Water Management Plan

Revision 1

United States Environmental Protection Agency
Region 10
Manchester Environmental Laboratory
7411 Beach Drive East
Port Orchard, WA 98366

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EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
MANCHESTER ENVIRONMENTAL LABORATORY
PORT ORCHARD, WASHINGTON

WATER MANAGEMENT PLAN, REVISION 1

Approved by:

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4/30/2013

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5/2/13

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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) Region 10 Manchester Environmental Laboratory in Port Orchard, Washington, in August 2012. Under this Water Management Plan, the Manchester Environmental 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 an 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 Manchester Environmental Laboratory to help contribute to the Agency's overall water use objectives.

Table 1. Potential Water Conservation Opportunities, Manchester Environmental Laboratory

Suggested Priority	Project Description	Project Cost	Potential Water Savings (gallons)	Potential Energy Savings (Million Btu)	Potential Utility Cost Savings*	Potential Payback (years)	Notes
1	Replace two, 2.5 gpm showerheads with 1.5 gpm WaterSense labeled models. The showerheads are located in the men's and women's restrooms in the metals wing.	$100	2,700	2	$80	1	None.
2	Replace two, 3.5 gpf tank-type toilets located in the South office building with 1.6 gallons per flush (gpf) models.	$1,000	35,500	0	$470	2	None.
3	Read existing reverse osmosis (RO) permeate meter and permeate and reject ratio once per month.	$0	Reading the permeate water meter and monitoring the ratio between permeate and reject will help the facility track the RO system water use and will ensure leaks or other problems are quickly identified.	0	$0	Not quantified	None.
4	Install and read meters on steam boiler make-up water lines and three humidifiers serving the major air handling units.	$2,000	Installing water meters on the steam boiler make-up water lines and the humidifier water lines will improve system monitoring and will ensure leaks or other problems are quickly identified.	0	Not quantified	Not quantified	None.

Table 1. Potential Water Conservation Opportunities, Manchester Environmental Laboratory

Suggested Priority	Project Description	Project Cost	Potential Water Savings (gallons)	Potential Energy Savings (Million Btu)	Potential Utility Cost Savings*	Potential Payback (years)	Notes
5	Replace high-flushing (3.5 gallons per flush [gpf] or higher) flushometer-valve toilets near the front entrance of the main laboratory (3) and in the warehouse (2) with 1.6 gpf models.	$5,000	25,000	0	$330	15	None.
NA	Retrofit 13 of 14 faucets with 0.5 gallons per minute (gpm) faucet aerators.	$130	23,000	14	$640	0.2	Manchester Environmental Laboratory replaced the faucet aerators on all of its faucets with 0.5 gpm aerators previously, but there were complaints that the flow was too restrictive, so the aerators were removed. This project is not effective at this facility.
NA	Replace all urinals with 0.25 gpf, WaterSense labeled models.	$4,000	11,000	0	$140	29	Manchester Environmental Laboratory does not intend to pursue this project because it is not cost effective.
NA	Replace three, 1.6 gpf tank-type toilets located in the North office building (2) and West annex (1) with WaterSense labeled models, flushing at 1.28 gpf or less.	$1,500	2,400	0	$30	50	Manchester Environmental Laboratory has long (200 feet), lateral (very low sloped) drainlines. Facility staff are concerned that fixtures with flush volumes less than 1.6 gpf will cause clogged drainlines, so they do not intend to pursue this project. In addition, it is not cost effective.

NA – Not applicable

*Utility cost savings are calculated using the most current water, sewer, and fuel oil costs available. As of 2012, the Manchester Environmental Laboratory's water rate is approximately $0.030 per cubic foot and the sewer rate is $0.070 per cubic foot. Combined, this rate is equal to $13.37 per 1,000 gallons. Fuel oil cost is $3.2759 per gallon, assuming 60 percent heating efficiency.

3.0 FACILITY INFORMATION

The Manchester Environmental Laboratory, occupied in 1979 and expanded in 2002, is a 68,222 square-foot facility located in Port Orchard, Washington. The building is owned and operated by EPA, and EPA is responsible for all water, sewer, and other utility bills.

