

Water Management Plan

United States Environmental Protection Agency
Region 1
New England Regional Laboratory
Office of Environmental Measurement and Evaluation
11 Technology Drive
North Chelmsford, Massachusetts 01863



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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
NEW ENGLAND REGIONAL LABORATORY
OFFICE OF ENVIRONMENTAL MEASUREMENT AND EVALUATION**

WATER MANAGEMENT PLAN

Approved by:

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Date

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1.0 EPA'S STATEMENT OF PRINCIPLES ON EFFICIENT WATER USE

In order to meet the needs of existing and future populations and ensure that habitats and ecosystems are protected, the nation's water must be sustainable and renewable. Sound water resource management, which emphasizes careful, efficient use of water, is essential to achieve these objectives.

Efficient water use can have major environmental, public health, and economic benefits by helping to improve water quality, maintain aquatic ecosystems, and protect drinking water resources. As we face increasing risks to ecosystems and their biological integrity, the inextricable link between water quality and water quantity becomes more important. Water efficiency is one way of addressing water quality and quantity goals. The efficient use of water can also prevent pollution by reducing wastewater flows, recycling process water, reclaiming wastewater, and using less energy.

EPA recognizes that regional, state, and local differences exist regarding water quality, quantity, and use. Differences in climate, geography, and local requirements influence the water efficiency programs applicable to specific facilities. Therefore, EPA is establishing facility specific Water Management Plans to promote the efficient use of water and meet the water conservation requirements under Executive Order 13123, Greening the Government Through Efficient Energy Management.

This Water Management Plan has been established to document and promote the efficient use of water at the U.S. EPA Region 1 New England Regional Laboratory in North Chelmsford, Massachusetts. The plan is organized according to the Federal Energy Management Program (FEMP) Facility Water Management Planning Guidelines under Executive Order 13123.

2.0 FACILITY DESCRIPTION

The New England Regional Laboratory (NERL) opened September 17, 2001. Situated on 11.97 acres at 11 Technology Drive, North Chelmsford, Massachusetts, the 68,000 square-foot laboratory is a showcase for environmental and energy-efficient technologies. The laboratory includes state-of-the-art systems for lighting, heating, cooling, plumbing, and waste handling.

The laboratory building is divided into two halves, an office wing and a laboratory wing. In the laboratory wing, the interior includes four laboratory sections, divided by interstitial utility chases and hallways. All systems have been designed to expand as the use of the building expands, and to be recycled if the building is ever decommissioned. The building is leased by the U.S. General Services Administration (GSA) from IStar, and is assigned to EPA by GSA. The building lease runs through 2021. EPA is responsible for all water, sewer, and other utility bills.

The Office of Environmental Measurement and Evaluation (OEME) manages NERL and provides chemical and laboratory analysis of environmental samples, environmental monitoring, quality assurance management, and response to environmental incidents within Region 1.

3.0 FACILITY WATER MANAGEMENT GOALS

The water management goals of NERL are achieved through the implementation of the NERL Environmental Management System (EMS). The EMS has been established and is implemented consistent with NERL environmental management policy. The NERL environmental management policy statement and resource conservation goals are provided in the following sections.

Environmental Management Policy

It is NERL policy to integrate environmental stewardship into all facets of our operations. We will manage our organizations and our programs in a manner that protects the environment, the safety of our employees, and public health.

In support of this policy, the managers and staff of NERL commit to:

- Comply fully with the letter and spirit of all applicable Federal, State, and local environmental laws and regulations.
- Work continuously to improve the effectiveness of our environmental management.
- Seek to prevent pollution before it is produced, reduce the amount of waste at our facility, re-use and recycle whenever possible, and support pollution prevention by our customers and suppliers.
- Provide appropriate environmental training and educate employees to be environmentally responsible on the job.
- Work to continuously improve our environmental performance by establishing and periodically reviewing our environmental performance goals, and monitor our environmental performance regularly through rigorous evaluations.
- Consider environmental factors and the full acquisition, use and disposal costs when making planning, purchasing, and operating decisions.
- Maintain and improve the grounds of NERL in an environmentally sensitive manner.
- Use energy efficiently throughout our operations, and support the efficient use of gas and electricity in our facility.
- Share information on our Environmental Policy and performance with the public and work cooperatively with the local community and other stakeholders to further common environmental objectives.
- Communicate and reinforce this policy throughout our organization

- Revisit the Policy and Environmental Management System yearly to make any necessary revisions due to operation changes or environmental improvements

Resource Conservation Goals

Conservation of water and other natural resources will be promoted through the implementation of the Standard Operating Procedure for General Energy and Natural Resource Use Reduction. The following sections provide the responsibilities, training requirements, and procedures that will be implemented under this protocol.

