Water Management Plan

Revision 1

United States Environmental Protection Agency
Office of Research and Development
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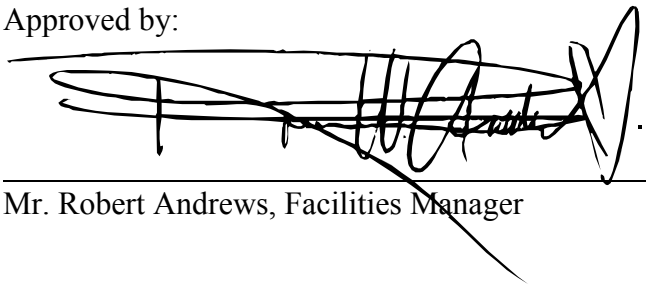
LAS VEGAS, NEVADA

WATER MANAGEMENT PLAN, REVISION 1

Approved by:



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1.0 IDENTIFIED WATER CONSERVATION OPPORTUNITIES

A water use and conservation assessment was conducted at the U.S. Environmental Protection Agency's (EPA's) National Exposure Research Laboratory (NERL) Environmental Sciences Division (ESD) (hereafter referred to as the ESD Laboratory) in Las Vegas, Nevada, in August 2012. Under this Water Management Plan, the ESD Laboratory will consider implementing the potential water conservation opportunities identified during the water assessment, which are summarized in Table 1.

The remainder of this Water Management Plan describes the facility's water reduction goals, water use trends, end uses of water, and drought management plans.

2.0 BACKGROUND AND PURPOSE

In 2007, *Executive Order (EO) 13423, Strengthening Federal Environmental, Energy, and Transportation Management,* called for federal agencies to reduce water use intensity by 2 percent per year between fiscal year (FY) 2007 and FY 2015, for a total reduction of 16 percent compared to a FY 2007 baseline. This goal was revised and extended by *EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance*. EO 13514 requires agencies to reduce potable water consumption intensity by 2 percent annually through FY 2020, relative to the FY 2007 baseline, for a 26 percent total reduction. Water use intensity is measured on a gallon/gross square foot (gsf) basis.

In addition to the potable water use reduction requirements in EO 13514, the order requires that agencies reduce industrial, landscaping, and agricultural (ILA) water consumption by 2 percent annually or 20 percent by the end of fiscal year 2020 relative to a FY 2010 baseline (including nonpotable sources). Agencies also should identify, promote, and implement water reuse strategies that reduce potable water consumption.

The implementing instructions of EO 13423, which remain in effect, require that, where applicable, agencies should purchase WaterSense® labeled products and choose irrigation contractors who are certified through a WaterSense labeled program. EO 13423 also requires agencies to audit 10 percent of facility square footage each year.

The Energy Independence and Security Act of 2007 (EISA 2007) added to these requirements, directing agencies to complete comprehensive energy and water evaluations of 25 percent of covered facilities each year (covered facilities are those that account for 75 percent of the agency's total energy use), implement cost-effective measures identified through life-cycle analyses, and measure and verify water savings.

In summary, existing executive orders and federal law require substantial reductions in all forms of water use, as well as ongoing, regular assessment of facility water use to identify and implement saving opportunities.

This facility-specific Water Management Plan has been developed to document and promote the efficient use of water at EPA's ESD Laboratory to help contribute to the Agency's overall water use objectives.

Table 1. Potential Water Conservation Opportunities, ESD Laboratory, Las Vegas, Nevada

Suggested Priority	Project Description	Project Cost	Potential Water Savings (gallons)	Potential Energy Savings (Mcf)	Potential Utility Cost Savings (b)	Potential Payback (years)
1	Install water meters on the make-up and blow down water lines of the cooling tower system.	$2,000	Installing water meters on the make-up and blow down water lines will improve system monitoring and ensure leaks or other problems are quickly identified.	0	Not quantified	Not quantified
2	Retrofit 1.6 gallons per flush (gpf) toilets in women's restrooms with dual-flush handles and flush valves.	$2,100	16,100	0	$50	42
3	Replace all urinals with 0.25 gpf, WaterSense® labeled models.	$15,600 (a)	24,200	0	$80	195

