Water Management Plan

Revision 1

United States Environmental Protection Agency
Region 9 Laboratory
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EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 9 LABORATORY
RICHMOND, CALIFORNIA

WATER MANAGEMENT PLAN, REVISION 1

Approved by:

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1.0 IDENTIFIED WATER CONSERVATION OPPORTUNITIES

In September 2014, a water use and conservation assessment was conducted at the U.S. Environmental Protection Agency's (EPA's) Region 9 Laboratory in Richmond, California. Under this Water Management Plan, the Region 9 Laboratory will consider implementing the potential water conservation and management opportunities identified during the water assessment, which are summarized in Table 1.

The rest of this Water Management Plan describes the Region 9 Laboratory'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 calls for reducing potable water use 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 in gallons per gross square feet (gsf).

The implementation instructions for water efficiency and management provisions of EO 13514 direct that agencies replacing fixtures or other water-using products should purchase Federal Energy Management Program-designated or WaterSense® labeled products.

In addition to the potable water use reduction requirements, EO 13514 requires agencies to reduce industrial, landscaping, and agricultural (ILA) water use by 2 percent annually or 20 percent by the end of FY 2020, relative to an FY 2010 baseline (including non-potable sources). The EO also directs agencies to identify, promote, and implement water reuse strategies that reduce potable water use.

The Energy Independence and Security Act of 2007 directs agencies to complete comprehensive energy and water evaluations of 25 percent of covered facilities (i.e., those accounting for 75 percent of total energy use) each year; implement cost-effective measures identified through life cycle analyses; and measure and verify water savings.

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

This Water Management Plan has been developed to document and promote the efficient use of water at the Region 9 Laboratory, so that the facility can contribute to meeting these Agency-wide objectives.

Table 1. Potential Water Conservation Opportunities, Region 9 Laboratory

Suggested Priority	Project Description	Project Cost	Potential Water Savings (gallons)	Potential Energy Savings (MMBtus)	Potential Utility Cost Savings	Potential Payback (years)
1	Retrofit three existing urinals that flush at 1.0 gallons per flush (gpf) with 0.5 gpf flushometer-valve inserts. See Note 1 below.	$150	8,000	N/A	$40	4
2	Replace five existing 2.5 gallons per minute (gpm) showerheads with WaterSense labeled models flowing at 1.75 gpm or less.	$150	2,000	1	$20	8
3	Install foot-operated flow control valves on the potable water and deionized (DI) water faucets on the primary glassware washing sink.	$2,000	9,000	2	$60	35
4	Replace three existing urinals that flush at 1.0 gpf with WaterSense labeled models flushing at 0.125 gpf. See Note 1 below.	$3,000	14,000	N/A	$70	43

Note 1: As a cost-effective alternative, Region 9 Laboratory will first pursue project 1, which may provide satisfactory urinal flushing performance. If performance is not satisfactory with the 0.5 gpf inserts, the Laboratory will consider replacing its three inefficient urinals (i.e., project 4).

3.0 FACILITY INFORMATION

The Region 9 Laboratory is a full-service, state-of-the-art facility specializing in chemical analysis, biological analysis, and field sampling services. The Laboratory is charged with producing environmental data and information that is technically sound and of requisite quality to achieve Agency and Region 9 goals.

The Region 9 Laboratory is located approximately 16 miles northwest of San Francisco in Richmond, California. The built-to-suit facility is leased by EPA through the U.S. General Services Administration from the Wareham Property Group on leased land located on the University of California Berkeley Richmond Field Station grounds. EPA first occupied the facility in 1993 and currently holds a five-year lease through February 2019. The facility consists of a main administration/laboratory building, a separate hazardous materials storage building, and secured parking for mobile laboratories and other laboratory vehicles. The Region 9 Laboratory also serves as the relocation site for EPA Region 9 essential staff under the Continuity of Operations Plan.

Laboratory buildings comprise a total of 45,800 square feet of conditioned space.

The laboratory is occupied by 42 EPA and contractor staff, typically between 9:00 a.m. and 5:00 p.m. Monday through Friday.