Responsibility

Management. Management's responsibility is to maintain communications with staff, contractors, and the building owner which supports and nurtures an environment of conservation and resource reduction. Management will reinforce continuation of the process initiated during design and construction to acquire efficient laboratory and facilities equipment that will minimize energy and resource consumption.

Facilities Manager. It will be the Facilities Manager's responsibility to record energy and resource use and champion energy and resource reduction by overseeing laboratory and facilities acquisitions. The Facilities Manager will seek regional and national funding for conservation projects.

Staff. It is the staff's responsibility to participate in the day to day conservation and reduction of natural resource use by turning off lights not needed, closing fumehoods when not in use, and when responsible for preparing procurement documents choosing equipment that will increase energy saving and reduce natural resource use.

Green Committee. OEME has a "Green Committee" which is actively involved with day to day issues related to conservation and resource reduction. The committee will be active in the awareness and education process. The committee will make recommendations for improving laboratory and facilities system efficiencies, which will include life cycle costing evaluation of committee and staff recommendations.

Training

At least annually, management will meet with staff to reinforce conservation and energy reduction policies. This process and communication should promote and provide an open forum for discussion of projects that will enhance the goal of conservation.

Procedure

OEME will require the building owner to replace and repair parts to the building systems with equipment at the present level of efficiency or greater. Laboratory instruments and equipment will be evaluated for efficiency. Acquisitions will be evaluated as applicable using life cost cycling and energy ratings. Water cooled equipment will include recirculating cooling systems or use the present house chiller to reduce water consumption. Staff awareness will be increased using signs and written and oral communications.

4.0 UTILITY INFORMATION

Contact Information

Potable water is provided by:

North Chelmsford Water District
P.O. Box 655
North Chelmsford, MA 01863-0635

(978) 251-3931

Sewer Service is provided by:

Town of Chelmsford
Department of Public Works
Sewer Division
50 Billerica Road
Chelmsford, MA 01824

(978) 250-5233

Rate Schedule

The water billing rate is \$2.00 per 1000 gallons, plus \$90 per quarter as a special assessment for the new water tower.

The fire sprinkler connection fee is \$295 per quarter.

The sewer use fee is \$2.30 per 1000 gallons.

Payment Office

Gerald Billings
Mail Code 2734-R
U.S. EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460

(202) 564-4841

On-site Water Supply

Water for specialized laboratory investigations and spot watering of distressed landscape plantings is supplied by an on-site well. The well provides less than 1% of the facility water supply (2,703 gallons between September 2001 and August 2002).

5.0 FACILITY INFORMATION

NERL practices an aggressive degree of water conservation, achieved through innovative facility and process design and through application of sound management systems, work practices, and operation and maintenance procedures. Low-flow sanitary plumbing fixtures with automatic flush valves and shutoffs are used throughout the facility. Xeriscaping is used on all of the facility grounds, eliminating the need for irrigation water. Laboratory processes have evolved to be primarily dry and do not consume significant quantities of water.

Major Water Using Processes

The Laboratory has occupied the current facility since September 2001 and maintains monthly total water use records. Estimates of water consumption by major area between September 2001 and August 2002 are provided in Table 1.

Table 1
Major Water Using Processes

Major Process	Annual Consumption (gallons)	Percent of Total	Comments
Cooling tower make-up	1,050,000	72.4	Engineering estimate
Laboratory processes, including reverse osmosis, and other uses	200,000	13.8	Engineering estimate
Sanitary	200,000	13.8	Engineering estimate
TOTAL	1,450,000	100.0	Metered

Because the majority of total water use is for cooling tower consumption, water use varies seasonally. A chart showing this water use trend between September 2001 and August 2002 is provided in Appendix A.

Measurement Devices

Incoming city water supply is metered through a combination low flow/ high flow metering device. The total flow is a combination of both meter readings, which are recorded at least monthly. On-site well water supply is metered; total flow is recorded at least monthly. The cooling tower make-up supply line, reverse osmosis (RO) unit production line, and RO reject water line are equipped with totalizing flow meters. While historical data for these meters are not available, total flow on these meters will be recorded at least monthly under this plan. The discharge line for the pH neutralization system (laboratory acid sewer) is equipped with a flow meter; meter readings are recorded daily in the treatment system log book.

