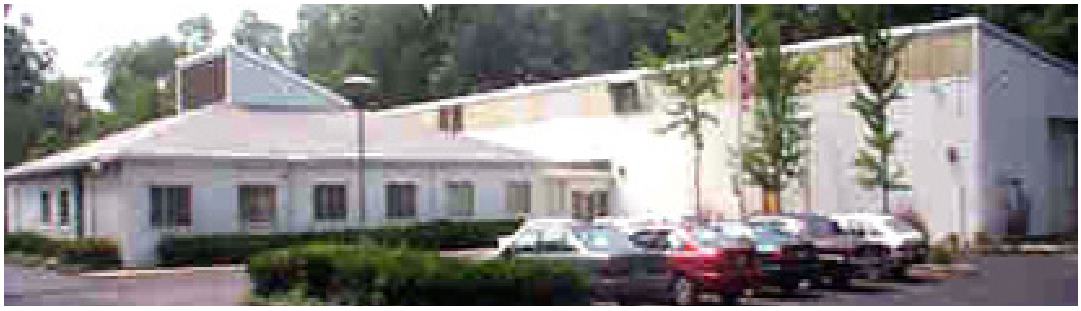
Water Management Plan

Revision 1

United States Environmental Protection Agency
Land Remediation and Pollution Control Division
Center Hill Research Laboratory
5995 Center Hill Avenue
Cincinnati, OH 45224



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Point of Contact:
Mr. Andy Franke
513-569-7924

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY
LAND REMEDIATION AND POLLUTION CONTROL DIVISION
CINCINNATI, OHIO

WATER MANAGEMENT PLAN, REVISION 1

Approved by:

Richard D. Koch, Director, Facilities Management and Services Division — Date 11/18/13

David Carson, Chief, Waste Management Branch — Date 15 NOV 2013

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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) Center Hill Research Laboratory (Center Hill) in Cincinnati, Ohio, in May 2013. Under this Water Management Plan, Center Hill will consider implementing the potential water conservation opportunities identified during the water assessment, which are summarized in Table 1.

The rest 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 calls for reducing 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 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 consumption 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 consumption.

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 executive orders 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 facility-specific Water Management Plan has been developed to document and promote the efficient use of water at Center Hill, so that the facility can contribute to meeting these Agency-wide objectives.

Table 1. Potential Water Conservation Opportunities, Center Hill

Suggested Priority	Project Description	Project Cost	Potential Water Savings (gallons)	Potential Energy Savings (MMBtus)	Potential Utility Cost Savings*	Potential Payback (years)
1	Retrofit all lavatory faucets with 0.5 gallon per minute (gpm) flow controllers.	$50	22,000	14	$600	<1
2	Replace existing 2.5 gpm showerhead with a 1.5 gpm WaterSense labeled model.	$30	2,000	1	$60	<1
3	Replace water-cooled heat pump in Room 130 with an air-cooled model.	$10,000	530,000	0	$10,000	1
4	Replace existing 1.0 gallon per flush (gpf) urinal with 0.125 gpf WaterSense labeled model.	$1,000	2,000	0	$40	25

*Utility cost savings are calculated using the most current water and sewer rates available. Based on bills provided to EPA from the University of Cincinnati Consolidated Utilities, the water and sewer rate is approximately $19.06 per 1,000 gallons.

3.0 FACILITY INFORMATION

Center Hill was constructed in the late 1960s. EPA initiated operations at the laboratory in the mid-1970s. The main laboratory building includes a research wing comprised of a high bay area with a row of laboratory spaces adjacent to the high bay, and an office wing with a reception area, staff offices, lavatories, and an employee break room. A separate trailer building constructed in the mid-1990s is located behind the main laboratory and contains housing contractor staff offices. EPA owns the research buildings with a total estimated area of 20,468 gsf. EPA operates the buildings and is responsible for all water and energy utility charges. The buildings are located on 18.5 acres of land leased from the University of Cincinnati. The current 20-year land lease runs through 2019.

Approximately 35 employees work at Center Hill. 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.

4.0 WATER MANAGEMENT GOALS

The water management goals of Center Hill are achieved through the implementation of the EPA Cincinnati Environmental Management System (EMS). The EMS is established and implemented consistent with Cincinnati's Comprehensive EMS Implementation Policy. Within the EMS, Center Hill's water management goals include:

- Continue 1 percent reduction at the facility annually as assigned in ConservW goals. Update goals upon receipt of new ConservW information.

5.0 WATER USE INFORMATION

Center Hill uses water for sanitary needs, equipment cooling, and laboratory processes. The facility's water use has decreased since the last water use assessment in 2008. Since the water assessment, Center Hill's major water-saving project was eliminating the single-pass cooling water for the X-ray diffraction (XRD) analytical instrument. The facility also ceased continuous flow of tempering water to the steam sterilizer by shutting it down when it is not in use.

