of alternative water sources.

Miscellaneous Laboratory Use

In anticipation of EPA's turnover of the ESD Laboratory facilities to UNLV, the facility has undertaken environmental due diligence activities. These activities started in the summer of 2014 and include, but are not limited to: soil sampling and other boring; wastewater and sewer mapping; pipe removal, testing, and replacement; and asbestos remediation. These activities can require a significant amount of potable water. Additional water is needed for custodial staff to clean up laboratory areas after environmental due diligence activities have taken place. The ESD Laboratory's increase in water usage since the 2012 water assessment is a direct of this effort.

The ESD Laboratory has a water purification system (including a small reverse osmosis [RO] unit) to provide purified water for laboratory use. The RO system has a storage tank of approximately 400 gallons. Amount of product and reject generated by the RO system is unknown, since submeters are not included on the system. The ESD Laboratory also has two Labconco® Flaskscrubber® under-counter glassware washers.

The ESD Laboratory does not control testing and flushing related to the building's fire sprinkler system and fire hydrants. UNLV tests fire sprinklers quarterly. The sprinkler valves for each building are opened and flushed for approximately 2 minutes. The local fire department flushes fire hydrants on site at the facility on an annual basis. Because of the persistent drought conditions in the Las Vegas area, these activities are conducted by local authorities in the most water-efficient way possible.

Historical Water Use

The ESD Laboratory's restroom fixtures are compliant with 1992 Energy Policy Act (EPA 1992) water efficiency requirements (1.6 gallons per flush [gpf] toilets and 1.0 gpf urinals).

Faucet fixtures are water-efficient, flowing at 0.5 gallons per minute (gpm). This flow rate is lower than the EPA 1992 standard for faucets and is compliant with the American Society of Mechanical Engineers (ASME) standard for lavatory faucets in public use. This flow rate is sufficient for hand washing and is considered a best practice for lavatory sinks in public settings.

There are no shower facilities at the ESD Laboratory. Table 2 provides an inventory of sanitary fixtures.

Table 2. Sanitary Fixtures Inventory, ESD Laboratory

Fixture Type	Flow Rate	Total Number
Toilets	1.6 gpf	28
Urinals	1.0 gpf	19
Lavatory faucets	0.5 gpm	34
Showerheads	N/A	0

During a previous water assessment, two water efficiency projects were identified related to sanitary fixtures at the ESD Laboratory. It was suggested that the ESD laboratory could install dual-flush retrofit kits on the 1.6 gpf toilets in the women’s restrooms and replace urinals with 0.125 gpf WaterSense labeled models. However, because EPA is planning to vacate these facilities by 2018, these projects are no longer recommended, as they are not cost-effective.

Drought Contingency Plan

Drought Risk

The ESD Laboratory is located in an area that frequently operates under drought conditions. Due to the dry climate and minimal annual rainfall, the Southern Nevada Water Authority (SNWA), which helps manage water resources in the greater Las Vegas Valley, is proactive in incorporating efficient water use into daily operations. Since 2003, SNWA has adopted drought restrictions. As a result, permanent landscape water restrictions, turf limitations, and other municipality-based conservation codes have been implemented year-round. The ESD Laboratory and UNLV are required to adhere to these restrictions on a daily basis.

In the event of further regional water supply shortage, the ESD Laboratory will follow the water use recommendations and restrictions provided by UNLV, SNWA, and the Las Vegas Valley Water District. As required, the building engineer, in consultation with the facilities manager, will implement these water use restrictions.

Stormwater Management

Stormwater generated at the ESD Laboratory is diverted to storm sewers located throughout the campus. Collected stormwater is discharged to a Municipal Separate Storm Sewer System (MS4). Due to the extremely dry climate and infrequent rainfall events, ESD Laboratory has never experienced onsite flooding or drainage problems. Therefore, the ESD Laboratory does not have any onsite green infrastructure for managing stormwater.

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