4.0 WATER MANAGEMENT GOALS

The Manchester Environmental Laboratory achieves its resource conservation goals by implementing a facility-specific Environmental Management System (EMS) program. The Manchester Environmental Laboratory made significant progress in reducing water use prior to 2007 by reducing eyewash rinse times, shortening dishwasher and autoclave run times and frequency of use, and minimizing landscape watering. In addition, water-using analytical equipment and facility processes were reviewed and replaced where appropriate. The facility was able to eliminate the need for a cooling tower by replacing it with standard refrigeration cooling. Because of all of its hard work in reducing water use to the extent practical, the Manchester Environmental Laboratory's EMS focuses on continuous improvement and not backsliding into water intensive practices. Within the EMS and otherwise, the Manchester Environmental Laboratory's water management goals include:

- Achieving a 26 percent potable water reduction by the end of FY 2020, compared to a FY 2007 baseline of 9.49 gallons per gsf, as required by EO 13514.
- Implementing site-specific water conservation projects to achieve the facility's ConservW target (set annually by EPA's Sustainable Facilities Practices Branch).

5.0 WATER USE INFORMATION

The Manchester Environmental Laboratory's water use has decreased since the last water use assessment in 2005. The facility has implemented many effective changes as described in Section 4.0.

The Manchester Environmental Laboratory uses water for: research and mission-related functions; steam boilers, which provide building and hot water heating; and sanitary needs.

The following sections provide additional details on the facility's water use.

5.1 Water Supply

The Manchester Environmental Laboratory's potable water is supplied by the Manchester Water District. Sewer service is provided by Kitsap County Public Works.

The Manchester Environmental Laboratory does not have nonpotable water sources.

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

5.2 Meters and Submeters

Incoming city water is supplied through five separate meters that service different buildings on the facility campus. Building-level meters are read weekly and data is evaluated to quickly

identify potential leaks or equipment malfunctions. Since leaks and other issues can be identified weekly, they are immediately corrected.

Laboratory water that is discharged to the acid neutralization system is metered before discharging to the sewer system.

The facility submeters RO permeate, although the meter is not read regularly. The Manchester Environmental Laboratory will begin reading this meter and the permeate and reject ratios monthly and will consider installing submeters on the steam boiler make-up lines under this Water Management Plan.

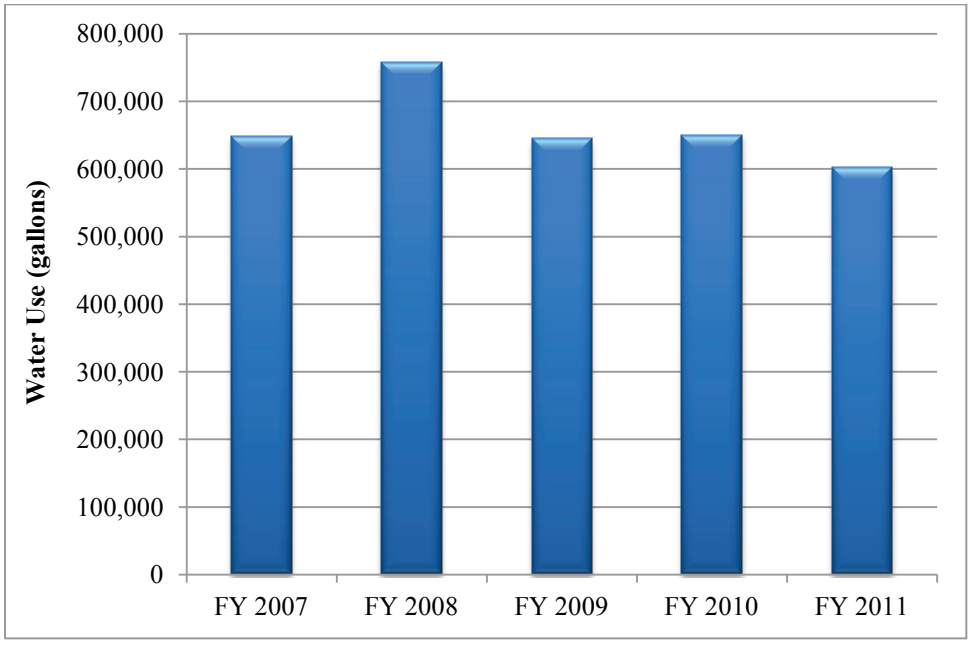
5.3 Historical Water Use

During a previous water use assessment conducted in 2005, it was estimated that the Manchester Environmental Laboratory was using 1,171,410 gallons of water per year. From August 2011 through July 2012, the Manchester Environmental Laboratory used 728,761 gallons of water—a reduction of approximately 38 percent since the last assessment.

In response to EO 13423, the Manchester Environmental Laboratory set a FY 2007 water use intensity baseline of 9.49 gallons per gsf. In FY 2011, water use intensity was down to 8.84 gallons per gsf—a reduction of 6.8 percent compared to the FY 2007 baseline. Figure 1 provides a graph of the Manchester Environmental Laboratory's water use from FY 2007 through FY 2011.

