



Putting WaterSense® to Work

# Laboratory Eliminates Single-Pass Cooling

*Sector: Laboratories; Focus: Mechanical Systems*

## Project Summary

The U.S. Environmental Protection Agency's (EPA's) Mid-Continent Ecology Division Laboratory (MED) is located in Duluth, Minnesota. MED consists of 10 buildings with 88,577 gross square feet of conditioned space. The laboratory houses both biology and chemistry laboratories and a large aquatic culture unit. Significant features include 50 laboratory rooms, seven constant temperature rooms, administrative offices, and a library. MED has used water from Lake Superior to support its ecotoxicology research since the laboratory opened in 1970.

Since 1993, MED has been implementing a comprehensive program to reduce potable water use. In the late 1980s and early 1990s, MED was using up to 10 million gallons of potable water per year, mostly for single-pass cooling of the building or research equipment. Taking advantage of its proximity to Lake Superior, MED made a concentrated effort to eliminate all uses of potable water for non-contact, single-pass cooling and replace it with lake water. As a result, MED was able to reduce its total potable water consumption by 90 percent. Instead of sending the lake water to the sanitary sewer, however, once the water is used, it is sent directly back to Lake Superior. Since the cooling water doesn't come in contact with any sources of contamination, it can be returned in the same quantity and quality as before without any needed treatment.

In addition, from a 2009 water assessment at MED (see the discussion in Section A.2: Federal Agency Implements Comprehensive Water Management Strategy), EPA noted that a significant amount of potable water was still used to supply single-pass cooling of an ice machine. At a flow rate of 0.54 gallons per minute (gpm), MED was discharging approximately 283,000 gallons of water per year to the sewer just to cool the ice machine. As a result of the assessment, MED recalibrated the cooling water control valve to only allow water to flow when needed for cooling. Ultimately, MED decided to eliminate this single-pass cooling water use by replacing the ice machine with an ENERGY STAR® qualified, air-cooled model. This replacement allowed MED to completely eliminate the use of potable water for single-pass cooling at the facility, and even further reduce its overall potable water consumption.

## Case Study Highlights

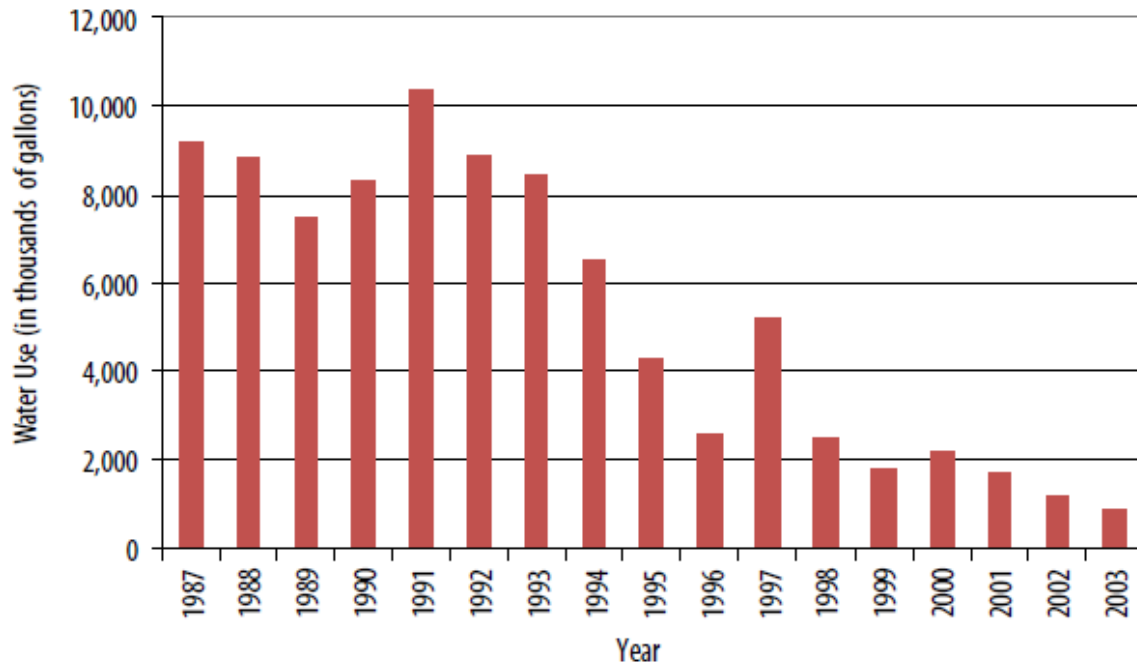


- **Facility name:** EPA's Mid-Continent Ecology Division Laboratory
- **Location:** Duluth, Minnesota
- **Number of occupants:** 175
- **Building size:** 88,577 gross square feet
- **Water savings:** Reduced potable water use by 90 percent, or approximately 7.5 million gallons per year, in addition to saving 283,000 gallons of water per year from replacement of water-cooled ice machines
- **Cost savings:** Approximately \$75,000 per year in water and sewer costs from replacing single-pass cooling, and \$2,800 in water and sewer costs per year from replacing the ice machine

## Savings Summary

By shifting to using lake water for non-contact, single-pass cooling, MED was able to reduce its potable water use by 90 percent between 1993 and 2003, which resulted in a water savings of approximately 7.5 million gallons per year or 55.4 million gallons in total, as illustrated in Figure 1.

Figure 1. MED Potable Water Use, 1987 to 2003



Reducing potable water use saved MED both water supply and sewer costs, since the lake water used for non-contact, single-pass cooling was sent back to Lake Superior instead of the sanitary sewer. This results in savings of approximately \$75,000 in water and sewer costs per year.

In 2009, MED spent approximately \$3,500 to replace the water-cooled ice machine with the ENERGY STAR qualified, air-cooled model. In addition to saving an estimated 283,000 gallons of water per year, MED saved \$2,800 per year in water and sewer bills and realized a payback period of less than two years from this installation.

Overall, MED has reduced its potable water use from approximately 9 million gallons per year in the early 1990s to only 884,000 gallons in 2010. In 2011, MED initiated plans to install WaterSense® labeled flushing urinals and dual-flush toilets to further reduce its potable water use. The facility's commitment to water savings has helped EPA to meet its Agencywide water reduction goals.

## Acknowledgements

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