The following sections provide additional details on Center Hill's water use.

5.1 Water Supply

Center Hill's potable water and sewer service is supplied by the University of Cincinnati Consolidated Utilities. The facility does not have use any sources of non-potable water. Therefore, all discussion of water use in this plan refers to potable use.

5.2 Meters and Submeters

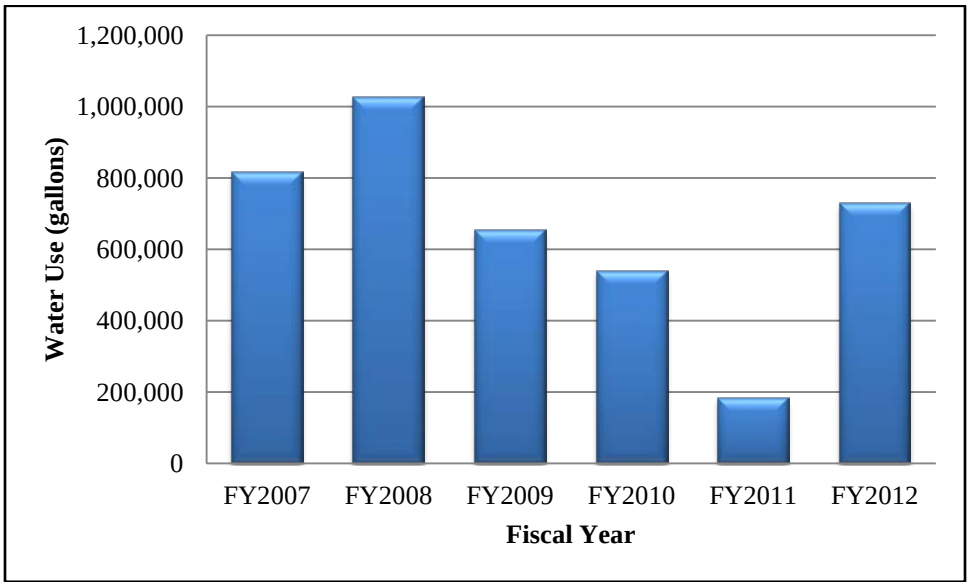
Water supplied to Center Hill is metered by the University of Cincinnati Consolidated Utilities and reported monthly to EPA through water bills. Flow-totalizing meters are installed on the two deionized water supply systems supplying laboratory needs. Data from these meters will be recorded weekly under this plan.

5.3 Water Use

During the previous water use assessment, it was estimated that Center Hill used 815,377 gallons of water in FY 2007. In FY 2012, Center Hill used 727,555 gallons of water—a reduction of approximately 10.8 percent since the last assessment. Figure 1 illustrates Center Hill's water use from FY 2007 to FY 2012.

In response to EO 13423, Center Hill set a FY 2007 water use intensity baseline of 39.84 gallons per gsf. In FY 2012, water use intensity had decreased to 35.55 gallons per gsf—a reduction of 10.8 percent compared to the FY 2007 baseline.

Figure 1. Water Use, Center Hill, FY 2007 - FY 2012



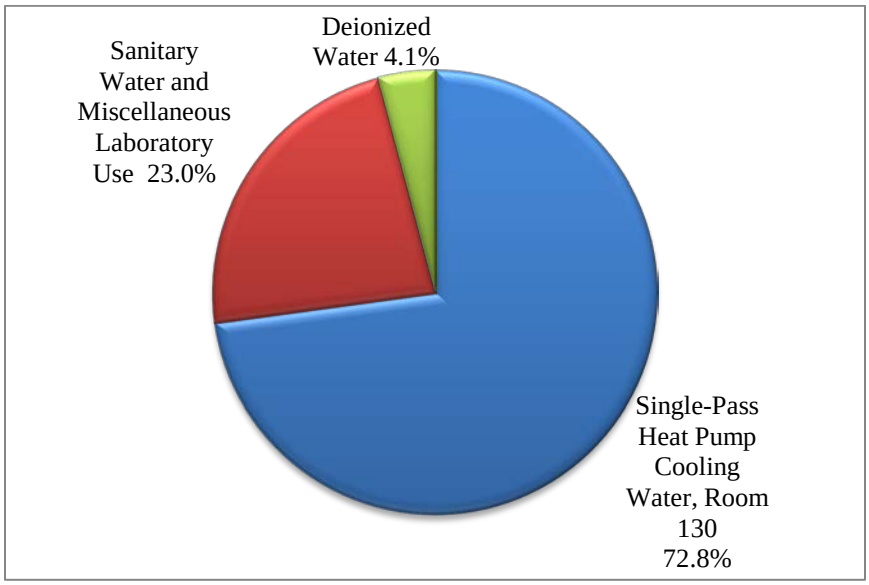
5.4 End Uses of Water

Table 2 and Figure 2 provide the end uses of water at Center Hill. 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, Center Hill, FY 2012