4.0 WATER MANAGEMENT GOALS

The Region 9 Laboratory achieves its resource conservation goals by implementing its Environmental Management Program (EMP). Within the EMP, the laboratory's water management goal is to reduce total water use intensity by 26 percent by FY 2020 (using a FY 2007 baseline).

In addition, the Laboratory will strive to meet annual facility-specific goals set by EPA's Sustainable Facilities Practices Branch (SFPB) under its ConservW program. These ConservW goals are calculated for each EPA facility based on the facility's previous water use reduction and its potential identified projects.

5.0 WATER USE INFORMATION

The Region 9 Laboratory uses potable water primarily for research, restroom use, and irrigation. The following sections provide additional details on water use.

5.1 Water Supply

East Bay Municipal Utility District (EBMUD) provides potable water service, and the City of Richmond provides sewer service.

Region 9 Laboratory does not use any non-potable ILA water.

5.2 Meters and Submeters

Incoming water is supplied through a two-inch metered service line. The meter is located outside of the fenceline along South 32nd Street.

Under this plan, the administrative officer and the EMS water manager will use metered water data to monitor water consumption trends. Unexpected changes in water consumption will be investigated and resolved.

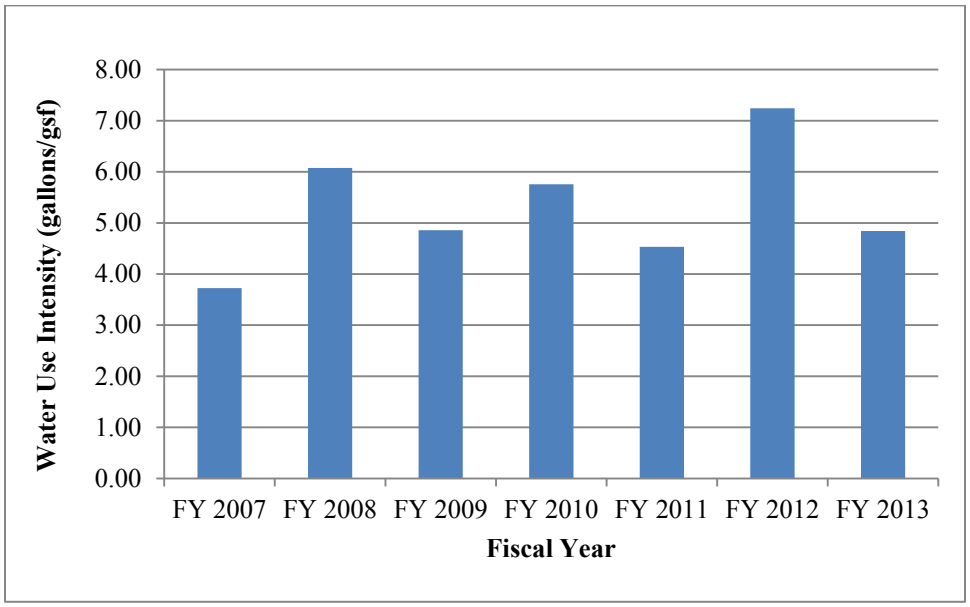
In addition, the building engineer maintains a monthly inspection log for the wastewater neutralization system, recording the flow of laboratory wastewater based on collection sump pump cycle counters and sump capacities from four collection stations located throughout the laboratory. Under this plan, the building engineer will continue maintaining these logs.

5.3 Historical Water Use

In response to EO 13423, the Region 9 Laboratory set a FY 2007 potable water use intensity baseline of 3.72 gallons per gsf. In FY 2013, water use intensity was 4.83 gallons per gsf—an increase compared to the FY 2007 baseline. Figure 1 illustrates the laboratory's potable water use intensity from FY 2007 to FY 2013. The laboratory's water use intensity is relatively low,

compared to other EPA laboratories, and has tended to vary year to year based on staffing levels, sample analysis workload, and associated glassware preparation and washing.

Figure 1. Annual Water Use Intensity, Region 9 Laboratory, FY 2007–FY 2013



5.4 End Uses of Water

Table 2 and Figure 2 describe the end uses of water at the Region 9 Laboratory.