(a) The local water utility, Southern Nevada Water Authority, will rebate up to $180 per urinal installation for projects involving 12 urinal replacements or more. This has been deducted from the total project cost estimate to increase the cost effectiveness. See http://www.snwa.com/biz/rebates_wet_preapproved.html for more information on rebates.
(b) Utility cost savings are calculated using the most current water rates. Sewer fees are billed at a fixed rate not based on consumption, so cost savings provided in this table do not include savings on sewer fees. As of 2012, the ESD Laboratory's water rate is $3.29 per 1,000 gallons ($3.09 per 1,000 gallons for consumption and an addition $0.20 per 1,000 gallons commodity charge). ESD Laboratory is also billed a 2.50 percent reliability charge on top of the $3.09 per 1,000 gallons consumption rate.

3.0 FACILITY INFORMATION

The ESD Laboratory, constructed in 1964, is a 92,700 square-foot facility located in Las Vegas, Nevada. The facility 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 EPA by the U.S. General Services Administration (GSA). The current building lease runs through 2015. EPA is responsible for all water, sewer, and other utility bills.

4.0 WATER MANAGEMENT GOALS

The ESD Laboratory achieves its resource conservation goals by implementing a standard EPA Office of Research and Development (ORD) Environmental Management System (EMS) program. Within the EMS and otherwise, the ESD Laboratory's water management goals include:

- Identify at least one water conservation project to be completed in FY 2013 and obtain funding.

- Achieve a 26 percent potable water reduction by the end of FY 2020, compared to a FY 2007 baseline of 24.79 gallons per gsf, as required by EO 13514.
- Implement site-specific water conservation projects to achieve the facility's ConservW target (set annually by EPA's Sustainable Facilities Practices Branch), with a goal of contributing to the combined ConservW target for all seven ORD facilities.

5.0 WATER USE INFORMATION

The ESD Laboratory's water use has decreased since the last water use assessment in 2004. The facility has implemented effective changes such as eliminating single-pass cooling by installing air-cooled systems (e.g., air-cooled ice machines).

The ESD Laboratory uses water for building cooling, sanitary needs, and laboratory processes.

The following sections provide additional details on facility water use.

5.1 Water Supply

The ESD Laboratory's potable water is supplied by UNLV.

The ESD Laboratory does not have any nonpotable water sources.

All discussion of water use in this plan refers to potable use.

5.2 Meters and Submeters

Incoming city water is supplied through three separate meters. Two additional meters are located onsite to submeter landscape water use and water use of 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 facility submeters two wastewater discharge systems collecting process water from QAL and CHL. These meters are read at least monthly.

In addition, although make-up and blow down submeters are installed on the cooling tower system, the meters do not appear to be reading reliably. ESD Laboratory staff will consider replacing these meters to allow better control of the cooling tower system under this Water Management Plan.

5.3 Historical Water Use

During a previous water use assessment conducted in 2004, it was estimated that the ESD Laboratory was using 5,326,000 gallons of water per year. From April 2011 through March 2012, ESD Laboratory used 1,877,900 gallons of water—a reduction of approximately 65 percent since the last assessment.

In response to EO 13423, the ESD Laboratory set a FY 2007 water use intensity baseline of 24.79 gallons per gsf. In FY 2011, water use intensity decreased to 20.36 gallons per gsf—a reduction of 17.9 percent compared to the FY 2007 baseline. Figure 1 provides a graph of the

ESD Laboratory's water use from FY 2007 through FY 2011. Figure 2 provides a graph of ESD Laboratory's water use from April 2011 through March 2012 to display the prominent seasonal water use trend.