Major Process	FY 2012 Annual Consumption (gallons)	Percent of Total Water Use (%)	Supporting Calculations and Source Documentation
Single-Pass Heat Pump Cooling Water, Room 130	530,000	72.8	Engineering estimate based on pattern analysis performed on water data for FY 2012. Because heat pump cooling is required seasonally, mainly during spring and summer months, water use can be estimated by looking at trend data. The heat pump, when operational, uses between 4.5 and 9.5 gpm.
Sanitary Water and Miscellaneous Laboratory Use	167,555	23.0	Calculated by difference from the FY 2012 metered total and the other metered/estimated water uses.
Deionized Water	30,000	4.1	Based on meter readings and assumed annual use (e.g., 167,000 gallons of water used between December 2007 and May 2013).
Total Water Use	**727,555**	**100.0**	**Metered total for FY 2012.**

Figure 2. Percentage of Water End Uses, Center Hill, FY 2012



Single-Pass Equipment Cooling

Single-pass water is used to cool a heat pump that provides dehumidification to Room 130. The water-cooled heat pump is a 3-ton, Carrier Model 50RHC036, which uses between 4.5 and 9.5 gpm for cooling purposes while operational. Center Hill should consider replacing the heat pump with an air-cooled model, potentially saving more than 500,000 gallons of water per year.

Sanitary Fixtures

Toilets and urinals have all been replaced or installed within the past 10 years. One urinal in the primary men's restroom was converted to a waterless urinal in 2007. The six toilets and one other urinal meet Energy Policy Act (EPAct) of 1992 water efficiency standards of 1.6 gpf and 1.0 gpf, respectively. A full inventory of sanitary fixtures is provided in Table 3. To conserve water, EPA should consider replacing the existing warehouse urinal with a 0.125 gpf WaterSense labeled model.

Table 3. Sanitary Fixture Inventory, Center Hill

Fixture	Quantity	Flow Rate
Toilet	6	1.6 gpf
Urinal	1	1.0 gpf
	1	Waterless
Lavatory Sink Faucet	3	2.2 gpm
	2	2.0 gpm
Showerhead	1	2.5 gpm
	1	1.6 gpm

Showerheads have all been replaced or installed within the past 10 years. During the primary men's lavatory renovation in 2007, a 1.6 gpm showerhead was installed. The one other showerhead, located in the warehouse, is rated at 2.5 gpm. To conserve water, the warehouse showerhead could be replaced with a 1.5 gpm WaterSense labeled model.

There are five lavatory sinks at Center Hill, two of which have 2.0 gpm faucets and three of which have 2.2 gpm faucets. The American Society of Mechanical Engineers (ASME) has established 0.5 gpm as the standard maximum flow rate for public-use (e.g., all non-residential applications) lavatory faucets (ASME A112.18.1). This flow rate is sufficient for hand-washing and is considered a best practice for lavatory sinks in public settings. To conserve water, all faucets could be retrofitted with flow controllers or aerators that limit the flow to 0.5 gpm.

System pressure is maintained between 20 to 80 pounds per square inch, within the range recommended for optimum system performance. Janitorial staff and employees are trained to report leaks or other maintenance problems, which are immediately corrected by the operations and maintenance contractor.

Laboratory Water Use

Center Hill is equipped with two steam sterilizers, as indicated in Table 4. The first sterilizer is an AMSCO 3021 model that is operated approximately once per week. Operating controls are in place so that tempering water only flows when the sterilizer is in use. The second sterilizer, manufactured by Consolidated Stills and Sterilizers, is currently out of service.

Center Hill also operates an AMSCO 470 glassware washer to clean laboratory materials when needed.

Table 4. Steam Sterilizer Inventory, Center Hill

Model	Operational?	Continuous Water Flow
AMSCO 3021	Yes	Only when needed
Consolidated Stills and Sterilizers	No	No

A small steam generator supplies the dishwasher, sterilizer, and steam distillation unit. Condensate from these units is not recovered.

Deionized Water

Center Hill has two deionized water supply systems. These systems provide deionized water for use within individual laboratories for bench scale experiments. Each system has a water meter that will be read weekly under this Water Management Plan.

Alternative Water Sources

No practical applications of alternate source water have been identified. Under this plan, primary attention will be focused on the efficiency improvements, as described above.

6.0 DROUGHT CONTINGENCY PLAN

The City of Cincinnati, Ohio, does not have a drought management plan. In the event of a drought or other water supply shortage, Center Hill will follow the water use recommendations and restrictions provided outlined under the State of Ohio Emergency Operations Plan Drought Incident Annex.[1] As required, the Laboratory Facility Manager in conjunction with the Director of the Facility Management Support Division will respond to any water use restrictions.

[1] The State of Ohio Emergency Operations Plan Drought Incident Annex can be found at: http://ema.ohio.gov/Documents/Ohio_EOP/drought_annex.pdf