Figure 3 provides a graph of the laboratory's monthly potable water use in FY 2013. Water use varies throughout the year, primarily as a function of restroom and laboratory water use demand as sample analysis workload varies.

The Region 9 Laboratory end uses of water are described in more detail in this section. Potential projects discussed in this section are summarized in Table 1.

Table 2. Major Water Uses, Region 9 Laboratory, FY 2013

Major Process	FY 2013 Annual Water Use (gallons)	Percent of Total Potable Water Use (%)	Estimated Utility Costs[a]	Basis
Restroom fixtures	73,000	32.9	$340	Engineering estimate based on fixtures installed, occupancy, and daily usage factors.
Irrigation and miscellaneous uses	71,632	32.3	$330	Calculated by difference from known total water use and all other calculated water uses.

Table 2. Major Water Uses, Region 9 Laboratory, FY 2013

Major Process	FY 2013 Annual Water Use (gallons)	Percent of Total Potable Water Use (%)	Estimated Utility Costs[a]	Basis
Laboratory water use [potable and DI/reverse osmosis (RO) water]	37,000	16.7	$170	Based on wastewater neutralization system log records from September 2013 to August 2014. Assumed similar to FY 2013.
RO system reject	22,000	9.9	$100	Engineering estimate based on assumed portion of laboratory water use and 1.2 gallons of reject for each gallon of RO water.
RO system backwash	18,000	8.1	$80	Calculated from backwash frequency and flow rate.
Boat washing	150	0.1	$1	Engineering estimate based on boat washing frequency.
Total Water Use	**221,782**	**100**		FY 2013 meter readings.

[a] Utility cost is calculated using the most current water rates available. Water service is provided at a rate of $3.81 per 100 cubic feet or $5.09 per 1,000 gallons. Sewer service is billed as a fixed cost to the landlord as part of the real estate tax bill and is not paid directly by the Laboratory.

Figure 2. Percentage of Potable Water End Uses, Region 9 Laboratory, FY 2013

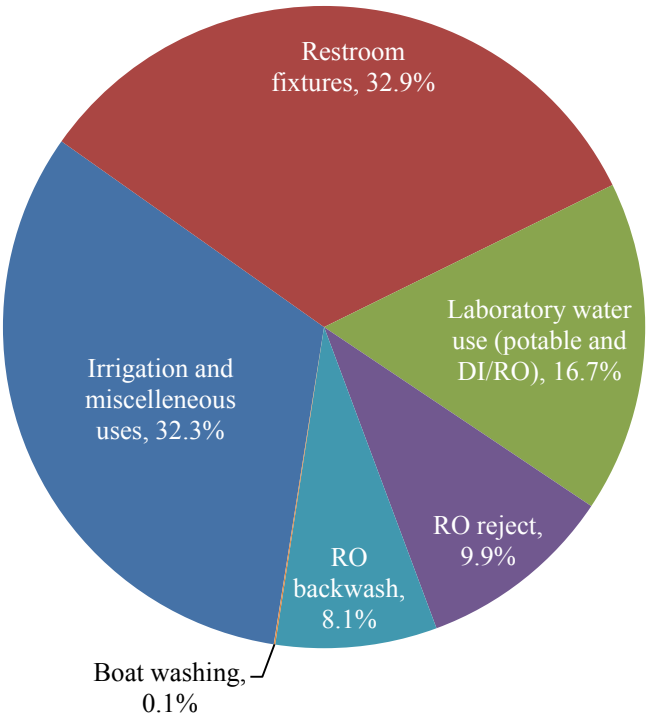
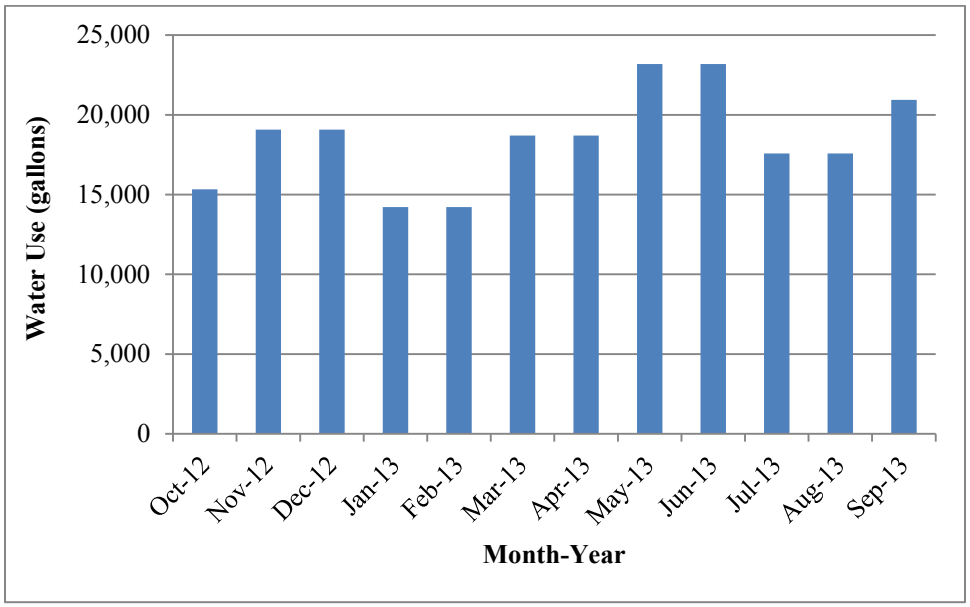