Figure 1. Water Use, ESD Laboratory, FY 2007 through FY 2011

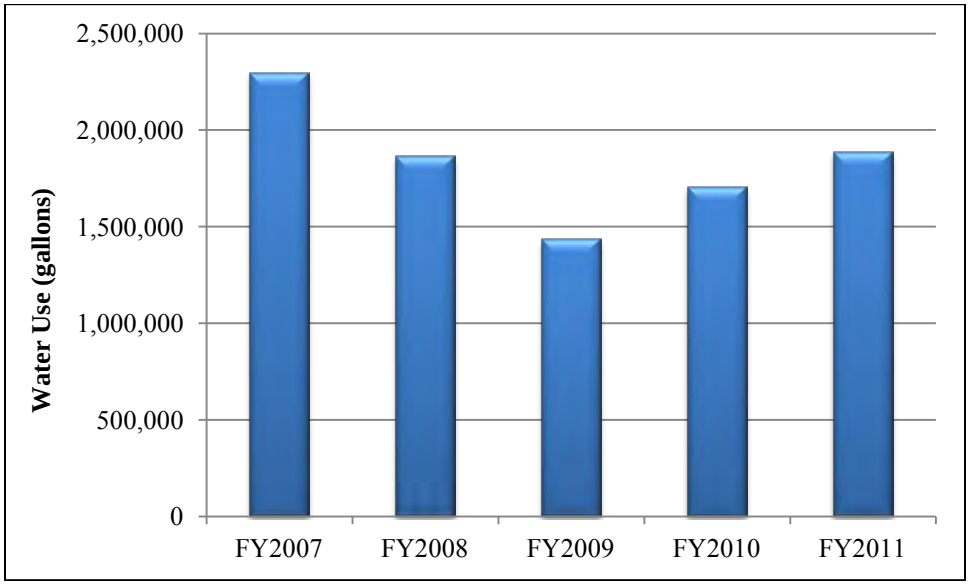
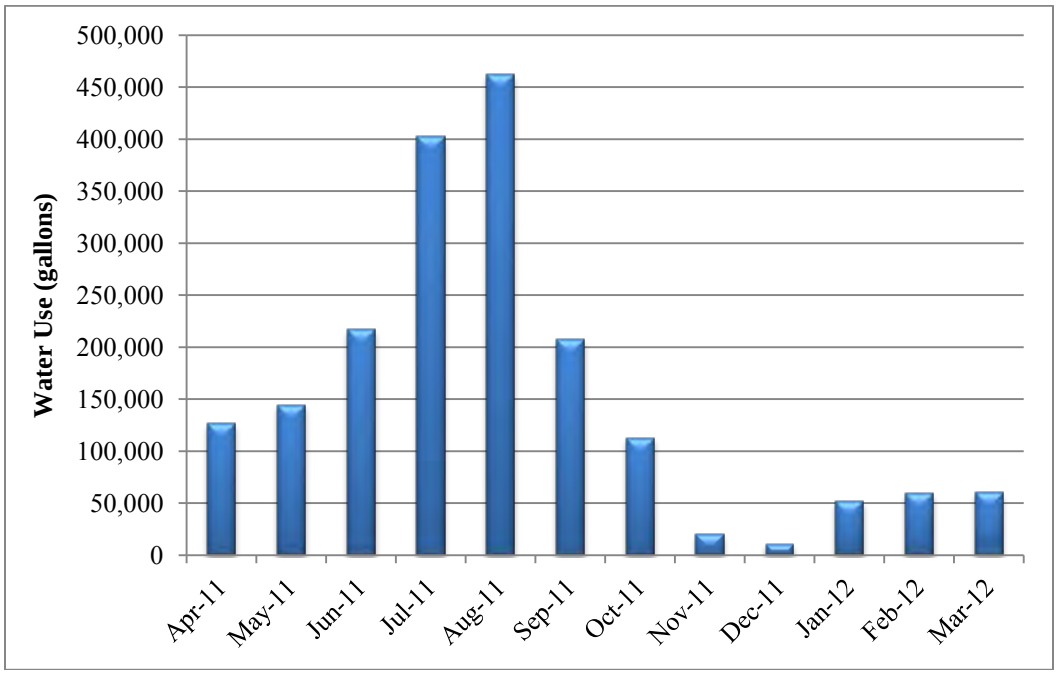


Figure 2. Seasonal Water Use Trend, ESD Laboratory, April 2011 – March 2012



5.4 End Uses of Water

Table 2 and Figure 3 provide the end uses of water at the ESD Laboratory. The uses are described in more detail below. Potential projects discussed in this section are summarized in Table 1.