Flow data from all meters will be recorded at least monthly and water use trends will be monitored on an ongoing basis. Unexpected changes in water use will be investigated and resolved.

Shut-off Valves

The main city water shut-off value (Tag DCW 97) is located in the mechanical room, Room 148.

Three valves that control well water shut-off (Tags WW 1, WW 2 and WW 3) are located in the shipping and receiving room, Room 214.

Occupancy and Operating Schedules

Approximately 82 employees work at NERL. The NERL operates on a flex time schedule, and is typically occupied between 6:00 a.m. and 6:00 p.m., Monday through Friday.

6.0 BEST MANAGEMENT PRACTICE SUMMARY AND STATUS

The Federal Energy Management Program (FEMP) has identified Water Efficiency Improvement Best Management Practices (BMPs) in ten possible areas. Implementation of BMPs in four or more areas are required under FEMP guidance. NERL has adopted and will maintain BMPs in seven of the ten areas:

- ✓ Public Information and Education Programs
- ✓ Distribution System Audits, Leak Detection and Repair
- ✓ Water Efficient Landscape
- ✓ Toilets and Urinals
- ✓ Faucets and Showerheads
- Boiler/Steam Systems
- ✓ Single-Pass Cooling Systems
- Cooling Tower Systems
- Miscellaneous High Water-Using Processes
- ✓ Water Reuse and Recycling

Public Information and Education Programs (BMP #1)

Water conservation is a stated goal in NERL's Standard Operating Procedure for General Energy and Natural Resource Use Reduction. The on-site owner's representative has been trained in water conservation practices. EPA staff awareness of water conservation is maintained through monthly staff meetings, and a "Green Committee" of employees is actively involved in day-to-day conservation issues. Public awareness is maintained by regularly opening the facility to public tours and producing bulletins and posters highlighting water and energy conservation achievements. Conservation techniques and practices of the laboratory have been featured in EPA newsletters and the public media and recognized in several awards the facility has received.

Distribution System Audits, Leak Detection and Repair (BMP #2)

All facility water consumption is accounted for. Water supply piping to laboratory spaces is on overhead racks in service corridors. Any leaks are immediately reported to the facilities manager and on-site owner's representative and corrected.

Water Efficient Landscape (BMP #3)

Xeriscaping is used throughout the facility grounds. The xeriscaping design relies on native plant species, including islands of trees and shrubs, surrounded by open areas planted with grasses and wildflowers. A minimal amount of well water produced on-site is used to water new plantings by hose during drought conditions while they get established. An in-ground irrigation system was installed during facility construction, but is not used.

Toilets and Urinals (BMP #4)

Low-flow fixtures with automatic flush valves are used throughout the facility. Janitorial staff and employees are trained to report leaks or other maintenance problems, which are immediately corrected. Two waterless urinals will be installed in the main men's restroom in the near future. An inventory of sanitary fixtures is provided in Table 2.

Table 2
NERL Sanitary Fixture Inventory

Fixture	Quantity	Flow Rate
Toilets	13	1.6 gpf
Urinals	4	1 gpf
Lavatory Sinks	14	1.8 gpm
Showers	8	2.5 gpm

Faucets and Showerheads (BMP #5)

Low-flow fixtures are used throughout the facility. Faucets in lavatories are equipped with automatic sensors to control flow. Janitorial staff and employees are trained to report leaks or other maintenance problems, which are immediately corrected. An inventory of sanitary fixtures is provided in Table 2.

Boiler/Steam Systems

Boilers produce recirculating hot water, rather than steam. No steam condensate is generated.

Single Pass Cooling Equipment (BMP #6)

No single pass cooling is used. All cooling needs are supplied by a central recirculating chilled water loop, or individual chillers for specific laboratory applications.

Cooling Tower Systems

Cooling tower make-up water is the largest use of water at the laboratory, estimated to account for over 70% of the water consumption between September 2001 and August 2002. The make-up water is needed to replenish water lost to evaporation, and to replace water blown down from the cooling loop to control dissolved solids and associated scale buildup. The cooling tower system is still being optimized, and a service agreement with a cooling tower maintenance contractor was established in late August 2002. NERL will continue to work toward establishing BMPs in this important area.