Figure 3. Monthly Water Use, Region 9 Laboratory, FY 2013



Laboratory Water Use

Both potable water and DI water are used in laboratories to support analytical chemistry activity and associated glassware washing. Hand washing glassware in the central washroom is the largest water-using activity in the laboratory space. After washing, glassware is triple rinsed with potable water and then final rinsed with DI water.

DI water is produced using a reverse osmosis (RO) system. For every gallon of purified water produced, the system rejects to the drain 1.2 gallons of water with concentrated minerals. This reject ratio is typical, and the system is considered efficient. The RO system membrane is also backwashed at 2.0 gpm for one minute every hour.

To reduce laboratory water use, the Region 9 Laboratory will consider installing foot-pedal-operated on-off controls on the potable water and DI/RO water faucets on the main glassware washing station. Glassware washing and rinsing is a two-handed operation and foot control of the rinse water flow would allow the lab technician to more precisely control when rinse water is flowing to only those times when a glassware item is under the spout, thereby reducing the total quantity of rinse water used.

Restroom Fixtures

Energy Policy Act of 1992 (EPAct 1992)-compliant restroom fixtures [1.6 gallons per flush (gpf) toilets and 1.0 gpf urinals] are installed throughout the facility.

High-efficiency faucets with a maximum flow rate of 0.5 gpm are used throughout the facility. The 0.5 gpm flow rate is lower than the EPAct 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 sinks in public settings.

EPAct 1992-compliant showerheads (2.5 gpm) are installed in all five shower stalls.

System pressure is maintained between 20 to 80 pounds per square inch, which is necessary for adequate restroom fixture performance.

Janitorial staff and employees are trained to report leaks or other maintenance problems to the administrative officer and building engineer. Reported maintenance problems are assigned a work order that is tracked and completed by the facilities operation and maintenance staff.

Table 3 provides a complete inventory of restroom fixtures.

Table 3. Restroom Fixtures Inventory, Region 9 Laboratory

Fixture Type	Flow Rate	Total Number
Toilets	1.6 gpf	10
Urinals	1.0 gpf	3
Lavatory faucets	0.5 gpm	13
Showerheads	2.5 gpm	5

To reduce restroom water use, the Laboratory will replace the existing urinal flushometer-valve insert cartridges with 0.5 gpf inserts. While the porcelain urinal fixture is rated for a 1.0-gallon flush, satisfactory performance can often be achieved with a 0.5-gallon flush. If this low-cost retrofit does not provide satisfactory results, the Laboratory will consider replacing the three existing 1.0 gpf urinals with WaterSense labeled models flushing at 0.125 gpf.

To further reduce restroom water use, the Laboratory will also consider replacing its five existing showerheads with WaterSense labeled models flowing at 1.75 gpm or less.