Note that water use in the twelve month period just prior to the assessment (August 2011 to July 2012) indicated an increase in FY 2011. Since most water uses have been significantly reduced or eliminated, this year over year increase will result from fluctuations in laboratory process water use.

Figure 1. Water Use, Manchester Environmental Laboratory, FY 2007 through FY 2011



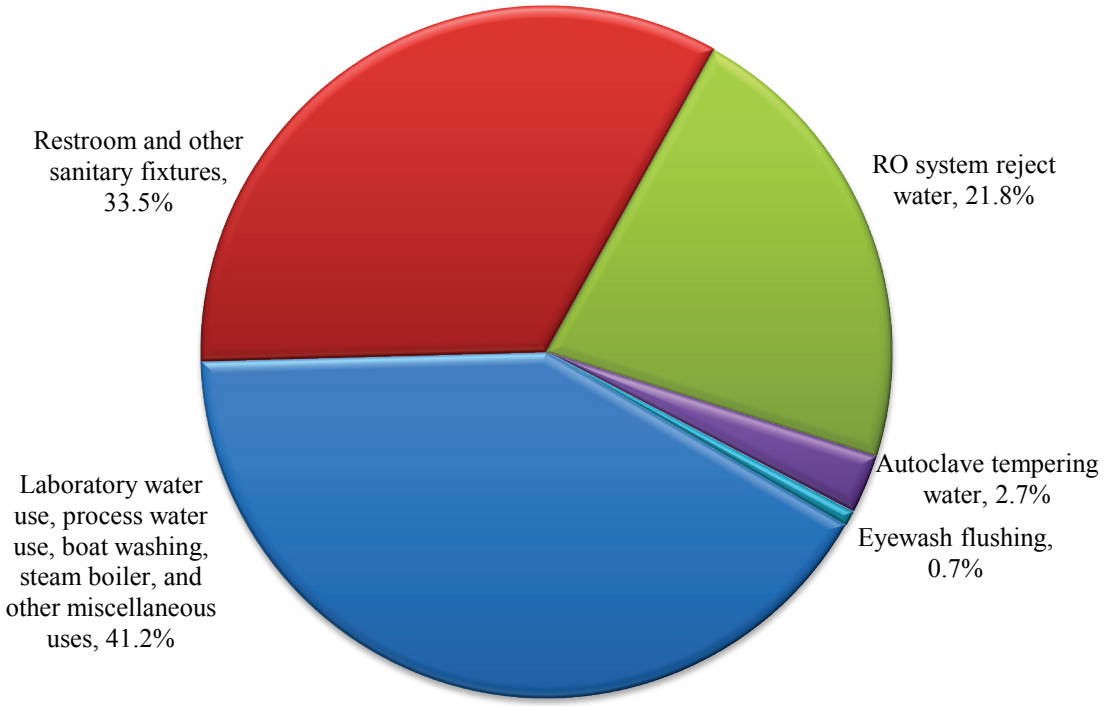
5.4 End Uses of Water

Table 2 and Figure 2 illustrate the end uses of water at the Manchester Environmental 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, Manchester Environmental Laboratory, August 2011 – July 2012

Major Process	August 2011 – July 2012 Annual Consumption (gallons)	Total Water Use (%)	Supporting Calculations and Source Documentation
Laboratory water use, process water use, boat washing, steam boilers, and other miscellaneous uses	300,561	41.2	Calculated by subtracting all other estimate water uses from the metered total.
Restroom and other sanitary fixtures	244,000	33.5	Engineering estimate based on sanitary fixtures installed (3.5 and 1.6 gpf toilets, 1.5 and 1.0 gpf urinals, and 0.5-2.5 gpm faucets). Since the fixtures are relatively inefficient, it is assumed that each person uses 15 gallons of water per day. There are 65 employees and 250 working days per year. 15 gallons/person/day x 65 people x 250 days/year = 243,750 gallons/year.
RO system reject water	159,000	21.8	Estimated from 2005 Water Management Plan by adding reject water use from two systems (125,000 gallons/year + 34,000 gallons/year). The two systems have been combined into one system. Assumes that research needs have not changed and that system efficiency is the same.
Autoclave tempering water	20,000	2.7	Based on laboratory autoclave study, which noted 665 operating hours/year x 0.5 gallons/minute discharge during operation x 60 minutes/hour = 19,950 gallons/year.
Eyewash flushing	5,200	0.7	Estimated based on and eyewash flushing study and operational changes made in 2005.
Total Water Use	**728,761**	**100.0**	**Sum of all building metered totals. Data provided by the facility.**

Figure 2. Percentage of Water End Uses, Manchester Laboratory, FY 2011



Research and Other Laboratory Water Use

The Manchester Environmental Laboratory has a water purification system to provide purified water for laboratory use. The water purification system consists of a mixed bed sand filter, activated carbon, cartridge filter, RO membrane filters, deionized resin beads, and ultraviolet light disinfection.