Miscellaneous High Water-Using Processes

Over years of operation at the previous location, NERL scientists have developed many “dry” laboratory procedures and conservation techniques. The current laboratory processes do not use significant quantities of water.

Water Reuse and Recycling (BMP # 7)

Storm water from a portion of the roof drains is used to recharge a wetland located on the property.

7.0 DROUGHT CONTINGENCY PLAN

OEME will follow the water use recommendations of the Massachusetts Department of Environmental Management Office of Water Resources, which coordinates the drought response within Massachusetts.

As a matter of general operating practice, OEME already follows most of the water conservation approaches that are recommended or could be required under drought conditions. Water is not used for irrigation, decorative fountains, maintenance of paved surfaces, or washing of mobile equipment.

In the event that voluntary or mandatory water consumption reductions are instituted by Massachusetts Department of Environmental Management or the North Chelmsford Water District, these requirements will be communicated by the Water District to the building owner. In turn, the owner's representative will communicate the requirements to the OEME Facilities Manager. OEME will then form a task force of facility and operating personnel to identify and implement modifications to facility operations to achieve additional specified reductions in water consumption.

If needed, additional general information on drought conditions in Massachusetts can be found at the following drought information web page:

<http://www.state.ma.us/dem/programs/rainfall/drought.htm>

NERL is located in the Northeast Drought Region.

8.0 COMPREHENSIVE PLANNING

The Facilities Manager will ensure that water efficiency BMPs are taken into account during the initial stages of planning and design for any facility renovations or new construction. Water efficiency BMPs will also be considered prior to the purchase and installation of any equipment that would measurably change facility water consumption.

The following protocol and methodology will be followed to manage water efficiency:

- 1) The building owner will include specifications or requirements to supply highly efficient equipment or systems during the planning and design phase for renovations, repairs, or new construction.
- 2) When planning facility modifications, the building owner will allow the Facilities Manager to review and comment on equipment being installed prior to acceptance of a final bid. (Prior review by the Facilities Manager is not a requirement of emergency repairs. However, equipment acquired for emergency repairs should be evaluated for water efficiency by the building owner and the most efficient equipment available should be used).
- 3) Any modification that impacts the xeriscape design of the facility grounds will be accomplished without significant impact on water use or reduction in conservation. The building owner will allow the Facilities Manager to review proposals, make recommendations, and concur on modifications that would impact water conservation goals.
- 4) Equipment purchased by EPA will be reviewed for water efficiency by the Facilities Manager prior to purchasing.

9.0

OPPORTUNITIES FOR FURTHER WATER CONSERVATION

NERL is pursuing two projects to achieve additional reductions in water use.

1) Cooling Tower Blow Down Flow Meter. Working with the building owner, EPA will arrange for the installation and routine monitoring of a flow meter on the cooling tower blow down discharge line. Data obtained from this meter, combined with data from the existing meter on the make-up water line, will provide a more accurate accounting of the flow balance around the cooling tower, and ultimately better cooling tower control.

2) Cooling Tower Water Conservation. Working with the building owner, EPA will request that the cooling tower maintenance contractor provide blow down control and chemical water treatment to achieve the minimum practical level of cooling tower blow down. Changes to the chemical treatment and blow down control system recommended by the maintenance contractor that offer cost effective system improvement and greater water use efficiency will be implemented.

APPENDIX A
MONTHLY WATER USE DATA

EPA New England Regional Laboratory Environmental Performance Indicators

Water Use

Unit: Gallon

	Sep-01	Oct-01	Nov-01	Dec-01	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02
High	45,115	62,970	8,380	6,090	3,490	2,340	3,730	54,140	49,290	66,840	151,690	169,470
Low	43,960	72,033	29,107	19,177	28,384	27,117	37,389	76,299	86,831	83,061	154,082	162,944
Well	Offline	Offline	45	42	205	24	271	760	231	76	325	724
Total	89,075	135,003	37,532	25,309	32,079	29,481	41,390	131,199	136,352	149,977	306,097	333,138

* Sep-01: Sep.18 - Sep. 30,
2001

* High: City Water Meter (High) * Low: City Water Meter (Low) * Well: Well Water Meter

	Sep-01	Oct-01	Nov-01	Dec-01	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02
Gallon	89,075	135,003	37,532	25,309	32,079	29,481	41,390	131,199	136,352	149,977	306,097	333,138