Irrigation and Miscellaneous Uses

Irrigation water is used sparingly at the Region 9 Laboratory. Irrigation is applied to approximately 0.5 acres of landscaped beds planted with drought-tolerant species. Irrigation water is applied on an as-needed, seasonal basis using a low-flow, drip irrigation system. The irrigation system is programmed and operated by a grounds maintenance contractor under supervision of the building owner's representative, the building engineer. Most irrigation water is applied in the late summer months. Water is normally applied three days per week during the irrigation season, using an automated, timed controller. The grounds maintenance contractor reduces the watering frequency or suspends irrigation entirely when natural precipitation is adequate to maintain healthy plant growth. During drought conditions, application of irrigation water is limited to no more than two times per week. Under this plan, irrigated areas will be inspected by the building engineer on a weekly basis to identify any unusual wet areas that could indicate a leaking drip irrigation line.

Water is also used during testing of safety shower and eye washes, in the employee lunch room, and for janitorial services.

Boat Washing

On a very limited basis, boats are washed in the boat storage area after they have been used in salt water. The boats are sprayed with a hose equipped with a hand-operated spray nozzle. This activity occurs approximately two times per year.

6.0 DROUGHT CONTINGENCY PLAN

This section describes the Region 9 Laboratory's drought contingency plans.

6.1 Drought Risk

The Region 9 Laboratory is located in an area that periodically experiences drought and, at times, can experience extreme drought. Water is supplied by EBMUD, which obtains water from Sierra Nevada mountain snowpack in the Molkelume River watershed. To help alleviate water shortage risk associated with drought, EBMUD has made arrangements to obtain supplemental Sacramento River water through the Freeport Regional Water Authority. Risk remains, however, due to the regional nature of drought conditions. Drought risk is expected to increase in coming years as climate change affects the formation and duration of mountain snow pack. Additional information related to drought management and response within the EMBUD service territory is available at https://ebmud.com/water-and-wastewater/water-supply/drought-update.

6.2 Recent Contributions to Drought Contingency

The Region 9 Laboratory is currently experiencing drought conditions and has recently limited irrigation water application to no more than two days per week in response to that drought and in compliance with EBMUD requirements. This limitation is expected to reduce water use from the levels observed in FY 2013.

6.3 Potential Capital Improvement Projects to Reduce Water Use

Potential capital improvement projects are identified in Table 1. These projects represent the Region 9 Laboratory's plan to reduce water use when faced with water supply limitations. If necessary, all of these 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 11 percent.

6.4 Opportunities for Short-Term Response to Local Drought

In the event of a severe local drought, the Laboratory could continue to curtail outdoor water use, limiting it to no more than two days per week (undertaken during the current 2014 drought), one day per week, or ultimately eliminating in entirely. These steps would be taken in coordination with the building owner, Wareham Property Group, in response to drought emergency

requirements communicated by EBMUD. Further limiting irrigation water use is projected to reduce facility water use by 10 to 20 percent beyond current levels. However, significantly reducing or entirely eliminating irrigation water use could damage existing landscape plant material if implemented for an extended period.

6.5 Considerations for New Construction

The Region 9 Laboratory's current design includes many aspects that are considered water efficiency best practices. For example, water is not used for building or equipment cooling or in other mechanical applications. However, if EPA had the opportunity to construct a new facility, the design choices listed below could be considered to further reduce water use.

1) The Laboratory could consider restroom fixtures with maximum flow rate and performance requirements provided in Table 4.

Table 4. Requirements for Restroom Fixtures in New Laboratory Construction

Fixture Type	Maximum Flow Rate	Performance Requirement
Toilets	1.28 gpf	WaterSense labeled once specification is released (expected 2015)
Urinals	0.125 gpf	WaterSense labeled
Lavatory faucets	0.5 gpm	None
Showerheads	1.75 gpm	WaterSense labeled

2) The Laboratory could consider landscaping that does not require supplemental irrigation.

3) When evaluating laboratory-wide DI/RO requirements, the Laboratory could consider whether point-of-use systems in individual laboratories would offer more efficient operation than central laboratory systems sized for maximum concurrent needs in multiple laboratories.