Table 2. Major Potable Water Uses, ESD Laboratory, April 2011 – March 2012

Major Process	April 2011 – March 2012 Annual Consumption (gallons)	Percent of Total Water Use (%)	Supporting Calculations and Source Documentation
Cooling tower make-up water	1,541,900	82.1	Engineering estimate based on seasonal water use pattern. The average water use during November 2011, December 2011, and January 2012 was 28,000 gallons/month, so it is assumed this is the baseline indoor water use without cooling. This is extrapolated to annual water use, and the seasonal water use (or cooling tower water use) is equal to the metered indoor water use minus the estimated baseline water use without cooling (1,877,900 gallons/year - 28,000 gallons/quarter indoor use x 12 months = 1,541,900 gallons/year).
Restroom and other sanitary fixtures	215,000	11.4	Engineering estimate based on sanitary fixtures installed (1.6 gpf toilets, 1.0 gpf urinals, and 0.5 gallons per minute [gpm] faucets). Since fixtures are relatively efficient, it is assumed that each person uses 10 gallons of water per day. There are 86 employees and 250 working days per year. 10 gallons/person/day x 86 people x 250 days/year = 215,000 gallons/year.
Miscellaneous laboratory use	121,000	6.4	Calculated by subtracting estimated and metered water uses from the sum of building metered totals .
Total Water Use	**1,877,900**	**100.0**	**Sum of all building metered totals from accounts #0171108, #0171105, and #0171106, minus deducted water from uses not controlled by EPA (technology building and landscape water use).**

Figure 3. Percentage of Water End Uses, ESD Laboratory, April 2011 – March 2012

Cooling Tower Make-Up

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 blow down. The blow down controller is set to achieve approximately two or three cycles of concentration within the cooling tower, maintaining a set point of between 2,400 and 2,800 microSiemens per centimeter (μS/cm) while the make-up water supply is approximately 900 μS/cm. The water is chemically treated to control scale and corrosion. The cooling tower media was replaced in 2011 to reduce air blow-by and excessive water carry from the tower.

Meters are installed on the manual and automatic make-up water lines, the backwash discharge, and the blow down, but the meter readings are not reliable. For better system control, the ESD Laboratory should install new submeters on the cooling tower make-up and blow down water lines. Reading the meters regularly will allow the facility to ensure that the cycles of concentration desired are achieved and any leaks, overflows, or other malfunctions are identified quickly.

Restroom and Other Sanitary Fixtures

The ESD Laboratory's restroom fixtures are compliant with 1992 Energy Policy Act (EPAct 1992) water efficiency requirements (1.6 gpf toilets and 1.0 gpf urinals).

Faucet fixtures are water efficient, flowing at 0.5 gpm. This flow rate is lower than the EPAct 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 3 provides an inventory of sanitary fixtures.

Table 3. 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

To reduce water use in the restrooms, the ESD Laboratory could install dual-flush retrofit kits on the 1.6 gpf toilets in the women's restrooms and replace urinals with 0.25 gpf, WaterSense labeled models. Southern Nevada Water Authority offers a rebate of $180 per urinal for replacement projects involving 12 urinals or more. Before undergoing any project in Table 1, the ESD Laboratory will review the rebates offered by Southern Nevada Water Authority (see http://www.snwa.com/biz/rebates_wet_preapproved.html).

Miscellaneous Laboratory Use

ESD Laboratory has a water purification system (including a small reverse osmosis unit) to provide purified water for laboratory use.

6.0 DROUGHT CONTINGENCY PLAN

Information on drought restrictions can be found on the Southern Nevada Water Authority's website at: www.snwa.com.

In the event of a drought or other water supply shortage, the ESD Laboratory will follow the water use recommendations and restrictions provided by UNLV and of the utility. As required, the building engineer, in consultation with the facilities manager, will implement these water use restrictions.