With the RO membranes, specifically, water efficiency is an important consideration. The building engineer changes the RO membranes and filters approximately every five years to ensure optimal efficiency. In addition, water entering the purification system is tempered to the optimal temperature for membrane pass through. There is a meter on the RO permeate line, but it is not read regularly. The Manchester Environmental Laboratory will consider reading this meter and the ratio of permeate to reject water regularly to track RO system water use and to ensure ongoing control of the system.

The Manchester Environmental Laboratory also operates two autoclaves, but tempering water flow is manually controlled to ensure that flow is not continuous.

In 2005, the facility initiated a study to determine how frequently eyewashes need to be flushed to meet safety requirements. The study showed that the facility could reduce flushing from once per week to once per month to reduce water uses.

The facility installed a pre-rinse spray valve in 2012 to use for field preparation and clean-up. The pre-rinse spray valve flows above the federal maximum of 1.6 gpm. When it is past its

useful life, the Manchester Environmental Laboratory will consider replacing it with a more efficient model.

The facility also optimizes five laboratory glassware washers to ensure that full loads are run and water use is as low as possible for proper cleaning.

Steam Boilers

The Manchester Environmental Laboratory has four steam boilers. Steam is supplied for building heat, domestic hot water production, and direct steam humidification. Steam condensate is collected and returned to the boilers. A small quantity of steam is blown down from the boilers as a preventative maintenance measure and tempered with cold water. Blow down is performed manually for about 5 seconds per boiler per day. Make-up water to the system passes through a water softener first. The boiler water systems are monitored and maintained once per month under a service contract to prevent scale and corrosion and optimize condensate reuse. Boiler water parameters such as phosphorous, chloride, and conductivity are monitored and controlled through periodic testing and chemical treatment.

The Manchester Environmental Laboratory will consider installing water meters on boiler make-up water lines to better monitor potable water usage.

Restroom and Other Sanitary Fixtures

Many of the Manchester Environmental Laboratory's restroom fixtures are not compliant with 1992 Energy Policy Act (EPAct 1992) water efficiency requirements (1.6 gpf toilets, 1.0 gpf urinals, and 2.5 gpm or less showerheads). Some toilets flush as high as 3.5 gpf, while some urinals flush higher than 1.0 gpf. In addition, the Manchester Environmental Laboratory has many tank-type toilet fixtures, which could be replaced with WaterSense labeled models flushing at 1.28 gpf or less.

Faucet fixtures are not water efficient, flowing between 2.0 and 2.5 gpm in most cases. Faucets that flow at 0.5 gpm are sufficient for hand washing and considered a best practice for lavatory sinks in public settings.

Table 3 provides an inventory of sanitary fixtures.

Table 3. Sanitary Fixtures Inventory, Manchester Environmental Laboratory

Fixture Type	Flow Rate	Total Number
Toilets	3.5 gpf tank-type	3
	1.6 gpf tank-type	2
	3.5 gpf flushometer-valve	5
	1.6 gpf flushometer-valve	7
Urinals	1.0 gpf or higher	4
Lavatory faucets	2.2 gpm	9
	2.0 gpm	3
	0.5 gpm	2*
Showerheads	2.5 gpm	2

*One of the 0.5 gpm faucets in the women's restroom in the metals wing may not be operating correctly. Per Table 1, this faucet aerator should also be replaced.

To reduce water use in the restrooms, the Manchester Environmental Laboratory will consider replacing tank-type toilets with WaterSense labeled models; replacing 3.5 gpf flushometer-valve toilets with 1.6 gpf models; replacing urinals with 0.25 gpf, WaterSense labeled models; retrofitting all faucets with 0.5 gpm faucet aerators; and replacing the 2.5 gpm showerheads with WaterSense labeled models. These fixture replacements represent the largest opportunity for savings at the Manchester Environmental Laboratory. When considering fixture replacements, the Manchester Environmental Laboratory may want to pilot test a limited number of installations to ensure existing plumbing is not compromised by high-efficiency fixture installations.

Miscellaneous Use

Occasionally, the Manchester Environmental Laboratory washes boats on site, but this is not a significant water use.

6.0 DROUGHT CONTINGENCY PLAN

If imposed, information on drought restrictions can be found on the Manchester Water District's website at: http://www.manchesterwater.org/.

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